

# THE AYURVEDIC PHARMACOPOEIA OF INDIA

## PART- I VOLUME – I



**GOVERNMENT OF INDIA**  
**MINISTRY OF HEALTH AND FAMILY WELFARE**  
**DEPARTMENT OF AYUSH**

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## **LEGAL NOTICES**

In India there are laws dealing with drugs that are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by these laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of the law are being complied with.

In general, the Drugs & Cosmetics Act, 1940 (subsequently amended in 1964 and 1982), the Dangerous Drugs Act, 1930 and the Poisons Act, 1919 and the rules framed thereunder should be consulted.

Under the Drugs & Cosmetics Act, the Ayurvedic Pharmacopoeia of India (A.P.I.), Part-I, Vol. I, is the book of standards for single drugs included therein and the standards prescribed in the Ayurvedic Pharmacopoeia of India, Part-I, Vol. I would be official. If considered necessary these standards can be amended and the Chairman of the Ayurvedic Pharmacopoeia Committee authorised to issue such amendments. Whenever such amendments are issued the Ayurvedic Pharmacopoeia of India, Part-I, Vol. I, would be deemed to have been amended accordingly.

## GENERAL NOTICES

**Title** - The title of the book is "Ayurvedic Pharmacopoeia of

**Name of the Drugs** - The name given on the top of each monograph of the drug is in Sanskrit as mentioned in the Ayurvedic classics and/or in the Ayurvedic Formulary of India, Part-I and Part-II will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

**Introductory Para** - Each monograph begins with an introductory paragraph indicating the part, scientific name of the drug in Latin with short description about its habit, distribution and method of collection, if any.

**Synonyms** - Synonyms of each drug appearing in each monograph in Sanskrit, English, Hindi, Urdu and other Indian regional languages have been mentioned as found in the classical texts, Ayurvedic Formulary of India, Part-I and Part-II as procured from the experts, scholars of Ayurveda and officials in the field from different states.

**Italics** - Italic type has been used for scientific name of the drug appearing in the introductory paragraph of each monograph as also for chemicals and reagents, substances or processes described in Appendix.

**Odour and Taste** - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description, as large numbers of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour.

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case if poisonous drugs, indicated in monograph.

**Mesh Number** - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

**Weights and Measures** - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gramme (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube, which delivers in 20 drops 1 gram of distilled water at 15°C.

Metric measures are required by the Pharmacopoeia to be graduated at 20°C and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

**Identity, Purity and Strength** - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects, pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive, water-soluble extractive, ether-soluble extractive, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method, which he uses, will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

**Limits for Heavy Metals** – All Ayurvedic Drugs (Single/Compound formulation) must comply with the limits for Heavy Metals prescribed in individual Monograph and wherever limit is not given then they must comply with the limits given in WHO publication "Quality Control Methods for Medicinal Plants and Material".

**Standards** - For statutory purpose, statements appearing in the API, Part-I, Vol. V, under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

**Thin Layer Chromatography (T.L.C.)** - Under this head, wherever given, the number of spots and R<sub>f</sub> values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

**Quantities to be weighed for Assays and Tests** - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

**Constant Weight** - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

**Constituents** - Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

**Percentage of Solutions** - In defining standards, the expression per cent (%), is used, according to circumstances, with one of the four meanings given below.

Per cent w/w (percentage weight in weight) expresses the number of grammes of active substance, in 100 grammes of product.

Per cent w/v (Percentage weight in volume) expresses the number of grammes of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent v/w (percentage volume in weight) expresses the number of millilitres of active substance in 100 grammes of product.

**Percentage of alcohol** - All statements of percentage of alcohol (C<sub>2</sub>H<sub>5</sub>OH) refer to percentage by volume at 15.56 °C.

**Temperature** - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

**Solutions** - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

**Reagents and Solutions** - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

**Solubility** - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities, which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that 1 gramme of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

<b>Descriptive terms</b>	<b>Relative quantities of solvent</b>
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1000 parts
Very slightly soluble	From 1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

**Therapeutic uses and important formulations** – Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognised Ayurvedic classics and in the Ayurvedic Formulary of India, Part –I and Part-II.

**Doses** – The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in **Ayurvedic** texts. A conversion table is appended giving classical weights of **Ayurvedic** System of Medicine with their metric equivalents. Doses mentioned in the **Ayurvedic** Pharmacopoeia of India (**A.P.I.**) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

The abbreviations commonly employed are as follows:

<b>Abbreviations of technical terms</b>	
m	Metre
l	Litre
mm	Millimetre
cm	Centimetre
μ	Micron (0.001 mm)
kg	Kilogram
g	Gramme
mg	Milligram
ml	Millilitre
in	Normal solution
0.5 N	Half-normal solution
0.1 N	Decinormal solution
1M	Molar solution
Fam.	Family
PS	Primary Standards
TS	Transverse Section

### Abbreviations used for Languages

Sansk.	Sanskrit
Assam.	Assamese
Beng.	Bengali
Eng.	English
Guj.	Gujrati
Kan.	Kannada
Kash.	Kashmiri
Mal.	Malayalam
Mar.	Marathi
Ori.	Oriya
Punj.	Punjabi
Tam.	Tamil
Tel.	Telugu

### ABBREVIATIONS FOR PARTS OF PLANTS

Cotyledon	Cotldn.
Flower	Fl.
Fruit	Fr.
Heart Wood	Ht. Wd.
Leaf	Lf.
Pseudo-bulb	Pseudo-bulb
Root Bark	Rt. Bk.
Root	Rt.
Rhizome	Rz.
Seed	Sd.
Stem Bark	St. Bk.
Stem	St.
Tuberous Root	Tub. Rt.
Wood	Wd.
Whole Plant	Wh. Pl.



## AJAGANDHĀ (Seed)

Ajagandhā consists of the seeds of *Cleome gynandra* Linn. Syn. *Gynandropsis gynandra* (Linn.) Briquet (Fam. Capparidaceae); a strong smelling, somewhat foetid herb, 0.6 - 1 m high, found abundantly throughout warmer parts of India.

### SYNONYMS

Sanskrit	:	Paśugandhā
Assamese	:	Bhutmulla
Bengali	:	Hurhuria, Shulte
English	:	Dog Mustard
Gujrati	:	Talvani, Dhelitalavan
Hindi	:	Hulhul, Hurhur, Kavalia
Kannada	:	Naram bele Soppu, Nayeetulasi
Kashmiri	:	Gandi Buti
Malayalam	:	Atunari vela
Marathi	:	Tilvan, Bhatvan, Mabli, Tilavana, Tilvant
Oriya	:	Anasoria, Anasoria
Punjabi	:	Bugra
Tamil	:	Nal valai, Nal velai
Telugu	:	Vaminta, Vayinta
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seeds, small, 1-2 mm in diameter, kidney shaped, surface rough, dark brown or black.

#### b) Microscopic

Dark brown, oily; under microscope shows a number of fragments of epidermis of

testa consisting of thin-walled, polygonal cells; groups of cells, resembling like stone cells, reddish-brown with non-lignified walls; a large number of oval, rounded or irregularly shaped protein bodies; starch and crystals absent.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 16 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 7 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Fixed oil, essential oil and oleoresin

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu
<b>Guna</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Hṛdya, Dīpana, Vātahara, Pittala, Śūlaghnī

**IMPORTANT FORMULATIONS** - Nārāyaṇa Cūrṇa

**THERAPEUTIC USES** - Gulma, Aṣṭhīlā, Kṛmiroga, Kaṇḍū, Karṇaroga

**DOSE** - 1-3 g of the drug in powder form.

## AJAMODĀ (Fruit)

Ajamodā consists of dried, aromatic fruits of *Apium leptophyllum* (Pers.) F. V. M. ex Benth. (Fam. Umbelliferae); an annual herb cultivated in Andhra Pradesh, Gujarat, Madhya Pradesh and Karnataka; collected by thrashing plants on a mat and dried in shade or in drying sheds.

### SYNONYMS

Sanskrit	:	Dīpyaka
Assamese	:	Bonjamani, Bonajain, Yamani, Ajowan
Bengali	:	Randhuni, Banyamani
English	:	--
Gujrati	:	Bodi Ajamo, Ajamo
Hindi	:	Ajmuda, Ajmod
Kannada	:	Oma, Ajavana, Omakki
Kashmiri	:	Fakhazur, Banjuan
Malayalam	:	Ayamodakum, Oman
Marathi	:	Ajmoda, Oova
Oriya	:	Banajuani
Punjabi	:	Valjawain, Ajmod
Tamil	:	Omam
Telugu	:	Naranji vamu
Urdu	:	Ajmod

### DESCRIPTION

#### a) Macroscopic

Drug consists of small, ovoid fruit; bulk colour yellowish brown, mainly occur as entire cremocarps with pedicel attached or detached and bifid stylopod, free ends curved sometimes occurs as separate mericarps; cremocarps glabrous, ovoid to conical, about 1.5-3.0 mm long and 1.2-2.8 mm wide, yellow to yellowish green; separated mericarps broadly ovoid, more or less curved, dorsal surface convex with five equally distinct, longitudinal primary ridges; at the summit curved stylopodiurn, commissural surface flat, showing darker and light coloured longitudinal bands, former representing the position of vittae and vascular bundles ; odour; aromatic; taste, slightly bitter giving a

sensation of warmth to tongue.

### **b) Microscopic**

Transverse section of fruit shows mericarps with four large vittae on dorsal surface, two on commissural surface and four primary ridges on dorsal surface; 3-5 secondary oil canals present under each primary ridge and also between ridges; carpophore present on commissural surface; epicarp cells with thin striated cuticle, outer walls drawn into papillae; stomata, anomocytic type upto 35  $\mu$  in diameter; mesocarp consists of polygonal paranchyma, with thickened and lignified cells, measuring 30-62-95 $\mu$ . in diameter with oval to round pits; collateral vascular bundles lie beneath epicarp; tracheids 25-203-388  $\mu$  in length with spiral, scalariform or reticulate thickenings; xylem parenchyma lignified, elongated with elliptical pits, measuring 52-118-176 by 13-30-44  $\mu$  large secondary vittae towards endosperm measure upto 123 $\mu$  in width and towards periphery the smallest vittae measuring 184 $\mu$  in diameter.

**Powder**-Shows moderately thick-walled cell of epicarp exhibiting characteristic striations and occasional presence of stoma, fragments of trichomes and glandular hairs, reticulate parenchymatous cells of mesocarp, fragments of yellowish-brown vittae; fragments of endosperm thick-walled polygonal cells containing aleurone grain and micro rosette crystals of calcium oxalate.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter (Including fStalk)	Not more than	5	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.
Volatile oil	Not less than	2	per cent v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oil and fixed oil

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vidāhī, Kaphavātajit, Dīpana, Rucikṛt, Kṛmijit, Śūlaghna

**IMPORTANT FORMULATIONS** - Ajamodārka, Ajamodādi Cūrṇa

**THERAPEUTIC USES** - Aruci, Ādhmāna, Gulma, Hikkā, Chardi, Kṛmiroga, Śūla

**DOSE** - 1-3 g of the drug in powder form.

Note: *Trachyspermum roxburghianum* (DC) Sprague Syn. *Carum roxburghianum* Benth. Hook.f. is the common market substitute

## **ĀMALAKĪ (Fresh Fruit pulp)**

Āmalakī consists of fresh fruit pulp of *Emblīca officinalis* Gaertn. (Fam. Euphorbiaceae); a small or medium sized tree, found in mixed deciduous forests, ascending to 1300 m on hills and cultivated in gardens and homeyards.

### **SYNONYMS**

Sanskrit	:	Āmalaka, Amṛtaphala, Dhātrīphala
Assamese	:	Amlaku, Amlakhi, Amlakhu
Bengali	:	Amla, Dhatri
English	:	Emblic Myrobalan
Gujrati	:	Ambala, Amala
Hindi	:	Amla, Aonla
Kannada	:	Nellikayi
Kashmiri	:	Embali, Amlī
Malayalam	:	Nellikka
Marathi	:	Anvala, Awalkathi
Oriya	:	Anala, Ainla
Punjabi	:	Aula, Amla
Tamil	:	Nellikai, Nelli
Telugu	:	Usirika
Urdu	:	Amla, Amlaj

### **DESCRIPTION**

#### **a) Macroscopic**

Fruit, globose, 2.5-3.5 cm in diameter, fleshy, smooth with six prominent lines; greenish when tender, changing to light yellowish or pinkish colour when mature, with a few dark specks: taste, sour and astringent followed by delicately sweet taste.

#### **b) Microscopic**

Transverse section of mature fruit shows an epicarp consisting of single layer of epidermis and 2-4 layers of hypodermis; epidermal cell, tabular in shape, covered externally with a thick cuticle and appear in surface view as polygonal; hypodermal cells tangentially elongated, thick-walled, smaller in dimension than epidermal cells; mesocarp forms bulk of fruit, consisting of thin-walled parenchymatous cells with intercellular spaces, peripheral 6-9 layers smaller, ovoid or tangentially elongated while rest of cells larger in size, isodiametric and radially elongated; several collateral fibrovascular bundles scattered throughout mesocarp consisting of xylem and phloem; xylem composed of tracheal elements, fibre tracheids and xylem fibres; tracheal elements show reticulate scalariform and spiral thickenings; xylem fibres elongated with narrow lumen and pointed end; mesocarp contains large aggregates of numerous irregular silica crystals.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive (On dried basis)	Not less than 40 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 50 per cent, Appendix	2.2.7.
Moisture content	Not less than 80 per cent, Appendix	2.2.9

### CONSTITUENTS - Ascorbic acid and tannins

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Amla, Kaṣāya, Madhura, Tikta, Kaṭu
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Tridoṣajit, Vṛṣya, Rasāyana, Cakṣuṣya

### IMPORTANT FORMULATIONS - Cyavanaprāśa

**THERAPEUTIC USES** - Raktapitta, Amlapitta, Prameha, Dāha

**DOSE** - 10-20 g of the drug

5-10 ml of fresh juice

## **ĀMALAKĪ (Dried fruit)**

Āmalakī consists of pericarp of dried mature fruits of *Emblica officinalis* Gaertn. Syn. *Phyllanthus emblica* Linn. (Fam. Euphorbiaceae); mostly collected in winter season after ripening and in Kashmir in summer, a small or medium sized tree, found both in natural state in mixed deciduous forests of the country ascending to 1300 m on hills; cultivated in gardens, homeyards or grown as a road side tree.

### **SYNONYMS**

Sanskrit	:	Amṛtaphala, Āmalaka, Dhātrīphala
Assamese	:	Amlakhi, Amlakhu, Amlaku
Bengali	:	Amla, Dhatri
English	:	Emblic Myrobalan
Gujrati	:	Ambala, Amala
Hindi	:	Amla, Aonla
Kannada	:	Nellikayi, Bela nelli, Pottadenollikayi
Kashmiri	:	Amlī, Embali
Malayalam	:	Nellikka
Marathi	:	Anvala, Avalkathi
Oriya	:	Ainla, Anala
Punjabi	:	Aula, Amla
Tamil	:	Nellikikai, Nelli
Telugu	:	Usirika
Urdu	:	Amla, Amlaj

### **DESCRIPTION**

#### **a) Macroscopic**

Drug consists of curled pieces of pericarp of dried fruit occurring either as separated single segment; 1-2 cm long or united as 3 or 4 segments; bulk colour grey to black, pieces showing, a broad, highly shrivelled and wrinkled external convex surface to somewhat concave, transversely wrinkled lateral surface, external surface shows a few whitish specks, occasionally some pieces show a portion of stony testa (which should be removed before processing); texture rough, cartilaginous, tough; taste, sour

and astringent.

### **b) Microscopic**

Transverse section of fruit shows epicarp consisting of a single layered epidermis, cell appearing tabular and poygonal in surface view; cuticle present; mesocarp cells tangentially elongated parenchymatous and crushed, differentiated roughly into peripheral 8 or 9 layers of tangentially elongated smaller cells, rest consisting of mostly isodiametric larger cells with walls showing irregular thickenings; ramified vascular elements occasionally present; stone cells present either isolated or in small groups towards endocarp ; pitted vascular fibres, walls appearing serrated due to the pit canals, leading into lumen.

**Powder:** Fine powder shows epidermis with uniformly thickened straight walled, isodiametric parenchyma cells with irregular thickened walls, occasionally short fibres and tracheids.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter (Including seed and seed coat)      Not more than 3 per cent, Appendix  
2.2.2.

Total Ash	Not more than 7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 40 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 50 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Ascorbic acid and gallotannins

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Amla, Kaṣāya, Madhura, Tikta, Kaṭu
<b>Guna</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura

**Karma** : Tridoṣajit, Vṛṣya, Rasāyana, Cakṣuṣya

**IMPORTANT FORMULATIONS** - Cyavanaprāśa, Dhātrī Lauha, Dhātryādi Ghṛta, Triphalā Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Amlapitta, Prameha, Dāha

**DOSE** - 3-6 g of the drug in powder form

## ĀRAGVADHA (Fruit pulp)

Āragvadha consists of pulp obtained from fruits (devoid of seeds, septa and pieces of pericarp) of *Cassia fistula* Linn. (Fam. Leguminosae), a moderate sized deciduous tree, common throughout India as wild or cultivated plant, fruits collected when ripe.

### SYNONYMS

Sanskrit	:	Kṛtamāla, Vyādhighāta, Śampāka, Nṛpadruma
Assamese	:	Sonaroo
Bengali	:	Sondala
English	:	Indian Laburnum, Purging cassia
Gujrati	:	Garamala, Garamalo
Hindi	:	Amaltas
Kannada	:	Aragvadha, Kakke, Kakke-gida, Kakkemara, Kakkedai, Rajataru
Kashmiri	:	Kriyantal Phali
Malayalam	:	Konna, Kritamalam
Marathi	:	Bahava, Garamala, Amaltas
Oriya	:	Sunari
Punjabi	:	Amaltas
Tamil	:	Sarakonrai, Sarakkonnai, Sarakkondi, Sharakkonrai
Telugu	:	Rela
Urdu	:	Khiyar Shambar

### DESCRIPTION

#### a) Macroscopic

Fruit, a many celled, indehiscent pod, 35-60 cm long and 18-25 mm diameter, nearly straight and subcylindrical, chocolate-brown to almost black in colour, pod surface smooth to naked eye, but under lens showing minute transverse fissures, both dorsal and ventral sutures evident, but not prominent, short stalk attached to base of fruit and rounded distal end mucronate, pericarp thin, hard and woody, fruit initially divided by transverse septa about 5 mm, apart, each containing a single seed attached to ventral suture by a long dark, thread-like funicle about 8-12 by 6-8 mm, circular to oval, flattened, reddish-brown, smooth, extremely hard and with a distinct dark brown line extending from micropyle to base, seed initially embedded in a black viscid pulp

consisting of black, thin, shining, circular disc like masses having central depression of seed on both surfaces or as broken pieces adhered with each other, when dipped in water makes yellow solution which darkness to brownish-yellow to dark brown, on keeping, pulp fills the cell but shrinks on drying and adheres to both sides of testa, seeds often lye loose in their segments, odour faint, sickly, taste, sweet.

#### **b) Microscopic**

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 46 per cent, Appendix	2.2.7.

### **ASSAY**

### **T.L.C.**

**CONSTITUENTS** - Sugar, mucilage, pectin and anthraquinone.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Guru
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Madhura

**Karma** : Recana

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Vibandha, Udāvarta, Gulma, Śūla, Udararoga, Hṛdroga, Prameha

**DOSE** - 5-10 g of the drug in powder form; Note:- The market material contains seeds, septa etc., which form the Foreign Matter and should be separated before use.

## ARKA (Root)

Arka consists of dried roots of *Calotropis procera* (Ait.) R. Br. (Fam. Asclepiadaceae) found wild more or less throughout India.

### SYNONYMS

Sanskrit	:	Ravi, Bhānu, Tapana
Assamese	:	Akand, Akan
Bengali	:	Akanda, Akone
English	:	Madar Tree
Gujrati	:	Aakado
Hindi	:	Aak, Madar, Akavana
Kannada	:	Ekka, Ekkadagida, Ekkegida
Kashmiri	:	Acka
Malayalam	:	Erikku
Marathi	:	Rui
Oriya	:	Arakha
Punjabi	:	Ak
Tamil	:	Vellerukku, Erukku
Telugu	:	Jilledu
Urdu	:	Madar, Aak

### DESCRIPTION

#### a) Macroscopic

Root:- rough, fissured longitudinally, corky and soft, externally yellowish-grey while internally white, central core cream coloured, bark easily separated from xylem, odour, characteristic: taste, bitter and acrid.

#### b) Microscopic

Transverse section of root shows outer most cork tissue consisting of 4-8 rows of tangentially elongated and radially arranged cells followed by 3-6 rows of moderately

thick-walled, irregular cells of secondary cortex devoid of calcium oxalate crystals and starch grains, cortex composed of large polyhedral parenchymatous cells containing abundant rounded starch grains, some cortical cells contain rosette crystals of calcium oxalate, scattered laticifer cells with brown contents, phloem consists of sieve elements and phloem parenchyma, sieve tubes thick-walled, cells more prominent towards inner region of phloem traversed by uni to tetraseriate medullary rays, phloem cells contain crystals of calcium oxalate, starch grains and laticifers similar to these found in cortex: cambium present just within the phloem consisting of 2-5 rows of thin-walled, tangentially elongated cells xylem forms the central part of root composed of vessels, tracheids, fibres and xylem parenchyma, vessels present throughout xylem region and arranged radially in groups of 2-7, sometime single vessels also occur, usually cylindrical having bordered pits on their walls, xylem fibres long, lignified with wide lumen, tapering on ends and have simple pits on walls, medullary rays 1-4 seriate and triseriate in outer region and uni or biseriate in inner region: cells of medullary rays radially elongated, filled with starch similar to those present in cortical cells.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

#### **ASSAY**

#### **T.L.C.**

**CONSTITUENTS** - Glycosides (calotropin)

#### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Guna** : Laghu  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Kaphavātaḥṛt, Dīpana, Bhedana, Kṛmighna, Vraṇahara, Viṣaghna,  
Kuṣṭhaghna

**IMPORTANT FORMULATIONS** - Mahā Viṣagarbha Taila, Dhānvantara Ghr̥ta

**THERAPEUTIC USES** - Kaṇḍū, Kuṣṭha, Kṛmiroga, Gulma, Udararoga, Vraṇa, Śvāsa

**DOSE** - 1-3 g of the drug for decoction

## ARKA (Leaf)

Arka consists of dried leaves of *Calotropis procera* (Ait.) R.Br. (Fam. Asclepiadaceae), found wild more or less throughout India.

### SYNONYMS

Sanskrit	:	Bhānu, Ravi, Tapana
Assamese	:	Akan, Akand
Bengali	:	Akanda, Akone
English	:	Madar Tree
Gujrati	:	Aakado
Hindi	:	Aak, Akavana, Madar
Kannada	:	Ekka, Ekkadagida, Ekkegida
Kashmiri	:	Acka
Malayalam	:	Erikku
Marathi	:	Rui
Oriya	:	Arakha
Punjabi	:	Ak
Tamil	:	Erukku, Vellerukku
Telugu	:	Jilledu
Urdu	:	Aak, Madar

### DESCRIPTION

#### a) Macroscopic

Sub-sessile, 6-15 cm by 4.5-8 cm, broadly ovate, ovate-oblong, elliptic or obovate acute, pubescent when young and glabrous on both sides on maturity.

#### b) Microscopic

**Midrib** - transverse section through midrib shows an upper and lower single layered epidermis externally covered with thick, striated cuticle, few epidermal cells on both surfaces of leaf elongated to form uniseriate, 2-3 celled trichomes, epidermal cells

cubical and radially elongated, epidermis followed by 3-8 layered collenchyma on both lower and upper surfaces, parenchymatous cells thin-walled, isodiametric to circular with intercellular spaces present in ground tissue, stele crescent shaped composed of bicollateral and open vascular bundle, xylem consists mostly of vessels and tracheids, a strip of cambium present between xylem and phloem tissues, laticifers also present in the phloem and parenchymatous zone.

**Lamina** - dorsiventral with mesophyll differentiated into a palisade and spongy tissue, upper and lower epidermis covered externally with a thick, striated cuticle, below upper epidermis three rows of elongated, closely arranged palisade parenchyma present, spongy parenchyma tissues almost radially elongated with intercellular spaces, central cells irregular in shape, laticifers and vascular bundles also present scattered in this region

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	21	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Glycoside (Calotropin)

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Sara, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātaḥṛt, Dīpana, Kṛmighna, Śōpha, Vraṇahara, Viṣaghna, Bhedana, Śvāsahara

**IMPORTANT FORMULATIONS** - Arka Lavaṇa

**THERAPEUTIC USES** - Śoṭha, Kaṇḍū, Kuṣṭha, Vraṇa, Kṛmiroga, Gulma, Śleṣmodararoga, Plīhāroga, Arśa, Śvāsa

**DOSE** - 250-750 mg of the drug in powder form

## ASANA (Heart wood)

Asana consists of heart-wood of *Pterocarpus marsupium* Roxb. (Fam. Leguminosae); a moderate to large sized, deciduous tree, upto 30 m high and 2.5 m in girth, with straight clear bole, found mostly throughout Gujarat, Madhya Pradesh, Bihar and Orissa.

### SYNONYMS

Sanskrit	:	Bījaka, Pītasāra, Asanaka, Bījasāra
Assamese	:	Aajar
Bengali	:	Piyasala, Pitasala
English	:	Indian Kino Tree
Gujrati	:	Biyo
Hindi	:	Vijayasara, Bija
Kannada	:	Bijasara, Asana
Kashmiri	:	Lal Chandeur
Malayalam	:	Venga
Marathi	:	Bibala
Oriya	:	Piashala
Punjabi	:	Chandan Lal, Channanlal
Tamil	:	Vengai
Telugu	:	Yegi, Vegisa
Urdu	:	Bijasar

### DESCRIPTION

#### a) Macroscopic

Drug occurs as irregular pieces in variable size and thickness, golden yellowish-brown with darker streaks, on soaking in water gives yellow colour solution with blue fluorescence strong, tough, very hard, moderately heavy, fracture, difficult to break but brittle, taste, astringent.

**b) Microscopic**

Transverse section shows alternating bands of larger and smaller polygonal cells consisting of tracheids, fibre tracheids, xylem parenchyma and traversed by xylem rays, numerous xylem vessels distributed throughout, in singles or in groups of 2-3, showing tyloses filled with tannin; in isolated preparations, vessels, drum or barrel shaped with well-marked perforation rims and bordered pits; tracheids numerous, long, thick-walled with tapering ends and simple pits; fibre tracheids elongated, thick-walled with narrow lumen and simple pits; xylem parenchyma rectangular with simple pits, paratracheal, surrounding vessels; xylem rays uni-to-biseriate, 3-5-7 cells high, prismatic crystals of calcium oxalate present in crystal fibres, starch absent.

**Powder:** Brown to chocolate colour, under microscope shows vessels with bordered pits, fibre tracheids, tracheids, fragments of xylem rays and few crystal fibres, starch absent.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	2 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids and resin

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Kaṭu, Tikta
<b>Guna</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittaśāmakā, Galadoṣaghna, Keśya, Tvacya, Stambhana, Kuṣṭhaghna, Rasāyana, Raktaśodhana

**IMPORTANT FORMULATIONS** - Nyagrodhādi Cūrṇa, Asanabilvādi Taila

**THERAPEUTIC USES** - Pāṇḍu, Prameha, Medodoṣa, Kuṣṭha, Kṛmiroga

**DOSE** - 50-100 g of the drug for decoction

## AŚOKA (Stem bark)

Aśoka consists of dried stem bark of *Saraca asoca* (Rose.) De. Willd , Syn. *Saraca indica* Linn. (Fam. Leguminosae), collected in spring from mature, wild or cultivated trees, found in Central and Eastern Himalayas, Western Ghats and Deccan.

### SYNONYMS

Sanskrit	:	Kaṅkeli
Assamese	:	Ashoka
Bengali	:	Ashoka
English	:	Asok Tree
Gujrati	:	Ashoka
Hindi	:	Ashoka
Kannada	:	Ashokadamara, Ashokamara, Kankalimara
Kashmiri	:	Ashok
Malayalam	:	Asokam
Marathi	:	Ashok
Oriya	:	Ashoka
Punjabi	:	Asok
Tamil	:	Asogam, Asogu, Asokam
Telugu	:	Ashokapatta
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark channelled, externally dark green to greenish grey, smooth with circular lenticels and transversely ridged, sometimes cracked, internally reddish-brown with fine longitudinal strands and fibers, fracture splintery exposing striated surface, a thin whitish continuous layer is seen beneath the cork layer, taste, astringent.

## b) Microscopic

Transverse section of stem bark shows periderm consisting of a wide layer of cork, radially flattened, narrow cork cambium, secondary cortex wide with one or two continuous layers of stone cells with many patches of sclereids, parenchymatous tissue contains yellow masses and prismatic crystals: secondary phloem consists of phloem parenchyma, sieve tubes with companion cells and phloem fibres occurring in groups, crystal fibres present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 11 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol (90 per cent) soluble extractive	Not less than 15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 11 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins and a crystalline glycoside.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Grāhī, Varṇya, Hṛdya, Śothahara, Viṣaghna

**IMPORTANT FORMULATIONS** - Aśokāriṣṭa, Aśokaghṛta

**THERAPEUTIC USES** - Asṛgdara, Apacī, Dāha, Raktadoṣa, Śoṭha

**DOSE** - 20-30 g of the drug for decoction.

## AŚVAGANDHĀ (Root)

Aśvagandhā consists of dried mature roots of *Withania somnifera* Dunal. (Fam. Solanaceae), a perennial shrub, found in waste land, cultivated field and open grounds throughout India, widely cultivated in certain areas of Madhya Pradesh and Rajasthan , roots collected in winter, washed and cut into short pieces.

### SYNONYMS

Sanskrit	:	Hayagandhā, Vājigandhā
Assamese	:	Ashvagandha
Bengali	:	Ashvagandha
English	:	--
Gujrati	:	Asgandha
Hindi	:	Asgandh
Kannada	:	Angarberu, Hiremaddina-gida
Kashmiri	:	Asagandh
Malayalam	:	Amukkuram
Marathi	:	Asagandha, Askagandha
Oriya	:	Aswagandha
Punjabi	:	Asgandh
Tamil	:	Amukkaramkizangu
Telugu	:	Pennerugadda
Urdu	:	Asgand

### DESCRIPTION

#### a) Macroscopic

Roots straight, unbranched, thickness varying with age. roots bear fibre-like secondary roots, outer surface buff to grey-yellow with longitudinal wrinkles, crown consists of 2-6 remains of stem base, stem bases variously thickened, nodes prominent only on the side from where petiole arises, cylindrical, green with longitudinal wrinkles, fracture, short and uneven, odour, characteristic, taste, bitter and acrid.

## b) Microscopic

Transverse section of root shows cork exfoliated or crushed, when present isodiametric and non-lignified, cork cambium of 2-4 diffused rows of cells, secondary cortex about twenty layers of compact parenchymatous cells, phloem consists of sieve tubes, companion cells, phloem parenchyma, cambium 4-5 rows of tangentially elongated cells, secondary xylem hard forming a closed vascular ring separated by multiseriate medullary rays, a few xylem parenchyma

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol (25 per cent) soluble extractive	Not less than 15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than per cent, Appendix	2.2.7.

## ASSAY

ASSAY -Aswagandha consists of not less than 0.2 per cent of total alkaloids, when assayed as follows:

Take about 30g accurately weighed of the powdered drug, cover with *Alcohol* (90 per cent) and allow to stand overnight. Extract for 6 hours so wet apparatus and concentrate to a syrup residue. Treat with 25, 20, 15 and 10 ml portions of 5 per cent **Sulphuric Acid** until complete extraction of alkaloid is affected.

To the combined acid extracts add an excess of Dragandorf's reagent. Filter under suction and dissolve the residue in *Acetone*, Shake the acetone solution with freshly prepared suspension of 2ml *Silver Carbonate* in 10 ml of Water. Filter the solution and wash the precipitate with *Acetone*, *Alcohol* and *water* in that order. Pass sufficient *Hydrogen Sulphide* through the filtrate. Boil the solution for 10 minutes, Inter and evaporate under vacuum in a tared flask. Add to the residue 5 ml of *Ethyl Alcohol* - evaporate to dryness, repeat the process once again and weight the residue to constant

weight in a vacuum dessicator.

**CONSTITUENTS** - Alkaloids and withanolides.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guna</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātakaphāpaha, Balya, Rasāyana, Vājīkaraṇa

**IMPORTANT FORMULATIONS** - Aśvagandhādyariṣṭa, Aśvagandhādi Lehya, Balāśvagandhalākṣādi Taila

**THERAPEUTIC USES** - Kṣaya, Daurbalya, Vātaroga, Śoṭha, Klaihya

**DOSE** - 3-6 g of the drug in powder form

## **AŚVATTHA (Bark)**

Aśvattha consists of dried bark of *Ficus religiosa* Linn. (Fam. Moraceae), a large perennial tree, glabrous when young, found throughout the plains of India upto 170 m altitude in the Himalayas, largely planted as an avenue and roadside tree especially near temples.

### **SYNONYMS**

Sanskrit	:	Pippala
Assamese	:	Ahant
Bengali	:	Asvattha, Ashud, Ashvattha
English	:	Pipal tree
Gujrati	:	Piplo, Jari, Piparo, Pipalo
Hindi	:	Pipala, Pipal
Kannada	:	Arlo, Ranji, Basri, Ashvatthanara, Ashwatha, Aralimara, Aralegida, Ashvathamara, Basari, Ashvattha
Kashmiri	:	Bad
Malayalam	:	Arayal
Marathi	:	Pipal, Pimpal, Pippal
Oriya	:	Aswatha
Punjabi	:	Pipal, Pippal
Tamil	:	Ashwarthan, Arasamaram, Arasan, Arasu, Arara
Telugu	:	Ravichettu
Urdu	:	---

### **DESCRIPTION**

#### **a) Macroscopic**

Bark occurs in flat or slightly curved pieces, varying from 1.0-2.5 cm or more in thickness, outer surface brown or ash coloured, surface uneven due to exfoliation of cork, inner surface smooth and somewhat brownish, fracture, fibrous, taste, astringent.

## b) Microscopic

Transverse section of bark shows compressed rectangular to cubical, thick-walled cork cells and dead elements of secondary cortex, consisting of masses of stone cells, cork cambium distinct with 3-4 rows of newly formed secondary cortex, mostly composed of stone cells towards periphery, stone cells found scattered in large groups, rarely isolated, most of parenchymatous cells of secondary cortex contain numerous starch grains and few prismatic crystals of calcium oxalate, secondary phloem a wide zone, consisting of sieve elements, phloem fibres in singles or in groups of 2 to many and non-lignified, numerous crystal fibres also present, in outer region sieve elements mostly collapsed while in inner region intact, phloem parenchyma mostly thick-walled, stone cells present in single or in small groups similar to those in secondary cortex, a number of ray-cells and phloem parenchyma filled with brown pigments, prismatic crystals of calcium oxalate and starch grains present in a number of parenchymatous cells, medullary rays uni to multiseriate, wider towards outer periphery composed of thick-walled cells with simple pits, in tangential section ray cells circular to oval in shape, cambium when present, consists of 2-4 layers of thin-walled rectangular cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Guru, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Kaphapittavināśī, Varṇya, Saṃgrāhī, Bhagnasandhānakara,  
Mūtrasaṃgrahaṇīya

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa, Nyagrodhādi Cūrṇa

**THERAPEUTIC USES** - Vātarakta, Raktapitta, Vraṇa, Yonidoṣa, Prameha

**DOSE** - 20-30 g of the drug for decoction

## ATASĪ (Seed)

AtasĪ consists of dried, ripe seeds of *Linum usitatissimum* Linn. (Fam. Linaceae), an erect annual herb, 0.6-1.2 m high, extensively cultivated throughout the plains of India upto an altitude of 800 m, capsule ripen by end of June, dried seeds separated from capsule by thrashing.

### SYNONYMS

Sanskrit	:	Umā, Kṣumā
Assamese	:	Tisi, Tusi
Bengali	:	Masina, Atasi
English	:	Linseed
Gujrati	:	Alshi, Arasi
Hindi	:	Alsi
Kannada	:	Agasebeeja, Semeagare, Agasi
Kashmiri	:	Alsi
Malayalam	:	Agastha, Agasi, Cheru charm
Marathi	:	Atshi
Oriya	:	Atushi
Punjabi	:	Ali
Tamil	:	Ali, Virai
Telugu	:	Avisa
Urdu	:	Alsi, Katan

### DESCRIPTION

#### a) Macroscopic

Seed small, brown, glossy with minutely pitted surface, about 4-6 mm long and 2-2.5 mm in maximum width, elongated-ovoid, flattened, rounded at one end and obliquely pointed at the other, near which on one edge, a light depression enclosing hilum and micropyle, embryo consisting of two yellowish-white, flattened planoconvex cotyledons and a radicle, nearly fills the seed and completely surrounded by a thin, whitish endosperm, both endosperm and embryo oily, testa mucilaginous when soaked in water, odour, characteristic, taste, oily when chewed.

## b) Microscopic

Transverse section of seed shows testa consists of isodiametric cells with mucilaginous outer walls, collenchymatous cells of middle layer of seed coat cylindrical, single layered, yellowish brown, longitudinally elongated, about 120-190 $\mu$  long and 14-17  $\mu$  wide, thick, lignified and with pitted walls, single layer of flattened polygonal pigment cells with reddish-brown contents, aleurone grains in the cotyledons, upto 20  $\mu$  in diameter, each with globoid and crystalloid, abundant globule of fixed oil and occasional starch grains present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	30	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.
Fixed oil	Not less than	25	per cent, Appendix	2.2.8

**CONSTITUENTS** - Fixed oil, mucilage and protein

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātaghna, Acakṣuṣya

**IMPORTANT FORMULATIONS** - Sarṣapādi Pralepa

**THERAPEUTIC USES** - Śīroroga, Kṛmiroga, Kuṣṭha, Prameha

**DOSE** - 3-6 g of the drug in powder form

## ATIBALĀ (Root)

Atibalā consists of root of *Abutilon indicum* (Linn.) Sweet (Fam. Malvaceae), a hairy herb or under-shrub 1.0-1.5 m high, annual or more often perennial with golden yellow flowers, flowering mostly throughout the year found abundantly throughout the hotter parts of India, as a common weed on road sides and other waste places in plains and hills, upto an elevation of 600 m.

### SYNONYMS

Sanskrit	:	Kaṅkatikā, Ṛṣyaprōktā
Assamese	:	Jayavandha, Jayapateri
Bengali	:	Badela
English	:	Indian Mallow
Gujrati	:	Kansaki, Khapat
Hindi	:	Kanghi
Kannada	:	Shrimudrigida, Mudragida, Turube
Malayalam	:	Uram, Katuvan, Urubam, Urabam, Vankuruntott, Oorpam, Tutti
Marathi	:	Chakrabhendi, Petari, Mudra
Oriya	:	Pedipidika
Punjabi	:	Kangi, Kangibooti
Tamil	:	Tutti, Thuthi
Telugu	:	Tutturubenda
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Tap roots, fairly long with a number of lateral branches, 1.5-2 cm in diameter, light brown, outer surface smooth with dot like lenticels, bark thin and can be easily peeled off, odour, feeble, taste, astringent and bitter.

## b) Microscopic

Transverse section of root shows a thin cork of 4-7 or more tangentially elongated rectangular cells, cork cambium, single layered, and at the lenticel regions followed by 2-3 layers of secondary cortex of thin-walled, almost cubical or rectangular cells, containing small clusters of calcium oxalate in most of cells, phellogen followed by 3-4 layers of thin-walled cells of cortex, some cells of cortex which are above the conical strands of bast, crushed, small starch grains, 6-9  $\mu$  in diameter, present in some of the cells, phloem forms the major portions of bark and present as conical strands with their bases towards the wood and with dilate distal ends of the primary medullary ray in between them, fibres, present in groups of 10-12 in these conical strands, in tangential rows, alternating with thin-walled phloem elements, towards wood fibre groups, element in between the fibres mostly consists of phloem parenchyma, Some cells contain cluster crystals of calcium oxalate and a few others have starch grains, some phloem cells towards periphery appear compressed and crushed, inner to phloem, a cambium present, consisting of 1-2 rows of narrow, thin-walled rectangular cells, wood composed of vessels, wood fibres, wood parenchyma and medullary rays vessels vary in diameter and arranged in radial groups of 2-4, also occur in singles, some cells show tyloses formation, parenchyma thick-walled and slightly wider than fibre cells, but less thickened, single or rarely compound starch grains present, tetrarch bundle or primary xylem present at the centre of wood, medullary rays uni or biseriate widen much towards distal ends, most of the ray cells contain starch grains and some contain cluster of calcium oxalate, starch grains present in wood larger than those of bark region, a few ray cells at centre of the root contain rhomboidal crystals.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.

Water-soluble extractive                      Not less than 9 per cent, Appendix 2.2.7.

**CONSTITUENTS** - Asparagin

**PROPERTIES AND ACTION**

**Rasa**                      :            Madhura  
**Guṇa**                      :            Snigdha  
**Vīrya**                     :            Śīta  
**Vipāka**                  :            Madhura  
**Karma**                    :            Grāhī, Vātahara, Balya, Vṛṣya

**IMPORTANT FORMULATIONS** - Balā Taila, Nārāyaṇa Taila, Mahā Nārāyaṇa Taila

**THERAPEUTIC USES** - Meha, Vātarakta, Raktapitta

**DOSE** - 3-6 g of the drug in powder form

## ATIVIṢĀ (Root)

Ativiṣā consists of dried, tuberous roots of *Aconitum heterophyllum* Wall. ex. Royle (Fam, Ranunculaceae), a perennial herb, native of western Himalayas and found in Garhwal, Kumaon and Kashmir at altitude between 2,500-4,000 m.

### SYNONYMS

Sanskrit	:	Aruṇā, Ghuṇapriyā, Viṣā.
Assamese	:	Aatich
Bengali	:	Ataicha
English	:	Atis Root
Gujrati	:	Ativishni Kali, Ativikhani Kali
Hindi	:	Atis
Kannada	:	Ativisha, Athihage
Malayalam	:	Atividayam, Ativitayam
Marathi	:	Ativisha
Oriya	:	Atushi
Punjabi	:	Atisa, Atees
Tamil	:	Atividayam
Telugu	:	Ativasa
Urdu	:	Atees

### DESCRIPTION

#### a) Macroscopic

Roots, ovoid-conical, tapering downwards to a point, 2.0-7.5 cm long, 0.4-1.6 cm or more thick at its upper extremity, gradually decreasing in thickness towards tapering end, externally light ash-grey, white or grey-brown, while internally starch white, external surface wrinkled marked with scars of fallen rootlet and with a rosette of scaly rudimentary leaves on top: fracture, short, starchy, showing uniform white surface, marked towards centre by 4-7 concentrically arranged yellowish-brown dots, corresponding to end of fibrovascular bundles traversing root longitudinally taste, bitter with no tingling sensation.

## b) Microscopic

Transverse section of mature root shows, single layered epidermis consisting of light brown tabular cells rupturing on formation of cork, cork consists of 5-10 rows of tangentially elongated, thin-walled cells, cork cambium single layered consisting of tangentially elongated, thin-walled cells, cortex much wider consisting of tangentially elongated or rounded, thin-walled parenchymatous cells with intercellular spaces, cells fully packed with both simple as well as compound starch grains, compound starch gains composed of 2-4 components of spherical body, endodermis distinct composed of barrel-shaped cells, elements of vascular bundles poorly developed, vascular bundles, arranged in a ring, inter-fascicular cambium present in form of a ring composed of few layered thin-walled cells, central core consisting of thin-walled parenchymatous cells, possessing starch grains similar to those found in cortical cells.

**Powder-** Ash coloured to light brown, under microscope shows abundant simple and compound starch grains and parenchymatous cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids (atisine, dihydroatisine, hetisined and heteratisine).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Saṃgrāhikā, Kaphapittahara

**IMPORTANT FORMULATIONS** - Rodhrāsava, Śivā Gutīkā, Lakṣmīnārāyaṇa Rasa, Mahā Viṣagarbha Taila, Rāsnairaṇḍādi Kvātha Cūrṇa, Sudarśana Cūrṇa, Pañcatikta Guggulu Ghṛta, Bālacāturbhadrikā Cūrṇa

**THERAPEUTIC USES** - Jvara, Kāsa, Chardi, Amāsisāra, Kṛmiroga

**DOSE** - 0.6-2.0 g of the drug in powder form

## **BABBŪLA (Stem bark)**

Babbūla consists of dried mature stem bark of *Acacia nilotica* (Linn.) Willd. ex. Del. sp. *indica* (Benth.) Brenan, Syn. *Acacia arabica* Willd. (Fam. Leguminosae), a moderate sized, spiny, evergreen tree found throughout India.

### **SYNONYMS**

Sanskrit	:	Bāvarī, Kinkirāta
Assamese	:	Babala
Bengali	:	Babla
English	:	Babula tree, Indian gum arabic tree
Gujrati	:	Baval, Kaloabaval
Hindi	:	Babula, Babura, Kikar
Kannada	:	Sharmeeruka, Kari Jail, Kari gobli, Pulai Jali
Kashmiri	:	Sak
Malayalam	:	Velutha Karuvelan
Marathi	:	Babhul, Babhula
Oriya	:	Babula, Babala
Punjabi	:	Kikkar
Tamil	:	Karuvelan, Karuvel
Telugu	:	Nallatumma, Thumma
Urdu	:	--

### **DESCRIPTION**

#### **a) Macroscopic**

Bark hard, dark brown or black, deeply fissured transversely and longitudinally, inner surface, reddish brown, longitudinally striated and fibrous, breaks with difficulty and exhibits a fibrous fracture, taste, astringent.

#### **b) Microscopic**

Transverse section of mature bark shows, 15-25 layered, thin-walled, slightly flattened mostly rectangular, brown coloured cork cells, a few lenticels formed by rupturing of cork cells, secondary cortical cells ovate to elongated, many tanniferous stone cells, variable in shape and size present in large groups, secondary phloem

consists of sieve tubes, companion cells, fibres, crystal fibres and phloem parenchyma phloem fibres in many groups and thick-walled, phloem tissues filled with reddish or brown contents present, crystal fibres thick-walled, elongated, divided by transverse septa into segments, each contain a prismatic crystal of calcium oxalate, medullary rays uni to-multi- seriate run almost straight, ray cells elongated to polygonal, 20-24 cells high and 2-5 cells wide, crystals of calcium oxalate found scattered amongst the stone cell"cells of secondary cortex and phloem parenchyma.

**Powder**-Powder as such reddish brown coloured, under microscope many prismatic crystals of calcium oxalate, stone cells, both with narrow and wide lumen and striations and crystal fibres seen.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins and gum

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya
<b>Guna</b>	:	Guru, Rūkṣa, Viśada
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Grāhī, Kaphahara, Viṣaghna

**IMPORTANT FORMULATIONS** - Mṛtasañjīvanī Surā, Babbūlarīṣṭa

**THERAPEUTIC USES** - Kuṣṭha, Kṛmiroga, Atīśāra, Kāsa

**DOSE** - 20-30 g of the drug for decoction

## BĀKUCĪ (Fruit)

Bākucī consists of dry ripe fruits of *Psoralea corylifolia* Linn. (Fam. Leguminosae), an erect, 0.3-1.8 m high annual herb, distributed throughout India, found commonly in Uttar Pradesh, Bengal and Maharashtra.

### SYNONYMS

Sanskrit	:	Avalguja, Somarājī
Assamese	:	Habucha
Bengali	:	Bakuchi, Somraji, Hakucha Veeja
English	:	--
Gujrati	:	Bavachi
Hindi	:	Babchi, Bavachi, Bakuchi
Kannada	:	Bauchige, Bhavantibeeja, Bhavanchigid, Baukuchi
Kashmiri	:	Babchi
Malayalam	:	Karkokil
Marathi	:	Bawchi
Oriya	:	Bakuchi
Punjabi	:	Babchi, Bavchi
Tamil	:	Karpokarisi, Karpogalarisi, Karbogalarisi
Telugu	:	Bavanchalu
Urdu	:	Babchi

### DESCRIPTION

#### a) Macroscopic

Fruits, dark chocolate to almost black with pericarp adhering to the seed-coat, 3-4.5 mm long, 2-3 mm broad, ovoid-oblong or bean shaped, some what compressed, glabrous rounded or mucronate, closely pitted, seeds campylotropous, non-endospermous, oily and free from starch, odourless, but when chewed smell of a pungent essential oil felt, taste, bitter, unpleasant and acrid.

## b) Microscopic

Transverse section of fruit shows pericarp with prominent ridges and depressions, consisting of collapsed parenchyma and large secretory glands containing oleo-resinous matter testa, an outer layer of palisade epidermis, layer of bearer cells which are much thickened in the inner tangential and basal radial walls and 2-3 layers of parenchyma, cotyledons of polyhedral parenchyma and three layers of palisade cells on the adaxial side.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	13	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil, fixed oil, Psoralen , psoralidin, isopsoralen and bakuchiol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Śleṣmāsrappittanut, Grāhī, Vraṇāpaha, Hṛdya

**IMPORTANT FORMULATIONS** - Somarājī Taila, Avalgujādi Lepa

**THERAPEUTIC USES** - Śvitra, Kuṣṭha, Kṛmiroga, Jvara, Meha

**DOSE** - 3-6 g of the drug in powder form

## BIBHĪTAKA (Fruit)

Bibhītaka consists of pericarp of dried ripe fruits of *Terntinalia belerica* Roxb. (Fam. Combretaceae), a large deciduous tree, 10-12 m or more high, commonly found in plain and forests upto 900 m elevation, fruits ripen towards November.

### SYNONYMS

Sanskrit	:	Vibhīta, Akṣa, Akṣaka
Assamese	:	Bhomora, Bhomra, Bhaira
Bengali	:	Bayada, Baheda
English	:	Beleric Myrobalan
Gujrati	:	Bahedan
Hindi	:	Bahera
Kannada	:	Tare kai, Shanti Kayi
Kashmiri	:	Babelo, Balali
Malayalam	:	Tannikka
Marathi	:	Baheda
Oriya	:	Baheda
Punjabi	:	Bahera
Tamil	:	Thanikkai
Telugu	:	Thanikkaya
Urdu	:	Bahera

### DESCRIPTION

#### a) Macroscopic

Fruit nearly spherical to ovoid, 2.5-4.0 cm in diameter, fresh ripe fruits slightly silvery or with whitish shiny pubescent surface, mature fruits grey or grayish brown with slightly wrinkled appearance, rind of fruit shows variation in thickness from 3-5 mm, taste, astringent.

#### b) Microscopic

Transverse section of fruit shows an outer epicarp consisting of a layer of epidermis, most of epidermal cells elongate to form hair like protuberance with swollen base, composed of a zone of parenchymatous cells, slightly tangentially elongated and irregularly arranged, intermingled with stone cells of varying shape and size, elongated stone cells found towards periphery and spherical in the inner zone of mesocarp in groups of 3-10, mesocarp traversed in various directions by numerous vascular strands, bundles collateral, endarch, simple starch grains and some stone cells found in most of mesocarp cells, few peripheral layers devoid of starch grains, rosettes of calcium oxalate and stone cells present in parenchymatous cells, endosperm composed of stone cells running longitudinally as well as transversely.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	35	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Gallic acid, tannic acid and glycosides

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphapittajit, Bhedaka, Kṛmināśana, Cakṣuṣya, Keśya, Kāśahara

**IMPORTANT FORMULATIONS** - Triphalā Cūrṇa, Triphalādi Taila, Lavaṅgādi Vaṭī

**THERAPEUTIC USES** - Svarabheda, Netraroga, Kāsa, Chardi, Kṛmiroga, Vibandha

**DOSE** - 3-6 g of the drug in powder form

## **BILVA (Fruit pulp)**

Bilva consists of pulp of entire, unripe or half ripe fruits of *Aegle marmelos* Carr. (Fam. Rutaceae), a tree, attaining a height of 12 m growing wild and also cultivated throughout the country, rind of fruit is removed and pulp is bruised and dried.

### **SYNONYMS**

Sanskrit	:	Śrīphala
Assamese	:	Bael, Vael
Bengali	:	Bela, Bilva
English	:	Bengal Quince, Bael fruit
Gujrati	:	Bill, Bilum, Bilvaphal
Hindi	:	Bela, Sripthal, Bel
Kannada	:	Bilva
Kashmiri	:	Bel
Malayalam	:	Koovalam
Marathi	:	Bel, Baela
Oriya	:	Bela
Punjabi	:	Bil
Tamil	:	Vilvam
Telugu	:	Maredu
Urdu	:	Bel

### **DESCRIPTION**

#### **a) Macroscopic**

Fruit, sub-globose, 5-18 cm in diameter, externally greenish when young, yellowish-brown when ripe, rind about 1.5 mm-3 mm thick, hard and woody, surface smooth or slightly granular bearing a circular scar at the point of attachment with peduncle, carpels, 10-15, central, each containing several hairy seeds embedded in yellowishbrown, extremely sticky mucilage, seeds oblong, flat, woody, and having white hair, fresh pulp of ripe fruit, brown, of sticky shreds, dried pulp hard and pale to dark red in colour, frequently breaks away from the rind during drying, leaving a thin layer attached to it, odour, faintly aromatic, taste, mucilaginous and slightly astringent.

## **b) Microscopic**

### **IDENTITY, PURITY AND STRENGTH**

Total Ash	Not more than 4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 6 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 50 per cent, Appendix	2.2.7.

### **ASSAY**

### **T.L.C.**

**CONSTITUENTS** - Marmalysin, tannins, mucilage, fatty oil and sugar.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Grāhī, Pittakṛt, Vātakaphahara, Balya

**IMPORTANT FORMULATIONS** - Bilvādi Leha, Bṛhat Gaṅgādhara Cūrṇa

**THERAPEUTIC USES** - Pravāhikā, Agnimāndya, Grahaṇīroga

**DOSE** - 3-6 g of the drug in powder form

## CANDRAŚŪRA (Seed)

Candraśūra consists of dried seeds of *Lepidium sativum* Linn. (Fam. Cruciferae) a small erect, annual herb, about 15-45 cm high, cultivated throughout India.

### SYNONYMS

Sanskrit	:	Candrikā
Assamese	:	Halim
Bengali	:	Chand Shura, Halim
English	:	Common Cress
Gujrati	:	Aseriya, Aseliyo
Hindi	:	Chansur
Kannada	:	Allibija, Kapila
Kashmiri	:	Alian
Malayalam	:	Asali
Marathi	:	Ahaliva, Haliv
Oriya	:	Chandasara, Chandasura
Punjabi	:	Holon, Taratej
Tamil	:	Allivirai
Telugu	:	Adityalu, Aadal
Urdu	:	Halim

### DESCRIPTION

#### a) Macroscopic

Seeds, small, oval-shaped, pointed and triangular at one end, smooth, about 2-3 mm long, 1-1.5 mm wide, reddish brown, a furrow present on both surfaces extending upto two thirds downward, a slight wing like extension present on both the edges of seed, when soaked in water seed coat swells and gets covered with a transparent, colourless mucilage, taste, mucilaginous.

#### b) Microscopic

**Powder-** Cream-yellow with a number of reddish-brown fragments of seed coats, under microscope shows pieces of seed coat, some showing red colouring matter and others with uniformly thick walls, endosperm oily.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 8 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 13 per cent, Appendix	2.2.6.

**CONSTITUENTS** - Alkaloids, essential oil, fixed oil and mucilage

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Balapuṣṭivivardhana, Vātaśleṣmahṛt

**IMPORTANT FORMULATIONS** - Kastūryādi (Vāyu) Guṭikā

**THERAPEUTIC USES** - Hikkā, Atīśāra, Vātarakta

**DOSE** - 3-6 g of the drug in powder form

## CITRAKA (Root)

Citraka consists of dried mature root of *Plumbago zeylanica* Linn. (Fam. Plumbaginaceae) , a large perennial sub-scandent shrub, found throughout India in wild state and occasionally cultivated in gardens.

### SYNONYMS

Sanskrit	:	Agni, Vahni, Jvalanākhyā, Kṛśāṇu, Hutāśa, Dahana, Hutabhuk, Śikhī
Assamese	:	Agiyachit, Agnachit
Bengali	:	Chita
English	:	Lead war
Gujrati	:	Chitrakmula
Hindi	:	Chira, Chitra
Kannada	:	Chitramula, Vahni, Bilichitramoola
Kashmiri	:	Chitra, Shatranja
Malayalam	:	Vellakeduveli, Thumpokkoduveli
Marathi	:	Chitraka
Oriya	:	Chitamula, Chitoparu
Punjabi	:	Chitra
Tamil	:	Chitramoolam, Kodiveli
Telugu	:	Chitramulam
Urdu	:	Sheetraj Hindi, Cheetah

### DESCRIPTION

#### a) Macroscopic

Roots 30 cm or more in length, 6 mm or more in diameter as also as short stout pieces, including root stocks reddish to deep brown, scars of rootlets present, bark thin and brown, internal structure striated, odour, disagreeable, taste, acrid.

#### b) Microscopic

Transverse section of root shows outer most tissue of cork consisting of 5 -7 row, of cubical to rectangular dark brown cells, secondary cortex consists of 2-3 rows of thin-walled rectangular, light brown cells, most of the cortex cells contain starch grains,

secondary cortex followed by a wide zone of cortex, composed of large polygonal to tangentially elongated parenchymatous cells varying in size and shape, containing starch grains and some cells with yellow contents, fibres scattered singly or in groups of 2-6, phloem a narrow zone of polygonal, thin-walled cells, consisting of usual elements and phloem fibres, similar to cortical zone, phloem fibres usually in groups of 2-5 or more but occasionally occurring singly, lignified with pointed ends and narrow lumen, similar in shape and size to those of secondary cortex, cambium indistinct, xylem light yellow to whitish, vessels radially arranged with pitted thickenings, medullary rays straight, 1-6 seriate, cells radially elongated starch filled with starch grains, stone cells absent.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	3	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

### CONSTITUENTS - Plumbagin

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Grāhī, Kaphavātahara, Arśohara, Śūlahara, Śothahara

### IMPORTANT FORMULATIONS - Citrakādi Vaṭī, Citrakaharītakī, Citrakādi Cūrṇa

### THERAPEUTIC USES - Agnimāndya, Grahaṇīroga, Arśa, Udaraśūla, Gudaśoṭha

**DOSE** - 1-2 g of the drug in powder form; Note - Śōdhana of this drug is to be done before use as described in the appendix

## DHĀNYAKA (Fruit)

Dhānyaka consists of dried ripe fruits of *Coriandrum sativum* Linn. (Fam. Umbelliferae) , a slender, glabrous, branched, annual herb, cultivated all over India, 30-90 cm high, giving characteristic aroma when rubbed, crop matures in 2-3 months after sowing, herb is pulled out with roots, after drying, fruits threshed out and dried in sun, winnowed, and stored in bags.

### SYNONYMS

Sanskrit	:	Dhanika, Dhānya, Vitunnaka, Kustumburu
Assamese	:	Dhaniya
Bengali	:	Dhane, Dhania
English	:	Coriander fruit
Gujrati	:	Dhana
Hindi	:	Dhaniya
Kannada	:	Havija, Kothambari bija
Kashmiri	:	Dhaniwal, Dhanawal
Malayalam	:	Malli, Kothampatayari
Marathi	:	Dhane, Kothimbir
Oriya	:	Dhania
Punjabi	:	Dhania
Tamil	:	Kottamalli virai, Dhaniya
Telugu	:	Dhaniyalu
Urdu	:	Kishneez

### DESCRIPTION

#### a) Macroscopic

Fruit globular, mericarps usually united by their margins forming a cremocarp about 2-4 mm in diameter, uniformly brownish-yellow or brown, glabrous, sometimes crowned by the remains of sepals and styles, primary ridges 10, wavy and slightly inconspicuous secondary ridges 8, straight, and more prominent, endosperm coelospermous , odour, aromatic, taste, spicy and characteristic.

## b) Microscopic

Transverse section of fruit shows pericarp with outer epidermis, when present with slightly thickened anticlinal wall, a few stomata, many cells with small prisms of calcium oxalate, trichomes absent, outer layer of mesocarp parenchymatous with inner cells in wavy longitudinal rows and degenerated vittae as tangentially flattened cavities, middle layer of mesocarp sclerenchymatous forming a thick layer of fusiform, pitted cells in very sinuous rows, layers often crossing at right angles with definite longitudinal strands in the secondary ridges, sinuous primary costae with some spiral vessel: inner cells of mesocarp, large, hexagonal with rather thin, lignified walls, inner epidermis of very narrow thin-walled cells slightly sinuous anticlinal wall showing parquetry arrangement, two or rarely more, normal vittae occurring on commissural side of each mesocarp containing volatile oil, endosperm of thick-walled cellulosic parenchyma containing much fixed oil, numerous aleurone grains, about 4-8 in diameter containing micro-rosettes of calcium oxalate, split carpophore passing at apex of each mericarp into raphe, adjacent to which a large cavity and on inner side of this a flattened vascular strand, carpophore consisting of fibres surrounded by spiral vessels.

**Powder-** Fawn to brown, epidermal cells of pericarp when present, slightly thick-walled and many containing small prism of calcium oxalate, parenchymatous cells of mesocarp without reticulate thickening, masses of sclerenchymatous cells of mesocarp in sinuous rows, often crossing at right angles, large tubular hexagonal rather thin-walled sclerenchymatous cells of endocarp, cells of inner epidermis with slightly sinuous anticlinal walls, thick-walled polygonal parenchymatous cells of endosperm, containing fixed oil and numerous small aleurone grains, micro-rosettes of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	19	per cent, Appendix	2.2.7.
Volatile oil	Not less than	0.3	per cent, Appendix	2.2.10

**CONSTITUENTS** - Essential oil (coriandrol)

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Dīpana, Pācana, Grāhī, Tridoṣanut, Mūtrala, Cakṣuṣya, Hṛdya

**IMPORTANT FORMULATIONS** - Dhānyapañcaka Kvātha Cūrṇa

**THERAPEUTIC USES** - Jvara, Tṛṣṇā, Chardi, Dāha, Ajīrṇa, Atīśāra

**DOSE** - 1-3 g of the drug in powder form

## DHĀTAKĪ (Flower)

Dhātakī consists of flowers of *Woodfordia fruticosa* (Linn.) Kurz. (Fam. Lythraceae) : much branched, semi deciduous, undershrub or shrub, 1-3 m high, rarely upto 3 m, found throughout India, ascending to 1500 m in Himalayas and also in the Gangetic plains , also cultivated in gardens.

### SYNONYMS

Sanskrit	:	Bahupuspī, Tāmrapuṣpī, Vahnijvālā
Assamese	:	Dhaiphool
Bengali	:	Dhaiphul
English	:	Fire flame bush
Gujrati	:	Dhavadi, Dhavani
Hindi	:	Dhai, Dhava
Kannada	:	Dhataki, Tamrapushpi
Malayalam	:	Tattiripuvu, Tatire
Marathi	:	Dhayati, Dhavati
Oriya	:	Dhaiphula, Dhatuki
Punjabi	:	Davi, Phul Dhava
Tamil	:	Kattati, Kattathi, Kattattipoo
Telugu	:	Aarl Puruvu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Flower, about 1.2 cm long, occurs as single or in bunches of 2-15, calyx 1.0-1.6 cm long, ridged and glabrous, bright red when fresh but fades on drying, with campanulate base and oblique apex having 6 triangular and acute teeth, each tooth being, 2-2.5 mm long, 6, very minute accessory sepals attached outside at the juncture of calyx tooth and deeper in colour, petals 6, attached inside the mouth of calyx-tube, slightly longer than calyx tooth, alternating with calyx-tooth pale rose or whitish, thin, papery, lanceolate, acuminate, stamens 12, united at the base, about 1.5-2 cm long, filament filiform, curved at the apex, keeping anthers inside calyx-tube , anthers dorsifixed brown, almost rounded or broadly ovate, carpels 2, united, ovary superior, style filiform,

longe, than ovary and stamens, taste, astringent.

#### **b) Microscopic**

Transverse section of sepal shows, single layered cuticularised epidermis, provided with both glandular and covering trichomes ;glandular trichomes, multicellular, long, consisting of a stalk and a globose, thin-walled, multicellular head, covering trichomes, unicellular thick-walled broad at base and pointed at the apex, ground tissue consisting of thin-walled, parenchymatous cells surface view of petal shows thin-walled, parenchymatous cells, provided with very few sparsely distributed covering trichomes, transverse section of filament shows, epidermis consisting of single layered tangentially elongated cells, covered with a very thick-cuticle, ground tissue consisting of thin walled parenchymatous cells with intercellular spaces, surrounding a central. vascular cylinder of spirally thickened vessels, transverse section of anther shows, single layered epidermis, covered with cuticle followed by several layers of thickened cells, surrounding both the pollen-sacs having numerous pollen grains, pollen grains roughly tetrahedral with three pores, measuring 12-16  $\mu$  approximately , central region consisting of thin-walled cells embodying vascular bundles.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	28	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannin and glucoside

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Kaṭu
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Grāhī, Viṣaghna, Garbhasthāpana, Kṛminut, Sandhānīya

**IMPORTANT FORMULATIONS** - Bṛhat Gaṅgādhara Cūrṇa

**THERAPEUTIC USES** - Atīśāra, Tṛṣṇā, Visarpa, Vraṇa, Raktapitta

**DOSE** - 3-6 g. of drug in powder form

## ERANḌA (Root)

Eraṇḍa consists of dried, mature roots of *Ricinus communis* Linn. (Fam. Euphorbiaceae), a tall glabrous shrub or almost small tree 2-4 m high, found throughout India, mostly growing wild on waste land and also cultivated for its oil seeds.

### SYNONYMS

Sanskrit	:	Gandharvahasta, Vātāri, Pañcāṅgula, Citrā, Urubu, Rubu
Assamese	:	Eda, Era
Bengali	:	Bherenda
English	:	Castor oil plant
Gujrati	:	Erando, Eradio
Hindi	:	Arand, Erand, Andi, Rend
Kannada	:	Haralu, Oudala gida
Kashmiri	:	Aran, Banangir
Malayalam	:	Avanakku
Marathi	:	Erand
Oriya	:	Jada, Gaba
Punjabi	:	Arind
Tamil	:	Amanakku
Telugu	:	Amudapu veru
Urdu	:	Bedanjir, Arand

### DESCRIPTION

#### a) Macroscopic

Root light in weight almost straight with few rootlets, outer surface dull yellowish brown, nearly smooth but marked with longitudinal wrinkles, some places whitish-yellow and soft, odourless, taste, acrid.

#### b) Microscopic

Transverse section of root shows thin layer of cork of squarish to tangentially

elongated, thin-walled cells, beneath cork, secondary cortex of thin-walled, tangentially elongated cells, narrow cortex of rounded to tangentially elongated thin-walled parenchymatous cells, some containing large oil globules, rosettes of calcium oxalate crystals and round simple or compound starch grains, phloem a broad zone, consisting of sieve tubes, phloem parenchyma and phloem fibres, fibres long, mostly septate, highly thickened, having narrow lumen, some fibres surrounded by concentric rows of cells containing crystals of calcium oxalate, sieve tubes, thin-walled with companion cells and phloem parenchyma in the inner region of phloem more prominent, some phloem parenchyma cells contain crystals of calcium oxalate, cambium 3-5 layered, cells rectangular in shape, xylem occupies major part of root, pentarch, five groups of primary xylem distinct in the centre of the wood, xylem consists of vessels, parenchyma and fibres, vessels uniformly scattered throughout the xylem region, either solitary or in groups, larger in size towards phloem, with bordered pits, xylem parenchyma less in number around vessels containing starch grains, xylem fibres long and thick-walled, medullary rays uni-to-biseriate, more or less straight, 4-5 seriate rays, sometimes found near protoxylem groups, ray cells, thin-walled, slightly radially elongated in phloem region, thick-walled in xylem region, all ray cells contain starch grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## CONSTITUENTS - Alkaloid (ricinine)

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vṛṣya, Vātahara, Āmapācana

**IMPORTANT FORMULATIONS** - Gandharvahastādi Kvātha Cūrṇa, Vātāri Guggulu,  
Gandharvahasta taila

**THERAPEUTIC USES** - Āmavāta, Śoṭha, Vastiśūla, Kaṭiśūla, Udararoga, Jvara

**DOSE** - 20-30 g of the drug for decoction

## GAMBHĀRĪ (Root bark)

Gambhārī consists of dried, mature root and root bark of *Gmelina arborea* Roxb. (Fam. Verbenaceae), tree about 18 m high, with a clear bole of 6-9 m and a girth of 1.5-2.1 m, found in the lower Himalayas, the Nilgiris and the East and West Coasts of India.

### SYNONYMS

Sanskrit	:	Kāśmarī, Kāśmarya
Assamese	:	Gamari
Bengali	:	Gambhar, Gamar
English	:	Candhar Tree
Gujrati	:	Shivan
Hindi	:	Gambhar, Khambhari
Kannada	:	Shivanigida, Shivani
Kashmiri	:	Kashmari
Malayalam	:	Kumizhu, Kumpil
Marathi	:	Shivan
Oriya	:	Gambhari
Punjabi	:	Gumhar, Kumhar
Tamil	:	Kumishan, Kumizhan
Telugu	:	Peggummudu, Peggummadi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Occurs in pieces with secondary and tertiary branches, root pieces nearly cylindrical with uneven surface, greyish brown, fracture somewhat tough in bark, brittle and predominant in woody portion.

**Root bark**-mature root bark when fresh, yellowish in colour, dry pieces curved and channelled, thinner ones forming single quills, external surface rugged due to presence of vertical cracks, ridges, fissures and numerous lenticels, fracture short and granular, taste, mucilaginous, sweetish with slight bitterness.

## b) Microscopic

**Root**-transverse section of root shows 6-8 layers of cork cells, secondary cortex, including primary and secondary phloem about two third consisting of wood, cork brownish, cells arranged in tangential direction and broken at places towards upper layers, cortex characterised by the presence of thin-walled parenchymatous cells with starch grains, resin ducts present in abundance throughout cortex, scattered stone cells fibre like or elongated common, fibres present, occurring mostly in singles, cells of cortex also contain rosette crystals of calcium oxalate and oil globules, primary phloem characterised by the presence of sieve tubes with companion cells, phloem parenchyma, soft bast fibres and ray cells, phloem fibres occur singly and scattered cortical cells 40-70  $\mu$  by 25-35  $\mu$  and bast fibres, 300-1000  $\mu$  by 10-15  $\mu$  development of cork takes place in second or third layer of primary cortex, wood consists of simple pitted wood parenchyma and medullary rays, wood cells mainly composed of vessels and tracheids and inner wood consists of a major portion of fibres together with a few vessels, vessels numerous and form almost a ring near the periphery of xylem cylinder and somewhat spares, being scattered in groups or singly nearer the central region, lumen of vessels somewhat large, dimensions of vessels 130-250  $\mu$  by 50-100  $\mu$  and those of the tracheids 175-300  $\mu$  by 30-50  $\mu$  wood fibres abundant and with simple pits, cambium distinct, medullary rays generally 1-2 celled thick with abundant starch grains cells oblong to rectangular.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids and lignans (arboreal, isoarboreal and related lignans)

## PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṣāya

**Guna** : Guru  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Dīpana, Pācana, Bhedana, Medhya, Tridoṣajit, Śothahara, Viṣaghna,  
Jvarahara

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Daśamūlaharītakī, Daśamūla Ghr̥ta,  
Daśamūla Ṣaṭpalaka Ghr̥ta

**THERAPEUTIC USES** - Jvara, Tṛṣṇā, Dāha, Arśa, Śoṭha

**DOSE** - 20-30 g of the drug for decoction



## **b) Microscopic**

Transverse section of primary roots show a layer of epidermis followed by 4-5 layers of thin-walled parenchymatous cortex, endodermis distinct, pericycle enclosing diarch stele, in mature root, cork 4-6 layered, cork cambium single layered followed by 6-14 layers of thin-walled parenchymatous cells with varying number of fibres, distributed throughout, some secondary cortex cells show secondary wall formation and reticulate thickening, fibres found in groups resembling those of phloem, secondary phloem divided into two zones, outer zone characterised by presence of numerous phloem fibres with a few sieve tubes slightly collapsed, inner zone frequently parenchymatous, devoid of fibres often showing sieve tubes and companion cells, phloem rays distinct, few cells get converted into fibres in outer region, cambium 3-5 layered, wood composed of vessels, tracheids, parenchyma and fibres and traversed by medullary rays, vessels scattered, arranged in singles or doubles towards inner side, in groups of three to four on outer side having bordered pits, tracheids long, narrow with simple pits, xylem parenchyma rectangular or slightly elongated with simple pits and reticulate thickening, xylem fibres few, tracheids elongated with simple pits, medullary rays heterogenous, 1-4 cells wide, starch grains and rosette crystals of calcium oxalate present in secondary cortex, phloem and medullary rays cells, few prismatic crystals also present in xylem ray cells.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## **CONSTITUENTS - Alkaloids and saponins**

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātanut, Vṛṣya, Bṛṃhaṇa, Mūtrala

**IMPORTANT FORMULATIONS** - Sahacarādi Taila, Daśamūla Kvātha Cūrṇa, Daśamūla Kaṭutrāya Kvātha Cūrṇa, Daśamūlapañcakolādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Kāsa, Śvāsa, Śūlaroga, Hṛdroga, Vātaroga, Mūtrakṛcchra, Aśmarī

**DOSE** - 20-30 g of the drug for decoction

## GOKṢURA (Fruit)

Gokṣura consists of dried, ripe, entire fruit of *Tribulus terrestris* Linn. (Fam Zygopyllaceae), an annual, rarely pernnial common weed of the pasture lands, road sides and other waste places, chiefly in hot, dry and sandy regions, grows throughout India as prostrate herb and upto 3,000 m in Kashmir.

### SYNONYMS

Sanskrit	:	Śvadamṣṭrā, Gokṣuraka, Traikaṇṭaka, Trikaṇṭa
Assamese	:	Gokhurkata, Gokshura
Bengali	:	Gokhri, Gokshura
English	:	Caltrops fruit
Gujrati	:	Bethagokharu, Mithagokhru, Nanagokharu
Hindi	:	Gokhru
Kannada	:	Neggilamullu, Neggilu, Sannaneggilu
Kashmiri	:	Pakhda, Michikand
Malayalam	:	Nerinjil
Marathi	:	Gokharu, Sarate
Oriya	:	Gokhyura, Gukhura
Punjabi	:	Bhakhra, Gokhru
Tamil	:	Nerinjil, Nerunjil
Telugu	:	Palleru Kaya
Urdu	:	Khar-e-Khasak Khurd

### DESCRIPTION

#### a) Macroscopic

Fruit stalked, light or greenish yellow, five ribbed or angled, more or less spherical in structure and covered with short stiff or pubescent hairs, 1 cm in diameter with five pairs, of prominent short stiff spines, pointed downwards, about 0.5 cm in length, tips of spines almost meet in pairs whole together forming pentagonal framework around fruit, ripe fruit separates into five segment, of each cocci and each appears as single-fruit, each coccus semi-lunar or plano-convex in structure one chambered, armed with a pair of spines, starting from its middle, containing four or more seeds, taste, slightly astringent.

## **b) Microscopic**

Transverse section of fruit shows small epidermal cells of each coccus rectangular, unicellular trichomes in abundance, mesocarp 6-10 layers of large parenchymatous cells, rosette of calcium oxalate crystals abundantly present, mesocarp followed by 3-4 compact layers of small cells containing prismatic crystals of calcium oxalate.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## **ASSAY**

## **T.L.C.**

**CONSTITUENTS** - Potassium nitrate, sterols, sapogenin with pyroketone ring (diosgenin), gitogenin and hecogenins.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta

**Vipāka** : Madhura

**Karma** : Vātanut, Vṛṣya, Bṛmhaṇa, Aśmarīhara, Vastiśodhana

**IMPORTANT FORMULATIONS** - Gokṣurādi Guggulu, Traikaṇṭaka Ghr̥ta, Drākṣadi Cūrṇa

**THERAPEUTIC USES** - Kāsa, Śvāsa, Aśmarī, Mūtrakṛcchra, Prameha, Arśa, Śūlaroga, Hṛdroga, Daurbalya

**DOSE** - 3-6 g of the drug in powder form

20-30 g of the drug for decoction

## GUDŪCĪ (Stem)

Guḍūcī consists of dried, matured pieces of stem of *Tinospora cordifolia* (Willd.) Miers. (Fam, Menispermaceae), a perennial climber found throughout Tropical India, drug collected during summer preferably in the month of May, drug is used in fresh form also.

### SYNONYMS

Sanskrit	:	Amṛtavallī, Amṛtā, Madhuparnī, Guḍūcikā, Chinnodbhavā
Assamese	:	Siddhilata, Amarlata
Bengali	:	Gulanha
English	:	--
Gujrati	:	Galac, Garo
Hindi	:	Giloe, Gurcha
Kannada	:	Amrutaballi
Kashmiri	:	Amrita, Gilo
Malayalam	:	Chittamrutu
Marathi	:	Gulvel
Oriya	:	Guluchi
Punjabi	:	Gilo
Tamil	:	Seendal, Seendil kodi
Telugu	:	Thippateega
Urdu	:	Gilo

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces of varying thickness ranging from 0.6-5 cm in diameter, young stems green with smooth surfaces and swelling at nodes, older ones show a light brown surface marked with warty protuberances due to circular lenticels, transversely smoothed surface shows a radial structure with conspicuous medullary rays traversing porous tissues, taste bitter.

## b) Microscopic

Transverse section of stem shows outer-most layer of cork, differentiating into outer zone of thick-walled brownish and compressed cells, inner zone of thin walled colourless, tangentially arranged 3-4 rows of cells, cork broken at some places due to opening of lenticels, followed by 5 or more rows of secondary cortex of which the cells of outer rows smaller than the inner one, just within the opening of lenticels, groups of sclereids consisting of 2-10 cells found in secondary cortex region, outer zone of cortex consists of 3--5 rows of irregularly arranged, tangentially elongated chlorenchymatous cells, cortical cells situated towards inner side, polygonal in shape and filled with plenty of starch grains, simple, ovoid, or irregularly ovoid-elliptical, occasionally compound of 2-4 components, several secretory cells, found scattered in the cortex, pericyclic fibres lignified with wide lumen and pointed ends, associated with a large number of crystal fibres containing a single prism in each chamber, vascular zone composed of 10-12 or more wedge-shaped strips of xylem, externally surrounded by semi-circular strips of phloem, alternating, with wide medullary rays, phloem consists of sieve tube, companion cells and phloem parenchyma of polygonal or tangentially elongated cells, some of them contain crystals of calcium oxalate, cambium composed of one to two layers of tangentially elongated cells in each vascular bundle, xylem consists of vessels, tracheids, parenchyma and fibres, in primary xylem, vessels comparatively narrow devoid of tyloses, secondary xylem elements thick-walled, lignified, vessels cylindrical in shape bearing bordered pits on their walls some large vessels possess several tyloses and often contain transverse septa, medullary rays 15-20 or more cells wide containing rounded, hemispherical, oblong, ovoid, with faintly marked concentric striations and central hilum appearing like a point, starch grains of 5.5-11.20  $\mu$  in diameter and 6-11.28  $\mu$  in length, pith composed of large, thin-walled cells mostly containing starch grains.

## IDENTITY, PURITY AND STRENGTH

dried drug -Foreign matter

Total ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	16	per cent, Appendix	2.2.4.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.6.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.
Water-soluble extractive	Not less than	11	per cent, Appendix	
For fresh drug				
Foreign matter		Nil	Appendix	2.2.2.
Moisture content		75	per cent, Appendix	2.2.9.

**CONSTITUENTS** - Terpenoids and alkaloids.

**PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṣāya

**Guṇa** : Laghu

**Vīrya** : Uṣṇa

**Vipāka** : Madhura

**Karma** : Tridoṣaśāmakā, Saṃgrāhī, Balya, Dīpana, Rasāyana, Raktaśodhaka, Jvaraghna

**IMPORTANT FORMULATIONS** - Amṛtāriṣṭa, Amṛtottara Kvātha Cūrṇa, Guḍūcī Taila, Guḍūcyādi Cūrṇa, Guḍūcī Sattva, Chinnodbhavādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Kuṣṭha, Vātarakta, Jvara, Kāmalā, Pāṇḍu, Prameha

**DOSE** - 3-6 g of the drug in powder form

20-30 g of the drug for decoction

## GUGGULU (Exudate)

Guggulu consists of exudate of *Commiphora wightii* (Arn.) Bhand, Syn.

*Balsamodendron mukul* Hook. ex Stocks *Commiphora mukul* Engl.), {Fam. Burseraceae), a small perennial tree or shrub upto 1.2-1.8 m high, occurring in rocky tracts of Rajasthan, Gujarat , exudate is collected during winter season by making the incisions in the bark or in summer, falling from the bark itself.

### SYNONYMS

Sanskrit	:	Purā, Mahiṣākṣa, Kauśika, Palañkaṣā
Assamese	:	Guggul
Bengali	:	Guggula
English	:	Gum-gugul, Indian Bdellium
Gujrati	:	Gugal, Guggal, Gugar
Hindi	:	Guggul, Gugal
Kannada	:	Kanthagana, Guggala, Mahishaksha guggulu, Guggulugida, Guggulu
Kashmiri	:	Guggal Dhoop, Kanth Gan
Malayalam	:	Gulgulu, Guggulu
Marathi	:	Guggul, Mahishaksh
Oriya	:	Guggulu
Punjabi	:	Guggal
Tamil	:	Mahisaksi Guggalu
Telugu	:	Makishakshi guggulu, Guggipannu
Urdu	:	Muqil (Shihappu)

### DESCRIPTION

#### a) Macroscopic

Drug occurs in vermicular or stalactitic pieces of pale yellow or brown coloured mass, makes milky emulsion in hot water and readily burns, when fresh viscid and golden coloured, odour, aromatic, taste., bitter and astringent.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	4	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	27	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	53	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oil, gum, resin, steroids

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Sara, Viśada
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātabalāsajit, Rasāyana, Varṇya, Balya, Bhagnasandhānakṛt, Medohara

**IMPORTANT FORMULATIONS** - Yogarāja Guggulu, Vātāri Guggulu, Siṃhanāda Guggulu, Kaiśora Guggulu, Mahāyogarāja Guggulu, Candraprabhā Vatī

**THERAPEUTIC USES** - Vātavyādhi, Āmavāta, Granthi, Śopha, Gaṇḍamālā, Medoroga, Prameha, Kuṣṭha

**DOSE** - 2-4 g of the drug

## GUÑJĀ (Seed)

Guñjā consists of seeds of *Abrus precatorius* Linn. (Fam. Leguminosae): a climber met with all along Himalayas ascending to 900 m, spreading throughout plains, flowering in August-September, and fruits ripen during winter.

### SYNONYMS

Sanskrit	:	Raktikā, Kākaṇantī
Assamese	:	Rati
Bengali	:	Kunch, Shonkainch
English	:	Jequirity
Gujrati	:	Rati, Chanothee
Hindi	:	Ratti, Ghungchi
Kannada	:	Galuganji, Gulagunjee
Malayalam	:	Kunni, Cuvanna Kunni
Marathi	:	Gunja
Oriya	:	Kainch
Punjabi	:	Ratti
Tamil	:	Kuntri, Kunrimani, Kundamani
Telugu	:	Guriginja, Gurivinda
Urdu	:	Ghongcha, Ratti

### DESCRIPTION

#### a) Macroscopic

Characterised by smooth, glossy surface and bright scarlet colour with black patch hilum, ovoid or sub-globular, 5-8 mm long, 4-5 mm broad.

#### b) Microscopic

Transverse section of seed shows testa about 75  $\mu$  thick, greater parts being formed by epidermis, composed of radially, much elongated cells, arranged irregularly

and measure 45-50  $\mu$  in length, Inner region of thin testa consists of collapsed cells forming a hyaline layer about 25  $\mu$  thick, endodermis composed of thick-walled cellulosic parenchyma, isodiametric cells larger towards inside, walls mainly of hemicellulose and swell considerably in water, outer one or two layers of cells of endodermis (pseudoeplidermis) formed of rather smaller cells, walls of which swell to less extent in water.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

**CONSTITUENTS** - An albuminous substance (abrine and abralin).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātapittajvarāpaha, Keśya, Kaṇḍūghna, Vraṇāpaha, Garbhanirodhaka

**IMPORTANT FORMULATIONS** - Mṛtasañjīvanī Guṭikā, Guñjābhadrā Rasa

**THERAPEUTIC USES** - Kuṣṭha, Vraṇa, Vātavyādhi, Indralupta

**DOSE** - 60-180 mg of the drug in powder form\*

Note: Śōdhana of this drug is to be done before use as described in the Appendix.

\* The dose should not exceed the higher limits.

## HARIDRĀ (Rhizome)

Haridrā consists of the dried and cured rhizomes of *Curcuma longa* Linn. (Fam. Zingiberaceae), a perennial herb extensively cultivated in all parts of the country, crop is harvested after 9-10 months when lower leaves turn yellow rhizomes carefully dug up with hand-picks between October-April and cured by boiling and dried.

### SYNONYMS

Sanskrit	:	Rajani, Niśā, Niśī, Rātri, Kṣaṇadā, Doṣā
Assamese	:	Haldhi, Haladhi
Bengali	:	Halud, Haldi
English	:	Turmeric
Gujrati	:	Haldar
Hindi	:	Haldi, Hardi
Kannada	:	Arishina
Kashmiri	:	Ledar, Ladhir
Malayalam	:	Manjal
Marathi	:	Halad
Oriya	:	Haladi
Punjabi	:	Haldi, Haldar
Tamil	:	Manjal
Telugu	:	Pasupu
Urdu	:	Haldi

### DESCRIPTION

#### a) Macroscopic

Rhizomes ovate, oblong or pyriform (round turmeric) or cylindrical, often short branched (long turmeric), former about half as broad as long, latter 2-5 cm long and about 1-1.8 cm thick, externally yellowish to yellowish-brown with root scars and annulations of leaf bases, fracture horny, fractured surface orange to reddish brown, central cylinder twice as broad as cortex: odour and taste characteristic.

## b) Microscopic

Transverse section of rhizome shows epidermis with thick-walled, cubical cells of various dimensions, cortex characterised by the presence of mostly thin-walled rounded parenchyma cells scattered collateral vascular bundles, a few layers of cork developed under epidermis and scattered oleo-resin cells with brownish contents; cork generally composed of 4-6 layers of thin-walled, brick-shaped parenchyma, cells of ground tissue contain starch grains of 4-15  $\mu$  in diameter, oil cell with suberised walls containing either orange-yellow globules of volatile oil or amorphous resinous matter, vessels mainly spirally thickened, a few reticulate and annular.

### Identification-

- 1) On the addition of *Concentrated Sulphuric acid* or a mixture of *Concentrated Sulphuric acid* and *alcohol* to the powdered drug, a deep crimson colour is produced.
- 2) A piece of filter paper is impregnated with an alcoholic extract of the powder, dried, and then moistened with a solution of *Boric acid* slightly acidified with *Hydrochloric acid*, dried again, the filter paper assumes a pink or brownish red colour which becomes deep blue or greenish-black on the addition of alkali.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.
Volatile oil	Not less than	4	per cent, v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oil and a colouring matter (curcumin).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittanut, Viṣaghna, Varṇya, Kuṣṭhaghna, Kṛmighna, Pramehanāśaka

## IMPORTANT FORMULATIONS - Haridrā Khaṇḍa

**THERAPEUTIC USES** - Viṣavikāra, Kuṣṭha, Vraṇa, Tvagroga, Prameha, Pāṇḍu, Śītapitta, Pīnasa

**DOSE** - 1-3 g of the drug in powder form

## HARĪTAKĪ (Fruit)

Harītakī consists of the pericarp of mature fruits of *Terminalia chebula* Retz. (Fam. Combretaceae), a moderate sized or large tree found throughout India, chiefly in deciduous forests and areas of light rainfall, but occasionally also in slightly moist forests, upto about 1500 m elevation, throughout India, flowers appear from April, August and fruits ripen from October-January.

### SYNONYMS

Sanskrit	:	Abhayā, Kāyasthā, Śivā, Pathyā, Vijayā (Not Bhaṅgā)
Assamese	:	Shilikha
Bengali	:	Haritaki
English	:	Myrobalan
Gujrati	:	Hirido, Himaja, Pulo-harda
Hindi	:	Harre, Harad, Harar
Kannada	:	Alalekai
Kashmiri	:	Halela
Malayalam	:	Katukka
Marathi	:	Hirda, Haritaki, Harda, Hireda
Oriya	:	Harida
Punjabi	:	Halela, Harar
Tamil	:	Kadukkai
Telugu	:	Karaka, Karakkaya
Urdu	:	Halela

### DESCRIPTION

#### a) Macroscopic

Intact fruit yellowish-brown, ovoid, 20-35 mm long, 13-25 mm wide, wrinkled and ribbed longitudinally, pericarp fibrous, 3-4 mm thick, non-adherent to the seed, taste, astringent.

## b) Microscopic

Transverse section of pericarp shows epicarp consisting of one layer of epidermal cells inner tangential and upper portions of radial wall thick, mesocarp, 2-3 layers of collenchyma, followed by a broad zone of parenchyma in which fibres and sclereids in group and vascular bundles scattered, fibres with peg like out growth and simple pitted walls, sclereids of various shapes and sizes but mostly elongated, tannins and raphides in parenchyma, endocarp consists of thick-walled sclereids of various shapes and sizes, mostly elongated, epidermal surface view reveal polygonal cells, uniformly thick-walled, several of them divided into two by a thin septa, starch grains simple rounded or oval in shape, measuring 2-7  $\mu$  in diameter, found in plenty in almost all cells of mesocarp.

**Powder-** Brownish in colour, under microscope shows a few fibres, vessels with simple pits and groups of sclereids.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	40	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	60	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins, anthraquinones and polyphenolic compounds

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Kaṭu, Tikta, Amla, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Sarvadoṣapraśamana, Rasāyana, Cakṣuṣya, Dīpana, Anulomana, Hṛdya, Medhya

**IMPORTANT FORMULATIONS** - Abhayāriṣṭa, Agastya Harītakī Rasāyana, Citraka Harītakī, Dantī Harītakī, Daśamūla Harītakī, Brāhma Rasāyana, Triphalā Cūrṇa, Triphalādi Taila, Abhayā Lavaṇa, Pathyādi Lepa

**THERAPEUTIC USES** - Vibandha, Aruci, Udāvarta, Gulma, Udararoga, Arśa, Pāṇḍu, Śoṭha, Jīrṇajvara, Viṣamajvara, Prameha, Śīroroga, Kāsa, Tamakaśvāsa, Hṛdroga

**DOSE** - 3-6 g of the drug in powder form

## HINGU (Oleo-gum-resin)

Hingu consists of oleo-gum-resin obtained from rhizomes and roots of *Ferula foetida* Regel., *Ferula narthex* Bioss, and other species of *Ferula* (Fam. Umbelliferae), a perennial herb, occurring in Persia and Afghanistan, resin collected after making incisions at the upper part of tap root of more than five year old plants by scrapping in March, April, just before flowering, whole process repeated many times, after one or two days or after a few weeks when it gets hardened.

### SYNONYMS

Sanskrit	:	Rāmaṭha, Sahasravedhi
Assamese	:	Hin
Bengali	:	Hing
English	:	Asfoetida
Gujrati	:	Hing, Vagharni
Hindi	:	Hing, Hingda
Kannada	:	Hing, Ingu
Kashmiri	:	Eng
Malayalam	:	Kayam
Marathi	:	Hing, Hira, Hing
Oriya	:	Hengu, Hingu
Punjabi	:	Hing
Tamil	:	Perungayam
Telugu	:	Inguva
Urdu	:	Hitleet, Hing

### DESCRIPTION

#### a) Macroscopic

Rounded, flattened or masses of agglutinated tears, greyish-white to dull yellow, mostly 12-25 mm in diameter, freshly exposed surface, yellowish and translucent or milky white, opaque, slowly becoming pink, red, finally reddish brown, odour, strong, characteristic and persistent, taste, bitter and acrid.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH-

#### Identification

(I) Freshly broken surface when touched with *sulphuric acid* a bright red or reddish-brown colour is produced, changing to violet when acid washed off with water.

(II) Boil 0.2 g with 2 ml *Hydrochloric acid* for about 1 minute, cool, dilute with an equal volume of *water*, and filter into 3 ml of dilute solution of Ammonia, fluorescence is produced.

*Absence of colophony resin*:-Triturate 1 g with 10 ml of Light Petroleum (b.p. 40°-60°) for 2 minutes, filter into a test tube and add to the filtrate 10 ml of a fresh 0.5 per cent w/v aqueous solution of copper acetate, shake well and allow the liquids to separate, petroleum layer does not show any green colour, indicating absence of colophony resin.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	50	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	50	per cent, Appendix	2.2.7.

### ASSAY

Place about 5 g accurately weighed, in a small beaker furnished with a glass rod, and tared add 50 ml of Alcohol (90 per cent), and boil gently. Filter the hot solution through a tared filter paper and boil the residue with further quantities of Alcohol (90 per cent); until all soluble matter is removed, using the glass rod to disintegrate the soluble matter. Wash the filter paper with hot alcohol (90 per cent) transfer the paper to the beaker, dry

the 100 $\bar{0}$ , and weigh. The- residue weighs not more than 50 per cent of the original sample taken.

**CONSTITUENTS** - Essential oil, gum and resin

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu

**Guṇa** : Tīkṣṇa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Rucya, Dīpana, Pācana, Anulomana, Kṛmighna, Vātakaphapraśamana, Hṛdya

**IMPORTANT FORMULATIONS** - Hiṅgvāṣṭaka Cūrṇa, Hiṅgvādi Cūrṇa, Hiṅgvacādi Cūrṇa

**THERAPEUTIC USES** - Agnimāndya, Ādhmāna, Ānāha, Gulma, Śūlaroga, Udararoga, Hṛdroga, Kṛmiroga

**DOSE** - 125-500 mg of the drug

## JATĀMĀMSĪ (Rhizome)

Jatāmāmsī consists of dried rhizome of *Nardostachys jatamansi* DC. (Fam. Valerianaceae), an erect perennial herb, 10-60 cm high growing at an altitude of 3000-5000 m on the sub-alpine Himalayan tracts.

### SYNONYMS

Sanskrit	:	Māmsī, Jaṭā, Jaṭilā
Assamese	:	Jatamansi, Jatamangshi
Bengali	:	Jatamamsi
English	:	Nardus root
Gujrati	:	Baalchad, Kalichad
Hindi	:	Balchara
Kannada	:	Bhootajata, Ganagila maste
Kashmiri	:	Bhutijata
Malayalam	:	Manchi, Jatamanchi
Marathi	:	Jatamansi
Oriya	:	Jatamansi
Punjabi	:	Billilotan, Balchhar, Chharguddi
Tamil	:	Jatamanji
Telugu	:	Jatamamsi
Urdu	:	Sumbul-ut-teeb

### DESCRIPTION

#### a) Macroscopic

Dried rhizome dark brown, 2.5-7.5 cm long, cylindrical, covered with reddish-brown fibres forming a net work, which are skeletons of sheathing leaf bases, fracture, brittle, internal colour reddish-brown, colour, strongly aromatic, taste, acrid, slightly bitter.

## b) Microscopic

Transverse section of rhizome shows cork consisting of 2-5 layers of cells filled with oil globules, cortex characterised by the presence of schizogenous canals, phloem in form of patches of small cells, cambium ring distinct and continuous, xylem consists of vessels, scattered individually or in rows of two or three vessels, with scalariform thickening, older rhizomes show one or more stellate shaped rings of interxylary and medullary cork, completely or incompletely separating the rhizome into four to nine vascular strands by joining outer cork, each separated strand encircled by a few layers of cork cell consisting of an outer cortex zone followed by two or more functional vascular bundles, tissues in between the strands usually non-functional except for the cork cells which act as storage organ for oil globule.

## IDENTITY, PURITY AND STRENGTH-

**Identification**-Shake about 2 g of the powder with 5 ml of Alcohol (80 per cent) for ten minutes and filter, Place one drop of the filtrate on a filter paper, dry and examine under ultra-violet light, a bright, bluish-white fluorescence is visible.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	5	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.
Volatile oil	Not less than	0.1	per cent, v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oil and resinuous matter

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Tridoṣānut, Medhya, Varṇya, Nidrājanana, Kuṣṭhaghna

**IMPORTANT FORMULATIONS** - Jaṭāmāṃsyarka

**THERAPEUTIC USES** - Kuṣṭha, Dāha, Visarpa, Mānasaroga, Anidrā

**DOSE** - 2-3 g of the drug in powder form /par5-10 g of the drug for decoction

## JĀTĪPHALA (Seed)

Jātīphala consists of the endosperm of dried seeds (kernels of fruits) of *Myristica fragrans* Houtt. (Fam. Myristicaceae), dioecious or occasionally monoecious aromatic tree, about 10-20 m high, found mostly in Tamil Nadu and to some extent in Kerala, Andhra Pradesh and Assam.

### SYNONYMS

Sanskrit	:	Jātiśasya, Jātīphala
Assamese	:	Jaiphal, Kanivish
Bengali	:	Jaiphala, Jaitri
English	:	Nutmeg
Gujrati	:	Jaiphala, Jayfar
Hindi	:	Jaiphal
Kannada	:	Jadikai, Jaykai, Jaidikai
Kashmiri	:	Jafal
Malayalam	:	Jatika
Marathi	:	Jaiphal
Oriya	:	Jaiphal
Punjabi	:	Jaiphal
Tamil	:	Sathikkai, Jathikkai, Jatikkai, Jadhikai, Jadhikkai
Telugu	:	Jajikaya
Urdu	:	Jauzbuwa, Jaiphal

### DESCRIPTION

#### a) Macroscopic

Seed ellipsoid, 20-30 mm long and about 20 mm broad, externally greenish-brown sometimes marked with small irregular dark brown patches or minute dark points and lines slightly furrowed reticulately, a small light-coloured area at one end indicating the position of the radicle a groove running along the line of raphe to the darker chalaza at the opposite end, surrounded by a thin layer of perisperm with infoldings appearing as dark ruminations in the abundant greyish-brown endosperm, embryo, in an irregular cavity, small with two widely spreading crumpled cotyledons and a small radicle odour,

strong and aromatic, taste, pungent and aromatic.

### **b) Microscopic**

Transverse section of endosperm shows peripheral perisperm, of several layers of strongly, flattened polyhedral cells with brown contents, or containing prismatic crystals, inner layer of perisperm of thin-walled parenchyma about 40  $\mu$  thick, infolding into the tissue of the endosperm to form the ruminations containing numerous, very large oil cells with brown cell walls, vascular strands, in the peripheral region, numerous small spiral vessels, large celled, endosperm, parenchymatous With occasional tannin idioblasts with thin brown walls, containing numerous simple, rounded and compound starch grains, with upto about 10 components usually 2-8 individual grains, upto 20  $\mu$  in diameter present, most of the cells with crystalline fat and often a large aleurone grain in each cell, containing a rhombic protein crystal upto 12  $\mu$  and small aleurone grains with less regular crystalloids, embryo, of shrivelled and collapsed parenchyma.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	11	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.
Ether soluble extractive	Not less than	25	per cent, Appendix	2.2.8
Volatile oil	Not less than	5	per cent, v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oil and fixed oil

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guna</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Dīpana, Grāhī, Mukhakledanāśaka, Mukhadaurgandhyanāśaka,  
Kaphavātāpaha, Vṛṣya

**IMPORTANT FORMULATIONS** - Jātīphalādi Cūrṇa

**THERAPEUTIC USES** - Atīsāra, Grahaṇī, Chardi, Mukharoga, Pīnasa, Kāsa, Śvāsa,  
Śukrameha

**DOSE** - 0.5 - 1.0 g of the drug in powder form

## **KAMPILLA (Fruit)**

Kampilla consists of glands and hairs of fruit of *Mallotus philippinensis* Muell . Arg. (Fam. Euphorbiaceae), a very common perennial shrub or small tree found in outer Himalayas ascending to 1500 m, mature fruits collected in February-March, reddish brown powder collected in cloth by shaking and rubbing the fruits with hands.

### **SYNONYMS**

Sanskrit	:	Rajanaka, Kampillaka
Assamese	:	Lochan
Bengali	:	Kamlagudi
English	:	Kamala
Gujrati	:	Kapilo
Hindi	:	Kabila
Kannada	:	Kapila, Chandrahettu, Kapilathettu
Kashmiri	:	Kameelak
Malayalam	:	Kampippala, Kampipalu
Marathi	:	Shendri, Kapila
Oriya	:	Kamalagundi
Punjabi	:	Kamila
Tamil	:	Kamala, Kampila
Telugu	:	Kampillamu
Urdu	:	Kamila

### **DESCRIPTION**

#### **a) Macroscopic**

Fine, granular powder, dull-red or madder-red coloured, floating on water.

#### **b) Microscopic**

Under microscope glands appear depressed and globular, containing deep-red coloured resin, secreted by many club shaped cell radiating from a common centre, a number of stellate trichomes present, trichomes thick-walled, branching lignified with smooth margins, yellow coloured, arranged in small radiating groups.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 50	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 1.0	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

**CONSTITUENTS** - Resinous colouring matter (rottlerin).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Virecana, Vraṇāpaha, Kṛmighna

**IMPORTANT FORMULATIONS** - Dhānvantara Ghṛta, Miśraka Sneha

**THERAPEUTIC USES** - Vibandha, Kṛmiroga, Ādhmāna, Gulma, Vraṇa

**DOSE** - 0.5-1.0 g of the drug in powder form

Note- Śōdhana of this drug is to be done before use, as described in Appendix

## KĀÑCANĀRA (Stem bark)

Kāñcanāra consists of the dried, stem bark of *Bauhinia variegata* Blume (Fam. Leguminosae): a medium sized tree occurring in sub-Himalayan tract extending eastwards to Assam, Eastern, Central and South India.

### SYNONYMS

Sanskrit	:	Kāñcanāraka
Assamese	:	Kancan, Kanchan
Bengali	:	Kanchana, Rakta Kanchana
English	:	Mountain Ebony
Gujrati	:	Champakati, Kanchnar, Kachnar
Hindi	:	Kachanar, Kanchanar, Kachnar
Kannada	:	Keyumandar, Kanchavala
Kashmiri	:	Kalad
Malayalam	:	Chuvanna Mandharam
Marathi	:	Kanchana, Raktakancana
Oriya	:	Kachana, Kaniara
Punjabi	:	Kanchnar
Tamil	:	Sigappu mandarai, Sihappu mantarai
Telugu	:	Deva Kanchanam
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark, dark brown, sometimes with silvery patches, rough, compact, exfoliating in woody strips and scales, outer surface with small transverse and longitudinal cracks, internal surface white, taste, astringent

#### b) Microscopic

Transverse section of mature stem bark shows a wide stratified cork, outer cork composed of thin-walled, slightly compressed, yellow brown cells followed by a number of layers of brown coloured cells, inner cork composed of transversely elongated orange brown cells, cork interrupted at certain places due to formation of rhytidoma, some secondary cortex composed of 15 or more rows or transversely elongated to circular,

thin-walled, parenchymatous cells, some secondary cortex cells contain orange brown contents: groups of stone cells found scattered in this region occasionally arranged in 1-7 or more tangential rows, pericyclic fibres, thick-walled with narrow lumen, scattered in secondary cortex in singles or in groups, secondary phloem consists of sieve tubes, companion cells, phloem parenchyma and fibres traversed by funnel shaped medullary rays, phloem fibres arranged in radial rows throughout phloem region, prismatic and rhomboidal crystals or calcium, oxalate abundantly found in phloem and secondary cortex regions, very rarely found in cork cells, cluster crystals also present in secondary cortex and secondary phloem, crystal fibres also found in secondary phloem.

**Powder** - pinkish, under microscope showing abundant crystals of calcium oxalate, sclereids in singles or in groups with wide lumen, bits of fibres, cork and secondary cortex cells, containing coloured content, and numerous crystal fibres

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	11 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣahara, Grāhī, Dīpana, Gaṇḍavṛddhahara

**IMPORTANT FORMULATIONS** - Kāñcanāra Guggulu

**THERAPEUTIC USES** - Kṛmiroga, Gaṇḍamālā, Apacī, Gudabhraṃśa, Vraṇa

**DOSE** - 20-30 g of the drug for decoction

## KAN̄KOLA (Fruit)

Kan̄kola consists of mature, dried fruits of *Piper cubeba* Linn.f. (Fam. Piperaceae), woody, climbing, perennial with dioecious flowers in spike, cultivated to a small extent in India, specially in the Karnataka state, fruits collected when mature but still unripe and carefully dried.

### SYNONYMS

Sanskrit	:	Kan̄kolaka, Cinoṣaṇa, Cinatīkṣṇa, Kakkola, Kan̄kolikā
Assamese	:	Kakkol, Kababchani
Bengali	:	Kahabchani, Sugandhamaricha
English	:	Cubebs, Tailed Pepper
Gujrati	:	Chanakabab, Chinikabab
Hindi	:	Seetalchini, Kababchini
Kannada	:	Gandhamenasu, Balamenasu
Kashmiri	:	Kushfal, Kababchini
Malayalam	:	Cheenamulaku, Takkolam, Valmulaku
Marathi	:	Kankol
Oriya	:	Kababchini
Punjabi	:	Kababchini, Sardchini
Tamil	:	Vaali milaku, Valmilagu
Telugu	:	Chalavamiriyalu, Tokamiriyalu
Urdu	:	Kababchini

### DESCRIPTION

#### a) Macroscopic

Fruit wrinkled, rounded, 5-7 mm in diameter, light brown to dark brown, about 7 mm long stalk attached, pericarp red to slightly brown, testa fused with pericarp, fruit hard and stony albumen white and oily, odour, aromatic end characteristic, taste, pungent and slightly bitter.

## b) Microscopic

Transverse section of fruit shows an outer layers of epidermis, externally covered with thick cuticle, a row of 2-5 small, crushed, brown and thick-walled cells below, mesocarp composed of large, thin-walled parenchymatous cells, oil cells and vascular bundles, endocarp of multi-layered sclereids heavily lignified with narrow lumen, testa and tegmen composed of elongated cells tegmen cells hyaline and kernel cells greyish in colour.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

**CONSTITUENTS** - Essential oil (cubebin).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Rucya, Kaphavātahara, Mukhadaurgandhyahara, Vastiśodhana

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Kumāryāsava

**THERAPEUTIC USES** - Aruci, Mukharoga, Mūtrakṛcchra, Śūla

**DOSE** - 1-2 g of the drug in powder form

## KANṬAKĀRĪ (Whole plant)

Kanṭakārī consists of mature, dried whole plant of *Solanum surattense* Burm. f., Syn. *Solanum xanthocarpum* Schrad. & Wendl, (Fam. Solanaceae), perennial, very prickly diffused herb of waste land, found throughout India.

### SYNONYMS

Sanskrit	:	Vyāghrī, Nidigdrikā, Kṣudrā, Kanṭakārikā, Dhāvanī, Nidigdā, Dusparśā
Assamese	:	Katvaedana, Kantakar
Bengali	:	Kantakari
English	:	Febrifuge plant
Gujrati	:	Bharingani
Hindi	:	Katai, Katali, Ringani, Bhatakataiya, Chhotikateri
Kannada	:	Nelagulla, Kiragulla
Malayalam	:	Kantakari chunda
Marathi	:	Bhauringani, Kataringani
Oriya	:	Bhejibaugana, Ankarati, Chakada Bhoji
Punjabi	:	Kandiari
Tamil	:	Kandangatri, Kandankatri, Kandanghathiri
Telugu	:	Nelamulaka, Pinnamulaka, Mulaka, Chinnamulaka, Vakudu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root**-10-45 cm long, few mm to two cm in diameter, almost cylindrical and tapering, bearing a number of fine longitudinal and few transverse wrinkles with occasional scars or a few lenticels and small rootlets, transversely smoothed surface shows a thin bark and wide compact cylinder of wood, fracture, short, taste, bitter.

**Stem**-herbaceous, prickly with prominent nodes and internodes, green when fresh, young branches, covered with numerous hairs, mature ones glabrous, furrows more prominent in young stem appearing almost circular towards basal region, stem pieces 8-10 mm thick of variable length, external surface light green, when dry,

surface yellowish green and smooth, transversely smoothened surface shows a very thin bark and prominent wood, centre shows a large and distinct, pith, mature and dry stem often with hollow pith, fracture short to slightly fibrous.

**Leaves**-petiolate, exstipulate, ovate--oblong or elliptic, sinuate or sub-pinnatifid, sub-acute hairy, 4-12.5 cm long and 2-7.5 cm wide, green, veins and midrib full with sharp prickles, odour and taste not distinct.

**Flower**-ebracteate, pedicellate, bisexual, pentamerous, regular, complete, bright blue or bluish purple, . calyx-persistent, gamosepalous, tube short, globose, linear-lanceolate, acute, hairy, 0.5-1.3 cm long and densely prickly, corollagamopetalous, lobes deltoid, acute, hairy, 1-2 cm long and purple in colour, stamens 5, epipetalous, basifixed, filament short 1-1.5 mm long, anther, oblong lanceolate, 0.7-0.8 cm long, ovary superior, ovoid, glabrous, bilocular with axile placentation having numerous ovules.

**Fruit**-Berry globular, measuring 0.8-1 cm in diameter, surrounded by persistent calyx at base unripe fruits variegated with green and white strips, ripe fruit shows different yellow and white shades.

**Seeds**-circular, flat, numerous, embedded in a fleshy mesocarp about 0.2 cm in diameter. glabrous taste, bitter and acrid.

## **b) Microscopic**

**Root**- transverse section of mature root shows cork composing of 3-6 layers of thin-walled, rectangular and tangentially elongated cells, cork cambium single layered followed by 6-15 layers of thin-walled, tangentially elongated to oval or circular parenchymatous cells, stone cells either single or in groups of 2-20 or even more present in this region, secondary phloem composed of sieve elements and phloem parenchyma traversed by medullary rays, stone cells present in singles or in groups of 2-20 or more in outer, and middle phloem regions, phloem rays 1-4 cells wide and 2-22 cells high, cambium 3-5 layered of thin-walled rectangular cells, xylem composed of vessels, tracheids, fibre tracheids, parenchyma and transversed by medullary rays, all elements being lignified, vessels and tracheids with bordered pits, fibres with a few simple pits, xylem parenchyma rectangular or lightly elongated with simple pits and rarely with reticulate thickening, xylem rays 1-3 cells wide and 1-20 cells high, microspenoidal crystals of calcium oxalate as sandy masses and simple starch grains present in secondary cortex, phloem and medullary rays.

**Stem**-transverse section of mature stem, 1.5-2 cm thick consists of 6-12 layers of cork of thin-walled somewhat rectangular cells, epidermis remains intact for a long time, secondary cortex consists of 7-11 layers of parenchymatous cells, some cells thickened and lignified forming stone cells primary cortex remains intact even in quite mature stage but later gets crushed, pericyclic fibre, occur singly or in small groups of 2-3, secondary phloem consists of sieve elements, parenchyma, a few fibres, stone cells and traversed by phloem rays, fibres found scattered in singles or in small groups in outer and middle phloem region, inner phloem devoid of fibres, stone cells present in singles

or in small groups of 2-4, phloem rays, 1-2 or rarely 3 cells wide, cambium composed of 2-3 layers, xylem consists of vessels, tracheids, parenchyma, fibres and traversed by xylem rays, vessels vary greatly in shape and size and show bordered pits, tracheids elongated with irregular walls and bordered pits, fibres much elongated, thick-walled and lignified with tapering and pointed ends, some having truncated ends or bifurcated at one or both ends with a few simple pits, tracheids fibres smaller than fibres, with both ends tapering and have reticulate thickening, xylem parenchyma cubical to rectangular with simple or bordered pits or reticulate thickening, xylem rays conspicuous by their pitted thickenings, longer size and radial elongation of cells, 1-2 or rarely 3 cells wide and 2-25 cells high, internal phloem composed of sieve elements and parenchyma, forming more or less continuous band and embedded in perimedullary zone, a few phloem fibres similar to those of outer phloem region also present, central region occupied by a large pith, microsphenoidal crystals of calcium oxalate as sandy masses and simple starch grains present in cortex, secondary cortex, phloem, medullary rays and pith cells.

### **Leaves-**

- (i) *Petiole*-transverse section of petiole shows circular to wavy outlines, epidermis single layered, covered externally by a thick cuticle, hypodermis consists of 3-4 layers of collenchymatous, cells, one large-crescent-shaped, bicollateral, central vascular bundle and two small lateral bundles present, rest of tissue of petiole composed of polygonal, angular, thin-walled, parenchymatous cells, epidermis shows mostly stellate and rarely urn to tricellular hairs.
- (ii) *Midrib*-transverse section of midrib shows a biconvex structure, epidermis on either side covered externally by a thick cuticle, below epidermis 3-4 layers of collenchyma present, stele composed of crescent-shaped, bicollateral, central vascular bundle and two small lateral vascular bundles, rest of tissue composed of thin-walled, parenchyma, some stellate hair present on epidermis.
- (iii) **Lamina**-transverse section shows dorsiventral structure, epidermis on either side, wavy in outline, covered externally by a thick cuticle, on upper side mesophyll composed of a single layered palisade and 4-6 layers of loosely arranged spongy parenchyma, some stellate hairs (4-8 armed) present on both sides of epidermis, anisocytic stomata present on both surfaces, vein-islet number 46-80 on lower epidermis (mean 63), 61-80 on upper epidermis (mean 70), stomatal index 20-25 (mean 22.5) on lower epidermis, 14-24 (mean 19) on upper epidermis, palisade ratio 1.7-4 (mean 2.85).

*Fruit*-transverse section of mature fruit shows single layered epidermis, covered externally by a thin cuticle, 1-2 layers of collenchyma present below epidermis, mesocarp composed of thin-walled, oval to polygonal cells, some fibre., vascular bundles present scattered, seed consists of thick-walled radially elongated testa, narrow endosperm with embryo, some cells of endosperm contain oil globules.

**Powder** - Greenish, under microscope shows single or groups of stone cells, groups of aseptate fibre with tapering ends, pitted vessels, groups of spongy parenchyma, fragments of palisade tissue, anisocytic stomata, stellate hairs and simple, rounded

to oval starch grains measuring 2.75-11 µ in dia.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Glucoalkaloids and sterols

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Āmadoṣanāśaka, Kaṇṭhya, Śothahara

**IMPORTANT FORMULATIONS** - Kaṇṭakāryāvāleha, Pañcatiktaka Ghṛta, Vyāghrīhar  
ītakī

**THERAPEUTIC USES** - Śvāsa, Kāsa, Jvara, Aruci, Pīnasa, Pārśvaśūla, Svarabheda

**DOSE** - 20-30 g of the drug for decoction

## KANYĀSĀRA (Leaf)

Kanyāsāra consists of dried juice of leaves of *Aloe barbadensis* Mill. Syn. *Aloe vera* Tourn.ex Linn, *Aloe indica* Royle. (Fam. Liliaceae), shrub planted in many Indian gardens and found growing throughout India.

### SYNONYMS

Sanskrit	:	Kumārīrasasambhava, Sahāsāra
Assamese	:	Musabhar, Machambar
Bengali	:	Ghritakalmi
English	:	Indian Aloe
Gujrati	:	Eliyo, Eariyo
Hindi	:	Musabhar, Elva
Kannada	:	Karibola, Lolesara satva, Lovalsara, Lolesara
Kashmiri	:	Musabbar, Siber
Malayalam	:	Chenninayakam
Marathi	:	Korphad
Oriya	:	Musabara
Punjabi	:	Kalasoлага, Mussabar, Alua
Tamil	:	Kattazhi, Satthukkathazhai
Telugu	:	Musambaram
Urdu	:	Musabbar, Ailiva, Siber

### DESCRIPTION

#### a) Macroscopic

Dark chocolate brown, to black, compact, irregular masses: surface dull, opaque with slightly vitreous appearance, odour, characteristic, taste, nauseous and bitter.

#### b) Microscopic

Powder when mounted in glycerin or lactophenol and examined under the

microscope shows innumerable crystalline, yellowish-brown to chocolate coloured particles of varying size and shape.

## IDENTITY, PURITY AND STRENGTH-

### Identification:

Mix 0.5 g with 50 ml of *water*, boil until nearly dissolved, cool, add 0.5 g of *Kieselguhr* and filter, to the filtrate apply the following tests-

(i) Heat 5 ml of filtrate with 0.2 g of *Borax* until dissolved, add a few drops of this solution to a test-tube nearly filled with *Water*, a green fluorescence is produced.

(ii) Mix 2 ml of filtrate with 2 ml of a freshly prepared solution of *Bromine*, a pale yellow precipitate is produced.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	80 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	60 per cent, Appendix	2.2.7.
Moisture content	Not more than	10 per cent, Per cent of its weight	
when dried to constant weight at 105° C			2.2.9

**CONSTITUENTS** - Anthraquinone, glycoside

## PROPERTIES AND ACTION

**Rasa** : Kaṭu

**Guṇa** : Uṣṇa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Bhedi, Pittanirharāṇa, Rajaḥpravartaka, Jvaranut

**IMPORTANT FORMULATIONS** - Rajaḥpravartinī Vaṭī, Cukkumtipalyādi Guṭikā

**THERAPEUTIC USES** - Udararoga, Kaṣṭārtava, Jvara, Yakṛdvikāra

**DOSE** - 125 - 500 mg of the drug in powder form

## KARAÑJA (Seed)

Karañja consists of seeds of *Pongamia pinnata* (Linn.) Merr, Syn. *Pongamia glabra* vent.(Fam. Leguminosae), a medium sized glabrous tree with a short bole and spreading crown and found almost throughout India upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Karañjaka, Naktamāla, Naktāhva, Ghṛtakarañja
Assamese	:	Korach
Bengali	:	Nata Karanja, Dahara Karanja
English	:	Smooth leaved pongamia
Gujrati	:	Kanajo, Karanji
Hindi	:	Dithouri, Karuaini
Kannada	:	Honge, Hulagilu
Malayalam	:	Avittal, Ungu, Unu, Pungu
Marathi	:	Karanja
Oriya	:	Karnja
Punjabi	:	Karanj
Tamil	:	Pungan, Pongana
Telugu	:	Lamiga, Kanuga
Urdu	:	Karanj

### DESCRIPTION

#### a) Macroscopic

Seed usually one and rarely two, elliptic or reniform in shape, 1.7-2.0 cm long and 1.2-1.8 cm broad, wrinkled with reddish leathery testa, micropylar end of cotyledons slightly depressed while other side semi-circular in shape.

#### b) Microscopic

Transverse section of seed shows, testa composed of a layer of palisade like outer

epidermis, filled with brown pigment, covered externally with a thick cuticle, a layer of large, thin walled, somewhat rectangular cells, 2-4 layers of thick-walled parenchyma cells, a few rows of cells with small inter-cellular spaces, 2-3 layers of thick-walled elongated cells, a few layers of spongy parenchyma having large inter-cellular spaces, a number of parenchyma cells containing brown pigment, cotyledons composed of outer layer of epidermis with cylindrical cells, externally covered with thin cuticle, epidermis followed by rectangular to polygonal cells of mesophyll, filled with globules, also present scattered in this region.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	3 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	23 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Fixed oil, flavones and traces of essential oil

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphavātaghna, Kṛmijit, Kuṣṭhaghna, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa, Pathyādi Lepa

**THERAPEUTIC USES** - Vraṇa, Kṛmi, Kuṣṭha

**DOSE** - 0.25 g of the drug in powder form /par5-10 g of the drug for decoction

## KARAVĪRA (Leaf)

Karavīra consists of dried leaves of *Nerium indicum* Mill. Syn. *Nerium odorum Soland* (Fam. Apocynaceae), a large evergreen woody shrub with milky Juice, found throughout the year in upper Gangetic plains, Himalayas, from Nepal to Kashmir upto 2000 m. Central and Southern India, also cultivated near temples and gardens.

### SYNONYMS

Sanskrit	:	Hayamāraka, Harapriya, Aśvamāra
Assamese	:	Karbira, Karavi, Karvir
Bengali	:	Karavi, Kalkephul
English	:	Indian Oleander
Gujrati	:	Kanera, Karena, Karen
Hindi	:	Kaner
Kannada	:	Kanagalu, Kanagile
Kashmiri	:	Gandeela, Gandula
Malayalam	:	Kanave eram, Arali, Kattalari
Marathi	:	Kanher
Oriya	:	Kaniara, Kaniar
Punjabi	:	Kaner
Tamil	:	Arali, Alari, Aatrulari
Telugu	:	Ganneru
Urdu	:	Kaner

### DESCRIPTION

#### a) Macroscopic

Leaves exstipulate, linear, lanceolate, 10-20 cm long and upto 2.5 cm wide, thick, dark green and shining above and dotted beneath, venation unicostate, reticulate with midrib being stout and the secondary veins arising in very large number, running parallel, stomata anamocytic.

## b) Microscopic

*Petiole-transverse* section of petiole shows a single layer of epidermis covered externally by thick cuticle, epidermal cells elongate to form unicellular, non-lignified and non-glandular hairs, a wide zone of cortex, composed of 4-7 layers of collenchymatous cells and a wide zone of parenchyma follows the epidermis, parenchymatous cells thin-walled, more or less isodiametric with intercellular spaces, some cells contain rosette crystals of calcium oxalate, petiole receives three vascular bundles from stem, central one large and crescent shaped while other two much smaller and somewhat circular present on each side of central vascular bundle, phloem present on upper side and xylem on lower side with usual elements.

*Lamina-transverse* section of lamina shows an isobilateral structure, upper epidermis composed of penta or hexagonal parenchymatous cells, externally covered with thick cuticle, below upper epidermis. 2-3 layers of hypodermis present, palisade 3-4 layered composed of elongated and compactly arranged cells, vascular strands also seen in between palisade and spongy parenchyma, spongy parenchyma filled with chlorophyll, towards lower surface 2-3 layered palisade, below which parenchyma and lower epidermis present, lower epidermis also coated with the cuticle externally, in lower surface many pits possessing stomata, unicellular, non-glandular and non-lignified trichomes, rosette crystals of calcium oxalate present throughout lamina, average palisade ratio 4: 1.

*Midrib-transverse* section of midrib shows epidermis composed of a layer of cells, externally covered with cuticle, some epidermal cells on upper and lower sides form unicellular hairs, between epidermis and parenchyma 2-4 rows of thick-walled cells, more prominent towards lower side, some parenchymatous cells contain rosette crystals of calcium oxalate, laticifers found scattered singly or in groups of 2 in this region, beneath the vascular bundle a strip of fibres present, vascular bundle 'U' shaped, xylem being towards lower side and phloem towards the upper consists of tracheids, vessels and parenchyma, vessels with end-openings, rarely with side openings tracheids many with spiral, annular or reticulate thickenings on their walls.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Cardiac glucoside (oleandrin)

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Kaṣāya  
**Guṇa** : Tīkṣṇa, Laghu, Rūkṣa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Jvarāpaha, Cakṣuṣya, Kuṣṭhaghna, Kaṇḍūghna, Kṛmighna, Vraṇāpaha, Śvāsahara, (Prabhāva: Hṛdya)

**IMPORTANT FORMULATIONS** - Kāsīsādi Taila

**THERAPEUTIC USES** - Jvara, Vraṇa, Kuṣṭha, Kaṇḍū, Kṛmiroga, Netraroga, Tamakaśvāsa, Hṛdroga

**DOSE** - 30-125 mg of the drug in powder form

\*Dose should not exceed the higher limit

NOTE-Sodhana of this drug is to be done before use as described in the appendix.

## KARKAṬAŚŔŔŒĠ (Gall)

KarkaṭaśŔŔŒĠ consists of gall-like excrescences formed by insects on the leaves, petioles and branches of the plant *Pistacia chinensia* Burgo, *Pistacia integerrima* Stew. ex Brandis, *Rhus succedanea* Linn. (Fam. Anacardiaceae) during autumn season, growing on the steps of Western Himalayas from Indus to Kumaon at an altitude of 350-2400 m, often cultivated in Punjab plains.

### SYNONYMS

Sanskrit	:	ŚŔŔŒĠ, ViṣānĠ, Karkaṭa
Assamese	:	KakiasrŔŒĠ
Bengali	:	Kankda Shringi
English	:	Crab's claw
Gujrati	:	Kakada shing, Kakada singi
Hindi	:	Kakadasingī, Kakarasingī, Gheekadava
Kannada	:	Kakadasingī, Karkatakasringī
Kashmiri	:	Kakkar, Kamaladina
Malayalam	:	Karkatasringi
Marathi	:	Kakadshingī
Oriya	:	Kakadashringi, Kakadashringi
Punjabi	:	Kakar, Kakarsingī
Tamil	:	Karkata singi
Telugu	:	Kakarsingī, Karkatakashringi
Urdu	:	Kakrasinghi

### DESCRIPTION

#### a) Macroscopic

Dried galls hard, hollow, horn-like, thin-walled, generally cylindrical, tapering at both the ends, greyish brown externally and reddish brown internally, size varies from 2.5-30.0 cm or more, each gall contains numerous dead insects, odour, terebinthine, taste of powdered galls, strongly astringent and slightly bitter.

## b) Microscopic

Transverse section of gall shows the collapsed epidermis on both the sides, epidermal cells thin-walled, tangentially elongated, ground tissues thin-walled and oval or circular, the outer two layers tangentially elongated while between vascular bundles radially elongated, outer few layers and some of cells of ground tissue filled with yellowish brown contents, vascular bundle scattered throughout the ground tissues in two rows, consist of phloem accompanied by a large tannin sac in each vascular bundle.

**Powder**-Powder greyish brown, under microscope, shows orange yellow colour isolated or associated fragments of xylem vessels and ground tissues.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 30 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 30 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil, tannins and resinous matters.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphavātahara, Kāśahara, Ūrdhvavātajit, Hikkānigrahaṇa

**IMPORTANT FORMULATIONS** - Bālacaturbhadrikā Cūrṇa

**THERAPEUTIC USES** - Jvara, Śvāsa, Kāsa, Hikkā, Kṣaya, Aruci, Chardi

**DOSE** - 3-6 g of the drug in powder form

## KĀRPĀSA (Seed)

Kārpāsa consists of seeds (devoid of lint) of *Gossypium herbaceum* Linn. (Fam. Malvaceae) , an annual or perennial shrub, 0.6-2.4m high, extensively cultivated in India.

### SYNONYMS

Sanskrit	:	Tuṇḍakeśi
Assamese	:	Karpasa, Tula
Bengali	:	Bona, Kapasia
English	:	Cotton plant seed
Gujrati	:	--
Hindi	:	Kapasa, Binaula
Kannada	:	Hati, Arale
Malayalam	:	Karpasi, Panji Karpasam
Marathi	:	Sarki
Oriya	:	--
Tamil	:	Parutti kkoottam
Telugu	:	Patti ginga
Urdu	:	Pambadana, Habb-ul-Qutn

### DESCRIPTION

#### a) Macroscopic

Seed, dark brown, ovoid, 0.3-0.6 cm diameter, minute, shallow longitudinal grooves arise from funicular region of seed, taste, slightly bitter.

#### b) Microscopic

Transverse section of mature seed shows, two integuments forming seed coat, outer integument differentiated into epidermis, a wide zone of parenchyma and a hyaline layer, epidermis single layered, some trichomes arise from epidermis and form lint and fuzz hairs, lint hairs elongated with thin wall and wide lumen, fuzz hairs thick-walled with narrow lumen, parenchymatous zone consists of 4-8 layers of reddish-brown cells, a few vascular bundles embedded in this zone, hyaline layer consisting of 2-3 layers of

tangentially elongated, cubical, thick-walled cells, inner integument composed of palisade and parenchyma, palisade cells compactly arranged and colourless, parenchyma many layered of tangentially elongated cells with deep reddish-brown contents, cotyledons thin, large and folded, upper epidermis of cotyledon, single layered, externally covered with cuticle followed by 1 or 2 layered palisade like cells of mesophyll, beneath this zone, mesophyll cells show elongated to rounded structure without inter-cellular spaces, lower epidermis single layered, cubical or oval, covered with cuticle, some lysigenous glands filled with yellowish-brown contents also found scattered in mesophyll region, starch and calcium oxalate crystals absent.

**Powder-** Brown under microscope shows palisade cells, thin-walled mesophyll cells, deep brown contents and hairs, pieces of testa and fuzz intact.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

### **ASSAY**

### **T.L.C.**

**CONSTITUENTS** - Fixed oil, resin and sterols

### **PROPERTIES AND ACTION**

**Rasa** : Madhura

<b>Guna</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Stanyajanana, Vṛṣya, Kaphakara, Hṛdya

**IMPORTANT FORMULATIONS** - Kārpāsāsthyādi Taila

**THERAPEUTIC USES** - Dāha, Śrama, Bhrānti, Mūrcchā, Stanyakṣaya

**DOSE** - 3-6 g of the drug in powder form

## **KASĒRU (Rhizome)**

KasĒru consists of rhizome of *Scirpus kysoor* Roxb. (Fam. Cyperaceae), a weed commonly found on the margins of ponds and swampy places throughout India.

### **SYNONYMS**

Sanskrit	:	KasĒruka
Assamese	:	Kaheru
Bengali	:	Keshura
English	:	Water chestnut
Gujrati	:	Kasela, Kasola
Hindi	:	Kaseru
Kannada	:	Kasure gadd, Kaseruva, Kothigadde
Malayalam	:	Kazhi Muthanga
Marathi	:	Kasara, Kachera, Kachora
Oriya	:	Kasaru Kawda, Kasaru Kanda
Punjabi	:	Kaseru
Tamil	:	Gundatigagaddi
Telugu	:	Guntatungagaddi
Urdu	:	Kaseru

### **DESCRIPTION**

#### **a) Macroscopic**

Rhizomes, oval to cylindrical, often branched having a number of transverse rings, black coloured roots and rounded scars, black externally and cream coloured internally, odour, aromatic, taste, bitter.

#### **b) Microscopic**

Tranverse section of rhizome shows epidermis of collapsed and brown coloured cells: hypodermis, 4-8 cells with thick brown cell walls, followed by a wide zone of cortical ground tissue of oval to rounded, thin-walled, parenchymatous cells, filled with oval to spherical starch grains, encircled by sclerenchymatous sheath, vascular bundles,

found scattered throughout cortical ground tissue, endodermis consists of brown coloured cells with heavy thickenings on their walls, enclosing a wide central stelar ground tissue with a number of scattered vascular bundles of closed, collateral type, encircled by sclerenchymatous sheath, stelar ground tissues of rounded to oval, thin-walled and parenchymatous cells, containing oval to spherical starch grains, a number of secretory cell with orange-brown contents found throughout cortical and stelar ground tissue.

**Powder-** Light brown, under microscope shows abundant round to oval starch grains and orange-yellow pigments, fragments of xylem vessels with annular thickenings and thin-walled, parenchymatous tissue.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Starch, saponins, sugars and progesterone.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittaghna, Dāhaghna, Śukrakara, Stanyakara, Cakṣuṣya, Grāhī, Rucikara

**IMPORTANT FORMULATIONS** - Saubhāgyaśuṅṭhī

**THERAPEUTIC USES** - Dāha, Netraroga, Aruci, Atīśāra, Śukrakṣaya, Stanyakṣaya, Daurbalya

**DOSE** - 5-10 g of the drug in powder form.

## KETAKĪ (Root)

Ketakī consists of dried, underground roots of *Pandanus tectorius* Soland.ex Parkinson (Fam. Pandanaceae), a densely branched shrub, rarely erect found along the coast of India and Andaman Island and sometimes cultivated in gardens also.

### SYNONYMS

Sanskrit	:	Sūcikāpuṣpa
Assamese	:	Katki
Bengali	:	Katki
English	:	Screw pine
Gujrati	:	Kevado
Hindi	:	Kevada
Kannada	:	Kadajlmudu, Talehuvu
Kashmiri	:	----
Malayalam	:	Pookaitha
Marathi	:	Kewda
Oriya	:	Ketaki, Kia
Punjabi	:	Keora
Tamil	:	Tazhai
Telugu	:	Mogali
Urdu	:	----

### DESCRIPTION

#### a) Macroscopic

Root pieces, 2-6 cm long, 0.3-2 cm in diameter, cylindrical, rusty or yellowish-brown, to grey, surface smooth except for protuberances at certain places, papery cork, surface uneven, easily peelable exposing a fibrous surface, fracture, usually unbreakable.

#### b) Microscopic

Transverse section of mature root shows a wide zone of stratified cork,

exfoliating at places, consisting of rectangular, thin-walled, tangentially elongated, radially arranged cells, upper few layers filled with reddish-brown contents, remaining cells colourless, cortex, a wide zone of rounded cells with fibre groups towards central and middle region, cells obliterated at places, endodermis barrel-shaped, slightly thick-walled, pericycle and phloem not distinct, xylem forms bulk of root consisting of vessels, fibres and parenchyma, medullary rays not distinct, vessels show annular or pitted thickening, fibres thick-walled, elongated having a few simple pits.

**Powder**-Yellowish-brown, under microscope shows fragments of corks, xylem vessels and fibres.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Madhura, Kaṭu
<b>Guna</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Varṇya, Keśya, Daurgandhyanāśana, Balya, Rasāyana, Dārḍhyakara, Saukhyakara, Kaphāpaha, Cakṣuṣya

**IMPORTANT FORMULATIONS** - Triphalādi Taila

**THERAPEUTIC USES** - Gulma, Kapharoga, Netraroga

**DOSE** - 20-30 g of the drug for decoction

## **KHADIRA (Heart wood)**

Khadira consists of dried pieces of heart-wood of *Acacia catechu* (Linn. f.) Willd. (Fam. Leguminosae), a moderate sized tree, found mostly in dry parts of India.

### **SYNONYMS**

Sanskrit	:	Gāyatri
Assamese	:	Kharira, Khara, Khayar
Bengali	:	Khera, Khayera
English	:	Black catechu, Cutch tree
Gujrati	:	Khair, Kathe, Kher
Hindi	:	Khair
Kannada	:	Kaggali, Kaggalinara, Kachinamara, Koggigida
Kashmiri	:	Kath
Malayalam	:	Karingali
Marathi	:	Khaira, Khair
Oriya	:	Khaira
Punjabi	:	Khair
Tamil	:	Karungali, Karungkali
Telugu	:	Chandra, Kaviri
Urdu	:	Chanbe Kaath

### **DESCRIPTION**

#### **a) Macroscopic**

Heart-wood, light red, turning brownish-red to nearly black with age, attached with whitish sapwood, fracture hard, taste, astringent

#### **b) Microscopic**

Transverse section of heart-wood shows, numerous, uni-to bi-seriate medullary rays, vessels occurring isolated or in small groups of two to four, xylem fibres with narrow lumen occupying major portion of wood, xylem parenchyma usually

predominantly paratracheal, forming a sheath around vessels, wood consists of crystal fibres with 14-28 segments, each having one prismatic crystal of calcium oxalate, a few tracheids with scalariform thickening, some of cells, including vessels, filled with brown content, prismatic crystals of calcium oxalate present in a number of cells throughout the wood.

**Powder-** Brown coloured, under microscope shows a number of xylem fibres, vessels, crystal fibres, prismatic crystals of calcium oxalate.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Catechin, catechu-tannic acid and tannin

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittahara, Raktaśodhaka, Kuṣṭhaghna, Medohara, Kṛmighna, Dantya

**IMPORTANT FORMULATIONS** - Khadirāriṣṭa, Arimedādi Taila, Khadirādi Guṭikā

**THERAPEUTIC USES** - Kuṣṭha, Vraṇa, Śoṭha, Prameha

**DOSE** - 20-30 g of the drug for the decoction.

## KIRĀTATIKTA (Whole plant)

Kirātatikta consists of whole plant of *Swertia chirata* Buch.Ham, (Fam, Gentianaceae), a small, erect, annual, herbaceous plant, 0.6-1. 25 m high, found in temperate Himalayas at an altitude between 1200-3000 m from Kashmir to Bhutan and Khasia Hills in Meghalaya, drug collected when flowering (July-October) and dried.

### SYNONYMS

Sanskrit	:	Kirāta, Kirātaka, Bhūnimba, Kirātatiktaka
Assamese	:	Chirta
Bengali	:	Chirata
English	:	Chireta
Gujrati	:	Kariyatu, Kariyatun
Hindi	:	Chirayata
Kannada	:	Nalebevu, Chirata Kaddi, Chirayat
Kashmiri	:	Lose, Chiraita
Malayalam	:	Nelaveppu, Kirayathu, Nilamakanjiram
Marathi	:	Kiraita, Kaduchiraita
Oriya	:	Chireita
Punjabi	:	Chiretta, Chiraita
Tamil	:	Nilavembu
Telugu	:	Nelavemu
Urdu	:	Chiraita

### DESCRIPTION

#### a) Macroscopic

Drug consists of whole plant, a peculiar shining yellowish tinge all over the herb in fresh sample, stem upto 1 m long and 6 mm in diameter, glabrous, yellowish-brown to purplish, slightly quadrangular above and cylindrical below, large, continuous, easily separable yellow pith, leaf, opposite, cauline, broad at base, ovate or lanceolate, entire, acuminate, glabrous, usually with 5-7 prominent lateral veins, branching from the axils of the leaves which ramify further into panicle inflorescence, flower, tetramerous, 2-3 mm wide, ovoid, with two glandular depressions near the base of each of corolla lobes, ovary, superior, bicarpellary, unilocular, ovoid and pointed, fruit. a capsule with

numerous, minute reticulated seed, 0.25-0.55 mm long, 0.16-0.45 mm broad irregularly ovoid.

## **b) Microscopic**

**Root**-transverse section of root shows, 2-4 layers of cork, secondary cortex represented by 4-12 layers of thick-walled, parenchymatous cells, some showing radial wall formation, tangentially elongated with sinuous walls, secondary phloem composed of thin-walled strands of sieve tubes, companion cells and phloem parenchyma, secondary xylem composed of vessels, tracheids parenchyma and xylem fibres, all elements lignified and thick-walled, in older roots, centre of wood more or less spongy and hollow in most cases, outer woody ring remaining strongly lignified, vessels show scalariform thickening and also simple and bordered pits, tracheids similar in thickening as the vessels, fibres have simple pits, mucilage present in secondary cortical cells, minute acicular crystals present in abundance in secondary cortex and phloem region, resin also present as dark brown mass in secondary cortex cells.

**Stem**-transverse section of stem shows single layered epidermis, externally covered with a thick striated cuticle present in young stem, in older epidermis remains intact but cells flattened and tangentially elongated, four ribs also consists of an epidermis and parenchymatous cortical cells, endodermis distinct, showing anticlinal or periclinal walls, followed by single layered pericycle consisting of thin walled cells, stem possesses an amphiphloic siphonostele, external phloem represented by usual elements, cambium between external phloem and xylem composed of a thin strip of tangentially elongated cells, internal phloem similar in structure as that of external phloem excepting that sieve tube strand is more widely separated, xylem continuous and composed mostly of tracheids, a few xylem vessels present singly or rarely in groups of two while tracheids and fibres present in abundance, vessels and fibre tracheids have mostly simple and bordered pits and fibres with simple pits on the walls, medullary rays absent, central part of the stem occupied by a pith consisting of rounded and isodiametric cells with prominent intercellular spaces mucilage present in cortical cells, minute acicular crystals also present in abundance, cortical cells, in resin present as dark brown mass in some cortical cells along with oil droplets.

Leaf-transverse section of leaf shows very little differentiation of mesophyll tissues, epidermis single layered covered with a thick, striated cuticle, more strongly developed on the upper surface than the lower, stomata of anisocytic type, palisade tissue single layered, cells at places become wider and less elongated particularly in bigger veins, spongy mesophyll represented by 4-7 layers of somewhat loosely arranged, tangentially elongated cells, some epidermal cells prominently arched outside at the margin, mucilage present in epidermal and mesophyll cell while minute acicular crystal also present in abundance in mesophyll cells, in leaf parenchymas oil droplets also present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol (60 per cent) soluble extractive	Not less than 10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 10 per cent, Appendix	2.2.7.

## ASSAY

**Absence of tannin**-On addition of *Ferric Chloride* to aqueous or alcoholic extract no blue black colour develops.

**Assay** -Contains not less than 1.3 per cent, of the bitter principle as determined by the following method:-

Mix 20 g in powder (No. 60 sieve) with boiling water containing 0.5 g of *Calcium Carbonate* and extract with boiling water till the last portion of the extract is devoid of bitterness, concentrate in vacuum and dissolve the residue in hot *Alcohol*. Filter while hot and wash the residue thrice on the filter with 10 ml portions of hot *Alcohol*, remove the alcohol from the filtrate and take up the residue repeatedly with 25, 15, 15, 15, and 15 ml of hot water. Shake the aqueous extract repeatedly with 25, 20, 15, 15 and 10 ml of *Ethyl Acetate*, collect the *Ethyl Acetate* extracts, evaporate, dry and weigh.

**CONSTITUENTS** - Xanthenes, xanthone glycoside and mangiferine (Flavonoid).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Jvaraghna, Vraṇaśodhana, Sāraka, Tṛṣṇāpaha, Raktaśodhaka, Kaphapittahara

**IMPORTANT FORMULATIONS** - Sudarśana Cūrṇa, Chinnodbhavādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Jvara, Trṣṇā, Dāha, Śoṭha, Kuṣṭha, Vraṇa, Kṛmiroga, Kaṇḍū, Meha

**DOSE** - 1-3 g of the drug in powder form

20-30 g of the drug for decoction.

## KṚṢṆAJĪRAKA (Fruit)

Kṛṣṇajīraka consists of dried ripe fruits of *Carum carvi* Linn. (Fam. Umbelliferae), a biennial herb, 30-90 cm high, cultivated as a cold season crop in plains of India and as summer crop in hilly areas of Kashmir, Kumaon, Garhwal and Chamba.

### SYNONYMS

Sanskrit	:	Asitajīraka
Assamese	:	Krisnjeera, Kalajira, Kaljira
Bengali	:	Kala jira
English	:	Black Caraway
Gujrati	:	Shahjirun
Hindi	:	Kalajira
Kannada	:	Kari jeerige, Shahajeerige
Kashmiri	:	Krihunzur
Malayalam	:	Karunjiraka, Karinjeerakam
Marathi	:	Shahira, Shahajira
Oriya	:	Kalajira
Punjabi	:	Zira Siyah, Kalajira
Tamil	:	Karamjiragam, Shimai shambu
Telugu	:	Nalla Jeelakarra
Urdu	:	Zira Siyah, Kala Zira

### DESCRIPTION

#### a) Macroscopic

Fruit, greenish-brown, slightly curved, elongated, mericarps, usually separate, free from the pedicel, carpophores, upto 7 mm long, 2 mm broad almost equally five sided, narrow, tapering to each end, arcuate, glabrous, brown with five very narrow, yellowish primary ridges' endosperm, orthospermous, odour and taste, aromatic and characteristic.

## b) Microscopic

Transverse section of fruit shows pericarp with outer epidermis of polygonal tabular cells with a thick outer wall and striated cuticle, trichomes, absent, vittae four dorsal, intercostal and two commissural extending the length of each mericarp, with an epithelium of brown cells and volatile oil in the cavity, mesocarp parenchymatous without reticulate thickening, costae five in each mericarp with vascular strand consisting of an inner group of small vessels and fibres and arched, outer group of pitted sclerenchyma with a small group of phloem on each lateral surface, on the outer margin of each vascular strand a small schizogenous canal extending into both stylopod and pedicel, inner epidermis of thin -walled, subrectangular cells, elongated tangentially each about 8-12 $\mu$  wide and 40-100 $\mu$  long, arranged parallel with one another, endosperm of thick-walled, cellulosic parenchyma, containing much fixed oil and numerous small aleurone grains upto 10  $\mu$  in diameter, each containing one or sometimes two micro-rosette crystals of calcium oxalate, carpophore, when present, passing at the apex to a raphe in each mericarp, and with a small strand of sclerenchyma, the sclereids of which continue into the stylopod.

**Powder**-Colour fawn to brown, epidermal cells of pericarp with striated cuticle, fragments of brown endothelium of vittae, parenchymatous cells of the mesocarp without reticulate thickening, rectangular, finely pitted sclereids of mesocarp, thick-walled polygonal parenchymatous cells of endosperm containing much fixed oil, numerous small aleurone grains containing micro-rosette crystals of calcium oxalate, trichomes, starch and parquetry layer absent, it contains no less than 2.5 per cent of volatile oil.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	9 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12 per cent, Appendix	2.2.7.
Volatile oil	Not less than	3.5 per cent, v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oils (carvone and carvacrol).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pācana, Dīpana, Saṃgrāhī, Jvaraghna, Rucya, Cakṣuṣya, Śothahara

**IMPORTANT FORMULATIONS** - Jīrakādyariṣṭa, Jīrakādi Modaka

**THERAPEUTIC USES** - Agnimāndya, Ādhmāna, Jīrṇajvara, Grahaṇīroga, Kṛmiroga

**DOSE** - 1-3 g of the drug in powder form.

## KULATTHA (Seed)

Kulattha consists of dry seeds of *Vigna unquiculata* (Linn.) Walp. Syn. *Dolichos biflorus* Linn. (Fam Leguminosae); an annual branched, sub-erect or twining, downy or glabrescent ; herb; cultivated all over India.

### SYNONYMS

Sanskrit	:	Khalva, Vardhipatraka
Assamese	:	--
Bengali	:	Kulattha, Kalaya
English	:	Horse gram
Gujrati	:	Kalathi, Kulathi
Hindi	:	Kulathi, Kurathi
Kannada	:	Huruli, Hurali
Malayalam	:	Mudiraa
Marathi	:	Kulitha
Oriya	:	--
Tamil	:	Kollu, Kaanam
Telugu	:	Ulavalu
Urdu	:	Kulthi

### DESCRIPTION

#### a) Macroscopic

Seeds, hard, surface smooth, ellipsoid, flattened, greyish to reddish brown, 4-6 mm long and 4 mm wide, micropyle prominent, taste, somewhat astringent.

#### b) Microscopic

Transverse section of seed shows testa consisting of a single layer of columnar, thin-walled, parenchymatous, palisade like cells covered with a thin cuticle followed by single layer of rectangular to square bearer cells and 3-4 layers of thin-walled rectangular parenchymatous cells, more wide at micropyle region, cotyledon consisting

of single layer of upper and lower epidermis covered with a thin cuticle, epidermal cells thin-walled, rectangular and parenchymatous followed by mesophyll, consisting of angular parenchymatous cells, filled with numerous simple starch grains and protein bodies also present.

**Powder**-Whitish in colour, under microscope shows broken pieces of testa, parenchymatous cells and starch

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	Nil per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12 per cent, Appendix	2.2.7.

**CONSTITUENTS** - An enzyme (urease) and oil.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vidāhī, Svedasaṃgrāhaka, Kṛmihara, Kaphavātahara

**IMPORTANT FORMULATIONS** - Saptasāra Kvātha Cūrṇa, Dhānvantara Taila

**THERAPEUTIC USES** - Aśmarī, Naṣṭārtava

**DOSE** - 12 g of the drug in powder form for decoction.

## KUṢṬHA (Root)

Kuṣṭha consists of dried roots of *Saussurea lappa* C.B. Clarke (Fam. Compositae), a tall, robust, perennial herb with thick roots, found in Kashmir at an altitude of 2500-3600 m, roots collected in September-October.

### SYNONYMS

Sanskrit	:	Āmaya, Pākala
Assamese	:	Kud, Kur
Bengali	:	Kudo
English	:	--
Gujrati	:	Upleta, Kath
Hindi	:	Kutha
Kannada	:	Changal Kustha
Kashmiri	:	Kuth
Malayalam	:	Kottam
Marathi	:	Upleta, Kustha
Oriya	:	Kudha
Punjabi	:	Kuth
Tamil	:	Goshtam, Koshtam, Kottam
Telugu	:	Changalva Koshtu
Urdu	:	Qust

### DESCRIPTION

#### a) Macroscopic

Drug greyish to dull brown, thick, stout, fusiform to cylindrical, 7-15 cm long, 1.0-5.5 cm broad, thicker roots with collapsed centre, occasionally ridged, wrinkles longitudinal and anastomosed, rootlets rarely present, cut surface shows two regions, outer periderm ring thin, inner porous woody portion lighter in colour showing fine radial striations and often the central portion collapsed, fracture, short, horny, odour, strong, characteristically aromatic, taste, slightly bitter.

## b) Microscopic

Transverse section of thin root shows thin periderm, followed by broad zone of phloem and still broader zone of xylem traversed by wide medullary rays, cork, 3-5 layered wide secondary cortical cells polygonal, mostly elongated, secondary phloem consists of mostly storage parenchyma, small groups of sieve tubes and companion cells and often phloem fibres, bast fibres thick-walled, lignified, upto 350  $\mu$  in length, with many simple pits associated with fibre, tracheids and parenchyma, wood fibres smaller than bast fibres, with wider lumen and obtusely tapering ends, medullary rays multi seriate and wider in phloem region, resin canals found throughout as large cavities, some roots possess a central cylinder of sclerenchyma, while others have parenchymatous centre with scattered xylem elements, in older roots, wood parenchyma collapses and takes a spongy appearance in the centre of root, inulin present in storage parenchyma.

**Powder**-Deep brown or rusty, under microscope irregular bits of yellow, brown or orange-red fragments of resins and oils associated with thin-walled parenchymatous cells, broken bits of xylem vessels with scalariform, reticulate thickening and horizontal end walls.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil, alkaloid (saussurine) and bitter resin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu

**Karma** : Kaphavātajit, Śukrala, Raktaśodhaka, Varṇya

**IMPORTANT FORMULATIONS** - Koṭṭamcukkādi Taila

**THERAPEUTIC USES** - Vātarakta, Visarpa, Kuṣṭha, Kāsa, Śvāsa

**DOSE** - 0.2-1.0 of the drug in powder form.

## KUṬAJA (Stem bark)

Kuṭaja consists of dried stem bark of *Holarrhena antidysenterica* (Roth) A. DC. (Fam. Apocynaceae): a small to medium sized tree, found throughout India, drug collected from 8-12 years old tree during the middle of rainy season (July to September) and again at the end of winter season by hewing and peeling and separated from attached wood.

### SYNONYMS

Sanskrit	:	Kaliṅga, Śakra, Vatsaka
Assamese	:	Dudhkuri
Bengali	:	Kurchi
English	:	Ester tree, Conessi bark
Gujrati	:	Kuda, Kadachhal, Kudo
Hindi	:	Kurchi, Kuraiya
Kannada	:	Kodasige, Halagattigida, Halagatti Mara
Kashmiri	:	Kogad
Malayalam	:	Kutakappala
Marathi	:	Pandhra Kuda
Oriya	:	Kurei, Keruan
Punjabi	:	Kurasukk, Kura
Tamil	:	Kudasapalai
Telugu	:	Kodisapala, Palakodisa
Urdu	:	Kurchi

### DESCRIPTION

#### a) Macroscopic

Small recurved pieces of varying sizes and thickness, outer surface buff to brownish longitudinally wrinkled and bearing horizontal lenticels, inner surface brownish, rough and scaly fracture short and granular, taste, acrid and bitter.

## b) Microscopic

Transverse section of dried stem bark shows cork consisting of 4-12 rows of tangentially elongated cells, radial 15- 45  $\mu$  tangential 30-60  $\mu$  cork cambium consists of a row of thin walled tangentially elongated cells, secondary cortex usually wide, parenchymatous, interspersed with strands of stone cells, stone cell rectangular to oval, with numerous pits often containing prismatic crystals of calcium oxalate, non-lignified pericyclic fibres upto 52 mm thick, present in bark, secondary phloem wide consisting of sieve-tubes, companion cells, phloem parenchyma and stone cells, stone cells arranged in tangential rows in concentric manner associated with crystal sheath containing prisms of calcium oxalate, medullary rays mostly bi or triseriate rarely uniseriate becoming wide toward, outer part and consist of thin-walled, radially elongated, parenchymatous cells, medullary ray cells near stone cells become sclerosed.

## IDENTITY, PURITY AND STRENGTH

Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.
Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	18	per cent, Appendix	2.2.6.

## ASSAY

**Assay-** Kutaja contains not less than 2 per cent of total alkaloids when assayed by the following method: weigh accurately about 5 g in powder (No. 85 sieve) and moisten with 10 ml of an Alcohol-chloroform mixture (1 :3) containing 2 per cent of Ammonia solution for 15 minutes. Pack the mixture in a small glass percolator surrounded by a jacket of hot water kept at 50°. Macerate with more of the alkaline Alcohol-chloroform mixture for an hour and collect 25 ml of percolate in a receiver containing 1 g of *Oxalic acid* dissolved in 5 ml of alcohol. Stop the percolation add 10 ml of the alcohol-chloroform mixture containing 1 per cent w/v of *Sodium Hydroxide* and macerate for fifteen minutes. Continue the percolation adding further quantities of the alcohol-chloroform mixture until the alkaloids are completely extracted. Mix the percolate well and extract by shaking with five 20 ml portions of 2 N *Hydrochloric acid*. Combine the acid extracts and make alkaline with *dilute Ammonia Solution*. Extract with four 10 ml

portions of Chloroform, add 1 ml of 0.5 N *Sodium Hydroxide*, and extract again with *Chloroform*. Wash each *Chloroform* extract with the same two 10 ml portions of water contained in different separators. Combine the *Chloroform* extracts, add 20 ml of 0.1N *Sulphuric Acid* and shake well for 5 Minutes. Transfer the acid Liquid to a conical flask, wash the *Chloroform* extract with two 20 ml portions of water and add the washing to the acid liquid in the conical flask. Titrate the excess of acid with 0.1N *Sodium Hydroxide* using the mixed 3 indicator. Each ml of 0.1N *Sulphuric Acid* is equivalent to 0.01657g of total alkaloids of Kutaja.

**CONSTITUENTS** - Conessine and related alkaloids.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Saṃgrāhī, Kaphapittaśāma

**IMPORTANT FORMULATIONS** - Kuṭajāriṣṭa, Kuṭajāvāleha, Kuṭajaghana Vaṭī

**THERAPEUTIC USES** - Pravāhikā, Atīsāra, Jvarātisāra, Arśa, Kuṣṭha, Trṣṇā

**DOSE** - 20-30 g of the drug for decoction.

## LAVAᅅGA (Flower Bud)

Lavaᅅga is the dried flower bud of *Syzygium aromaticum* (Linn.) Merr. & L.M. Perry Syn. *Eugenia aromatica* Kuntze, *Eugenia caryophyllata* Thunb. (Fam. Myrtaceae), a tree. cultivated in many parts of the. world and also to a considerable extent in South India: flower buds collected twice a year, In the months of October and February when they change colour from green to crimson, dried carefully and separated from their peduncles.

### SYNONYMS

Sanskrit	:	Devapuᅅpa
Assamese	:	Lavang, Lan, Long
Bengali	:	Lavang
English	:	Clove
Gujrati	:	Lavang, Laving
Hindi	:	Lavanga, Laung
Kannada	:	Lavanga
Kashmiri	:	Rung
Malayalam	:	Karampu, Karayampoovu, Grampu
Marathi	:	Lavang
Oriya	:	Labanga
Punjabi	:	Laung, Long
Tamil	:	Kirambu, Lavangam
Telugu	:	Lavangalu
Urdu	:	Qarnful, Laung

### DESCRIPTION

#### a) Macroscopic

Flower bud measuring 10-17.5 mm in length, dark brown or dusty red, consisting of a sub-cylindrical, slightly flattened, four sided hypanthium, readily exuding oil when pressed hypanthium containing in its upper portion a two celled inferior ovary with numerous ovules attached to a axile placenta, surmounted by four thick, divergent sepals

and covered by unopened corolla consisting of four membranous imbricate petals, frequently detached, enclosing numerous incurved stamens and one erect-style, odour, strongly aromatic, taste, pungent, aromatic followed by slight tingling of the tongue.

### **b) Microscopic**

Transverse section of hypanthium shows epidermis and calyx teeth composed of straight walled cells, With thick cuticle having large anomocytic stomata, hypanthium tissue spongy, clusters of calcium oxalate crystals varying in size from 6-20  $\mu$  in diameter, small number of stone cells and prismatic crystals of calcium oxalate present in stalk, stamens, each with an oil gland in the apex of the connective, triangularly centricular pollen grains, 15-20  $\mu$  in diameter anther walls showing a typical fibrous layer, schizolysigenous glands found in all parts of clove, occasional isolate pericyclic fibres present.

**Power**-Dark brown, fragments of parenchyma showing large oval, schizolysigenous oil cavities, spiral tracheids and a few rather thick-walled, spindle shaped fibres, calcium oxalate crystals in rosette aggregates, 10-15  $\mu$  in diameter, fragments of anther walls with characteristic reticulated cells pollen grains numerous, tetrahedral, 15-20 $\mu$ . in diameter.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.
Volatile oil	Not less than	15	per cent, Appendix	2.2.10

**CONSTITUENTS** - Essential oils (eugenalacetate and caryophyllene)

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Rucya, Kaphapittaśāma, Śūlahara, Kāsahara

**IMPORTANT FORMULATIONS** - Lavaṅgādi Vaṭī, Lavaṅgādi Cūrṇa

**THERAPEUTIC USES** - Kāsa, Śvāsa, Hikkā, Kṣaya, Ādhmāna, Tṛṣṇā, Chardi, Amlapitta

**DOSE** - 0.5-2.0 g of the drug in powder form.

## LODHRA (Stem bark)

Lodhra consists of dried stem bark of *Symplocos racemosa* Roxb. (Fam. Symplocaceae): an evergreen tree, 6-8.5 m tall, found abundantly in plains and lower hills throughout India.

### SYNONYMS

Sanskrit	:	Rodhra, Paitṭkā Lodhra, Śābara Lodhra, Tirīṭa.
Assamese	:	Mugam
Bengali	:	Lodha, Lodhra
English	:	Symplocos bark
Gujrati	:	Lodhar
Hindi	:	Lodha
Kannada	:	Lodhra
Malayalam	:	Pachotti
Marathi	:	Lodha, Lodhra
Oriya	:	--
Punjabi	:	Lodhar
Tamil	:	Vellilathi, Vellilothram
Telugu	:	Lodhuga
Urdu	:	Lodh, Lodhpathani

### DESCRIPTION

#### a) Macroscopic

Mature stem bark occurs in channelled or curved pieces, few fiat pieces also occur in thickness upto 1cm, outer surface uneven and rough due to fissures and cracks, grayish brown to grey externally, pale to whitish-brown internally, fracture short and granular in cortical region and somewhat fibrous in inner region, taste, astringent and feebly bitter.

## b) Microscopic

Transverse section of mature bark shows a wide cork of thin-walled, rectangular cells arranged in radial rows, cork cambium 1-3 layered, secondary cortex consists of thin-walled, oval and tangentially elongated parenchymatous cells towards outer side and rounded cells towards inner side, a number of stone cells, in singles or in groups present, scattered throughout the region having highly thickened walls with distinct pits, prismatic and cluster crystals of calcium oxalate, and starch grains, mostly simple present in a number of cortical cells, secondary phloem wide consisting of sieve elements, phloem parenchyma, phloem fibres and stone cells, phloem parenchyma thin-walled, oval to rectangular, containing prismatic crystals of calcium oxalate scattered in phloem parenchyma, phloem fibres lignified and present in singles or in groups, crystals not present in fibres, isolated fibres spindle shaped with pointed ends, groups of stone cells as rounded patches distributed throughout phloem region, medullary rays uni to multiseriate consisting of rectangular cells having brown colouring matter in some cells, broader medullary rays dialating towards outer phloem region, a number of phloem cells also contain starch grains, mostly arranged in groups, rarely solitary, simple and rounded.

**Powder**-Greyish-brown, under microscope shows fragments of cork, stone cells, fibres, prismatic and cluster crystals of calcium oxalate and starch grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	Nil	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

**CONSTITUENTS** - Alkaloids (loturine and colloturine) and red colouring matter.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittanut, Grāhī, Cakṣuṣya

**IMPORTANT FORMULATIONS** - Rodhrāsava (Lodhrāsava ), Puṣyānuga Cūrṇa, Bṛhat Gaṅgādhara Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Atīsāra, Śoṭha, Pradara, Netraroga

**DOSE** - 3-5 g of the drug in powder form

20-30 g of the drug in for decoction

## MADANA (Fruit)

Madana consists of dried fruit of *Xeromphis spinosa* (Thunb) Keay, Syn *Randia dumetorum* Lam. (Fam. Rubiaceae), a deciduous thorny shrub or a small, tree, reaching a height upto 9 m and girth about a metre, branches numerous, thick and horizontal, found in sub-Himalayan tracts extending eastwards in Sikkim upto 1200 m and southwards to Peninsular India.

### SYNONYMS

Sanskrit	:	Mādanī
Assamese	:	Maen
Bengali	:	Mainaphal, Mayanaphal
English	:	Emetic nut
Gujrati	:	Mindhāl, Mindhol, Mindhar
Hindi	:	Manphal
Kannada	:	Mangarikai, Karigidda, Madanaphala Maggrekai, Kari, Maggare Kayi
Kashmiri	:	Madanfāl
Malayalam	:	Malankara, Malamkarakka
Marathi	:	Gal, Galphala, Giephala, Madanphala
Oriya	:	Maena, Madana
Punjabi	:	Mindhāl, Rara, Manphal
Tamil	:	Marukkarai
Telugu	:	Mranga Kaya, Monga Kaya
Urdu	:	Mainphal, Jauz-ul-Qai

### DESCRIPTION

#### a) Macroscopic

Fruit, 1.8-4.5 cm long, globose or broadly ovoid, longitudinally ribbed or smooth yellowish-brown, crowned with persistent calyx-limb, fruit, contains numerous seeds, 0.4-0.6 cm long, compressed, smooth, brown and very hard.

## b) Microscopic

**Fruit**-transverse section shows epicarp consisting of single layered epidermis, sometimes obliterated in surface view, epidermal cells thin-walled and polygonal, mesocarp, broad zone consisting of thin-walled, parenchymatous cells, some cells contain reddish-brown content, a number of vascular bundles found embedded in this zone, endocarp stony consisting of light yellow polygonal, sclerenchymatous cells of variable shape and size.

**Seed**-transverse section shows a seed coat, consisting of single layered, rounded to oval epidermal cells, a few layers of yellowish-brown pigmented cells, endosperm forms bulk of seed consisting of large oval and irregular shaped parenchymatous cells, albumen horny, translucent, cells of outermost layer smaller in size.

**Powder**-Reddish brown, under microscope shows numerous, large, irregular, reddish brown cells sclereids of variable shape and size, pieces of xylem vessels with reticulate thickenings, thin-walled, crushed parenchymatous cells and yellow-orange pieces of seed coat

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.25 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 19 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 16 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil, saponin, tannin and resin

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu

**Karma** : Vamana, Lekhana

**IMPORTANT FORMULATIONS** - Pippalyādi Taila

**THERAPEUTIC USES** - Gulma, Vidradhi, Kuṣṭha, Śleṣmajvara, Pratiśyāya

**DOSE** - 0.5 -1.0 g of the drug in powder form for decoction

3-6 g of the drug for induction of vomiting.

## MÍSREYĀ (Fruit)

Mísreyā consists of dried ripe fruits of *Foeniculum vulgare* Mill (Fam. Umbelliferae) , an erect, glabrous, aromatic herb, 1-2 m high, cultivated extensively throughout India upto 1830 m and also sometimes found wild, fruits ripen in September, stems cut with sickles and put up in loose sheaves to dry in sun, when dry, fruits are beaten out in a cloth in sun, cleaned by winnowing and collected.

### SYNONYMS

Sanskrit	:	Miśi, Misi, Madhurikā
Assamese	:	Guvamuri
Bengali	:	Marui, Panmauri
English	:	Fennel Fruit
Gujrati	:	Variyali
Hindi	:	Saunf
Kannada	:	Badisompu, Doddasompu
Kashmiri	:	Sanuf, Badnai
Malayalam	:	Kattusatakuppa, Parinjaeragum
Marathi	:	Badishop
Oriya	:	Panamadhuri
Punjabi	:	Saunf
Tamil	:	Shombu
Telugu	:	Sopu
Urdu	:	Saunf

### DESCRIPTION

#### a) Macroscopic

Fruits, usually entire with pedicel attached, mericarps, upto about 10 mm long and 4 mm broad, five sided with a wider commissural surface, tapering lightly towards base and apex, crowned with a conical stylopod, glabrous, greenish or yellowish-brown with five paler prominent primary ridges , endosperm, orthospermous.

## b) Microscopic

Transverse section of fruit shows pericarp with outer epidermis of quadrangular to polygonal cells with smooth cuticle and a few stomata, trichomes, absent vittae, 4 dorsal and 2 commissural extending with length of each mericarp, intercostal with an epithelium of brown cells and volatile oil in cavity, mesocarp, with much reticulate lignified parenchyma, costae, 5 in each mericarp, each with 1 vascular strand having inner xylem strand and 2 lateral phloem strands separated by a bundle of fibres inner epidermis of very narrow, thin-walled cells arranged parallel to one another in groups of 5-7, many of these groups with longer axis of their cells at angle with those of adjacent groups (Parquetry arrangement), endosperm consists of thick-walled, cellulosic parenchyma containing much fixed oil, micro-rosette crystals of calcium oxalate, and numerous aleurone grains upto 5  $\mu$  in diameter, carpophore with very thick-walled sclerenchyma in two strands, often unsplit with two strands very close to each Other.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	12 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	15 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1 per cent, Appendix	2.2.7.
Volatile oil	Not less than	1.4 per cent v/w, Appendix	2.2.10

**CONSTITUENTS** - Essential oil and fixed oil

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṭu, Tikta
<b>Guna</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Dīpana, Vātapittahara, Balya, Anulomana, Āmadoṣahara

**IMPORTANT FORMULATIONS** - Miśreyārka, Pañcasakāra Cūrṇa

**THERAPEUTIC USES** - Agnimāndya, Śūla, Kāsa, Raktadoṣa, Pravāhikā, Arśa

**DOSE** - 3-6 g of the powder in powder form

## NYAGRODHA (Stem bark)

Nyagrodha consists of dried mature stem bark of *Ficus bengalensis* Linn. (Fam. Moraceae) , a large branching tree with numerous aerial roots occurring all over India.

### SYNONYMS

Sanskrit	:	Vata
Assamese	:	Vat, Ahat, Vatgach
Bengali	:	Bot
English	:	Banyan tree
Gujrati	:	Vad, Vadalo
Hindi	:	Badra, Bargad, Bada
Kannada	:	Aala, Aladamara, Vata
Kashmiri	:	Bad
Malayalam	:	Peraal
Marathi	:	Vad
Oriya	:	Bata, Bara
Punjabi	:	Bhaur
Tamil	:	Aalamaram, Aalam
Telugu	:	Marri
Urdu	:	Bargad, Bad

### DESCRIPTION

#### a) Macroscopic

Mature stem bark grey with thin, closely adhered ashy white, light bluish-green or grey patches, bark flat or slightly curve, thickness varies with age of tree : externally rough due to presence of horizontal furrows and lenticels, mostly circular and prominent, fracture short in outer two thirds of bark while inner portion shows a fibrous fracture taste, astringent

## b) Microscopic

Transverse section of mature bark shows compressed cork tissue and dead elements of secondary cortex consisting of mostly stone cells and thin-walled, compressed elements of cortex cork cells rectangular, thick-walled and containing brownish content, secondary cortex wide, forming more than half of thickness of bark, composed of large groups of stone cells and parenchymatous cells, stone cells vary in shape, parenchymatous cells thin-walled and somewhat cubical to oval few in number and occur between groups of stone cells, some of cells contain prismatic crystals of calcium oxalate, starch grains and tannin, secondary phloem composed of a few sieve elements parenchyma, fibres, stone cells and latex tube alternating with medullary rays, sieve elements compressed in outer region of bark while intact in inner region, few thick-walled phloem parenchyma occurring in between patches of phloem fibres and stone cells, stone cells similar to those present in secondary cortex, some phloem cells contain prismatic calcium oxalate crystals also, present in fibres forming crystal fibres, medullary rays 2-5 seriate, composed of thick-walled, circular to oval cells few cells also converted into stone cells and some have pitted walls, also containing plenty of starch grains, mostly rounded, rarely oval or semi-lunar in shape, simple as well as compound type, compound starch grains consist of 2-3 components, cambium composed of a few layers of small, rectangular, thin-walled cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins, glycosides and flavonoids

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Guru, Rūkṣa
<b>Vīrya</b>	:	Śīta

**Vipāka** : Kaṭu

**Karma** : Kaphapittajit, Vraṇāpaha, Varṇya, Stambhana, Mūtrasamgrahaṇīya, Dāhaghna, Yonidoṣahṛt

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa, Nyagrodhādi Cūrṇa

**THERAPEUTIC USES** - Dāha, Tṛṣṇā, Raktapitta, Vraṇa, Visarpa, Yonidoṣa, Prameha

**DOSE** - 3-6 g of the drug in powder form.

## PĀṢĀṆĀBHEDA (Rhizome)

Pāṣāṇabheda consists of rhizomes of *Bergenia ciliata* (Haw.) Sternb., Syn. *Bergenia ligulata* (Wall.) Engl. (Fam. Saxifragaceae), a small perennial herb found throughout temperate Himalayas from Bhutan to Kashmir at an altitude between 2000-3000 m and in Khasia hills upto 1200 m altitude.

### SYNONYMS

Sanskrit	:	Aśmabhedaka, Śilābheda
Assamese	:	Patharkuchi
Bengali	:	Patharkuchi, Himasagara, Patrankur
English	:	--
Gujrati	:	Pashanbheda, Pakhanbheda
Hindi	:	Pakhanabheda, Silphara, Patharcua, Pakhanabhed, Silpbheda
Kannada	:	Alepgaya, Pahanbhedi, Hittaga, Pasanaberu, Hittulaka
Kashmiri	:	Pashanbhed
Malayalam	:	Kallurvanchi, Kallurvanni, Kallorvanchi
Marathi	:	Pashanbheda
Oriya	:	Pasanbhedi, Pashanabheda
Punjabi	:	Kachalu, Pashanbhed
Tamil	:	Sirupilai
Telugu	:	Kondapindi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Rhizome, solid, barrel shaped, cylindrical, 1.5-3 cm long and 1-2 cm in diameter with small roots, ridges, furrows and root scars distinct, transversely cut surface shows outer ring of brown coloured cork, short middle cortex, vascular bundles and large central pith, odour, aromatic, taste, astringent.

## b) Microscopic

Transverse section of rhizome shows cork divided into two zones, outer a few layers of slightly compressed and brown coloured cells, inner zone multilayered consisting of thin-walled tangentially elongated and colourless cells, followed by a single layered cork cambium and 2-3 layers of secondary cortex composed of thick-walled, tangentially elongated, rectangular cells with intercellular spaces, some cells contain rosette crystals of calcium oxalate and simple starch grains cortex a narrow-zone of parenchymatous cells containing a number of simple starch grains, most of cortical cells also contain large rosette crystals of calcium oxalate, endoderm is and pericycle absent. vascular bundles, arranged in a ring, collateral, conjoint and open, phloem tissues composed of sieve elements and parenchyma, in outer region found as compressed masses while in inner region intact. a number of rosette crystals of calcium oxalate also found as crystal fibres, cambium present as continuous ring composed of 2-3 layers of thin-walled, tangentially elongated cells, xylem consist of fibres, tracheids, vessels and parenchyma, with centre occupied by large pith composed of circular to oval, parenchymatous cells, varying in size and containing starch grains with crystals of calcium oxalate similar to those found in cortical region.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannic acid, gallic acid and glucose

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Aśmarīghna, Bhedana, Vastiśodhana, Mūtravirecanīya

**IMPORTANT FORMULATIONS** - Aśmarīhara Kaṣāya Cūrṇa, Mūtravirecanīya Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Meha, Mūtrakṛcchra, Aśmarī

**DOSE** - 3-6 g of the drug in powder form

20-30 g of the drug for decoction.

## PĀṬHĀ (Root)

Pāṭhā consists of roots of *Cissampelos pareira* Linn. (Fam. Menispermaceae), an extensively spreading, glabrous to softly pubescent, perennial climbing shrub with nodose stem, common in warm and dry regions of tropical and sub-tropical parts of India upto an altitude of about 1500 m.

### SYNONYMS

Sanskrit	:	Ambaṣṭhakī
Assamese	:	Tuprilata
Bengali	:	Patha, Akanadi
English	:	Velvet leaf
Gujrati	:	Kalipath, Karondhium, Karondium, Venivel, Karedhium
Hindi	:	Patha, Padh, Akanadi
Kannada	:	Pahadavela, Agalushunthi
Kashmiri	:	Pad
Malayalam	:	Patha
Marathi	:	Pashadvel, Paharrel, Pahadavel, Padali
Oriya	:	Kanabindhi, Patha
Punjabi	:	Patha
Tamil	:	Vatta tiruppi
Telugu	:	Adivibankatiga, chiru boddi, Boddi tiga
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Roots, cylindrical, often tortuous, 1-1.5 cm in diameter, light brown to yellowish in colour, surface rough and at places rugged due to transverse wrinkles, cracks and fissures, fracture short and splintery, odour, faint aromatic, taste, bitter.

## b) Microscopic

Transverse section of root shows, 6-10 layers of thin-walled, rectangular cork cells secondary cortex, 1-3 layered of oval to tangentially elongated cells, discontinuous ring consisting of 2-3 rows of stone cells and group of phloem fibres, stone cells variable in shape with simple pits, vascular strands as radiating strips usually 8-12 of xylem and phloem some reaching up to the centre, phloem consists of small strands of sieve elements and parenchyma just below the ring of stone cells, xylem consists of vessels, tracheids, fibres and xylem parenchyma, vessels and tracheids show simple pits on the walls, xylem parenchyma usually thick-walled and lignified but due to delignification patches of thin-walled parenchyma appear in the xylem region., medullary rays 1-3 seriate appear to be very wide at a number of places due to addition of delignified xylem parenchymatous cells, ray cells thin-walled, a few lignified and thick-walled while some show reticulate thickening, plenty of starch grains present in some of ray cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	11	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids, saponin and quaternary ammonium bases, flavonol and sterol

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣaśamana, Raktaśodhaka, Viṣaghna, Bhagnasandhānakṛt, Grāhī, Stanyaśodhana

**IMPORTANT FORMULATIONS** - Puṣyānuga Cūrṇa, Pradarāntaka Lauha, Sārasvata Ghr̥ta, Bṛhat Gaṅgādhara Cūrṇa, Stanyaśodhana Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Śūlaroga, Atīśāra, Kuṣṭha, Kaṇḍū, Jvara, Chardi, Stanyaduṣṭi

**DOSE** - 3-6 g of the drug in powder form.

## PŪGA (Seed)

Pūga consists of dried ripe seed of *Areca catechu* Linn. (Fam. Palmae), a graceful, slender, stemmed, perennial palm, trunk reaching a height of about 25 m cultivated in the coastal regions of Southern India, Bengal and Assam upto an altitude of 1000 m.

### SYNONYMS

Sanskrit	:	Kramuka, Ghṛṇṭā
Assamese	:	Tamol, Tamul
Bengali	:	Supari
English	:	Areca nut, Betle nut
Gujrati	:	Sopari
Hindi	:	Supari, Chaalia
Kannada	:	Adika
Kashmiri	:	Supari, Spari
Malayalam	:	Adakku, Pakku
Marathi	:	Supari, Pophal
Oriya	:	Gua
Punjabi	:	Supari, Spari
Tamil	:	Kamugu, Pakku, Pakhumaram
Telugu	:	Paka chekka, Vakka
Urdu	:	Fufal, Choalia

### DESCRIPTION

#### a) Macroscopic

Ovoid, externally pale, reddish-brown to light yellowish-brown, marked with a net work of paler lines, frequently with adhering portions of silvery brittle endocarp and adhering fibres of mesocarp at base of seed, seed hard with ruminant endosperm of brownish tissue alternating with whitish tissue, odour, characteristic, taste, astringent.

#### b) Microscopic

Transverse section of seed shows a seed coat consisting of several rows of cells, tangentially elongated, with inner walls more or less thickened, whitish cell of endosperm tissue with thick porous walls containing oil globules and aleuronic grains, brown perisperm tissue with thick walled cells and delicate tracheae.

**Powder**-Reddish brown to light brown, under microscope shows fragments of endosperm tissue with porous walls, irregularly thickened and small stone cells of seed coat, a few aleurone grains and oil globules and a few delicate tracheae, starch absent.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	3 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	19 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10 per cent, Appendix	2.2.7.

### ASSAY

### T.L.C.

**CONSTITUENTS** - Alkaloid (arecoline) tannins and fats

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : (Prabhāva: Mohakṛt), Dīpana, Kaphapittajit, Kledanāśana, Malabhedī, Mukhaśodhana, Vikāśī

**IMPORTANT FORMULATIONS** - Pūgakhaṇḍa

**THERAPEUTIC USES** - Mukhavikāra, Aruci, Yoniśaithilya, Śvetapradara

**DOSE** - 1-2 g of the drug in powder form.

## PUNARNAVĀ (RAKTA) (Whole plant)

Punarnavā consists of dried, matured whole plant of *Boerhaavia diffusa* Linn. (Fam Nyctaginaceae), trailing herb found throughout India and collected after rainy season, herb is diffusely branched with stout root stock and many long slender, prostrate or ascending branches.

### SYNONYMS

Sanskrit	:	Kaṭhilla, Śophaghñī, Śothaghñī, Varṣābhū
Assamese	:	Ranga Punarnabha
Bengali	:	Rakta punarnava
English	:	Horse Purslane, Hog Weed
Gujrati	:	Dholisaturdi, Motosatodo
Hindi	:	Gadapurna, Lalpunarnava
Kannada	:	Sanadika, Kommeberu, Komma
Kashmiri	:	Vanjula Punarnava
Malayalam	:	Chuvanna Tazhutawa
Marathi	:	Ghetuli, Vasuchimuli, Satodimula, Punarnava, Khaparkhuti
Oriya	:	Lalapuiruni, Nalipuruni
Punjabi	:	Iteit (Ial), Khattan
Tamil	:	Mukurattai (Shihappu)
Telugu	:	Atikamamidi, Erra galijeru

### DESCRIPTION

#### a) Macroscopic

*Stem*-greenishpurple, stiff, slender, cylindrical, swollen at nodes, minutely pubescent or nearly glabrous, prostrate divergately branched, branches from common stalk, often more than a metre long.

*Root*- well developed, fairly long, somewhat tortuous, cylindrical, 0.2-1.5 cm in diameter, yellowish brown to brown coloured, surface soft to touch but rough due to minute longitudinal striations and root scars, fracture, short, no distinct odour, taste, slightly bitter.

*Leaves*-opposite in unequal pairs, larger ones 25-37 mm long and smaller ones 12-18 mm long ovate-oblong or suborbicular, apex rounded or slightly pointed, base subcordate or rounded, green and glabrous above, whitish below, margin entire or sub-undulate, dorsal side pinkish in certain cases, thick in texture, petioles nearly as long as the blade, slender.

*Flowers*-very small, pink coloured, nearly sessile or shortly stalked, 10-25 cm, in small umbells, arranged on slender long stalks, 4-10 corymb, axillary and in terminal panicles, bracteoles, small, acute, perianth tube constricted above the ovary, lower part greenish, ovoid, ribbed, upper part pink, funnel-shaped, 3 mm long, tube 5 lobed, stamen 2-3.

*Fruit*-one seeded nut, 6 mm long clavate, rounded, broadly and bluntly 5 ribbed, viscidly glandular.

## **b) Microscopic**

*Stem*-Transverse section of stem shows epidermal layer containing multi cellular, uniseriate glandular trichome consisting of 9-12 stalked cells and an ellipsoidal head, 150-220  $\mu$  long, cortex consists of 1-2 layers of parenchyma, endodermis indistinct, pericycle 1-2 layered, thick-walled often containing scattered isolated fibres, stele consisting of many small vascular bundles often joined together in a ring and many big vascular bundles scattered in the ground tissue, intra fascicular cambium present.

*Root*-transverse section of mature root shows a cork composed of thin-walled tangentially elongated cells with brown walls in the outer few layers, cork cambium of 1-2 layers of thin walled cells secondary cortex consists of 2-3 layers of parenchymatous cells followed by cortex composed of 5-12 layers of thin-walled, oval to polygonal cells, several concentric bands of xylem tissue alternating with wide zone of parenchymatous tissue present below cortical regions, number of bands vary according to thickness of root and composed of vessels, tracheids and fibres, vessels mostly found in groups of 2-8 in radial rows, having simple pits and reticulate thickening, tracheids, small, thick-walled with simple pits, fibres aseptate, elongated, thick-walled, spindle shaped with pointed ends, phloem occurs as hemispherical or crescentic patches outside each group of xylem vessels and composed of sieve elements and parenchyma, broad zone of parenchymatous tissue, in between two successive rings of xylem elements composed of thin-walled more or less rectangular cells arranged in radial rows, central regions of root occupied by primary vascular bundles, numerous raphides of calcium oxalate, in single or in group present in cortical region and parenchymatous tissue in between xylem tissue, starch grains simple and compound having 2-4 components found in abundance in most of cells of cortex, xylem elements in parenchymatous tissue between xylem elements, simple starch grains mostly rounded in shape and measure 2.75-11  $\mu$  in diameter.

*Leaves*-Transverse section of leaf shows anomocytic stomata on both sides, numerous, a few short hairs, 3-4 celled, present on the margin and on veins, palisade one layered, spongy parenchyma 2-4 layered with small air spaces, idioblasts containing raphides, occasionally cluster crystal of calcium oxalate and orange-red resinous matter present in mesophyll.

Palisade ratio 3.5-6.5, stomatal index 11-16 , vein islet number 9-15.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

### ASSAY

**Assay**-Contains not less than 0.1 per cent of total alkaloids, when assayed by the following methods,

Take accurately about 100 g of the drug (60 mesh powder) and moisten with dilute solution of *Ammonia*. Extract continuously in a soxhlet apparatus for 18 hours with 95 per cent *Alcohol*. Remove the alcohol by distillation. Extract the residue with five 25 ml portions of 1 *N Hydrochloric acid* till complete extraction of the alkaloid is effected. Transfer the mixed acid solutions into a separating funnel and wash with 5 ml of *Chloroform*, runoff the Chloroform layer. Make the acid solution distinctly alkaline with *Ammonia* and shake with five 25 ml portions of *Chloroform* or till complete extraction of alkaloids is effected. Wash the combined chloroform extracts with two portions each of 5 ml of water. Filter the chloroform layer in tared flask and evaporate to dryness. Add to the residue 5 ml of *Alcohol*, evaporate to dryness, repeat the process once again and weigh the residue to constant weight in a vacuum desiccator.

**CONSTITUENTS** - Alkaloid (Punarnavine).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātaśleṣmahara, Mūtrala, Śothahara, Anulomana

**IMPORTANT FORMULATIONS** - Punarnavāṣṭaka Kvātha Cūrṇa, Punarnavāsava, Punarnavādi Maṇḍūra, Sukumāra Ghṛta, Śothaghna Lepa

**THERAPEUTIC USES** - Pāṇḍu, Śoṭha

**DOSE** - 20-30 g of the drug for decoction.

## SAPTAPARNA (Stem bark)

Saptaparṇa consists of stem bark of *Alstonia scholaris* (Linn.) R. Br. (Fam. Apocynaceae), a tall evergreen tree, found in the Sub-Himalayan tracts ascending to 900 m from Jammu eastwards and western peninsula mostly in deciduous forests.

### SYNONYMS

Sanskrit	:	Saptacchada, Saptaparnī, Saptāhvā
Assamese	:	Chatiyān
Bengali	:	Chatin
English	:	Dita
Gujrati	:	Saptaparna, Satvana
Hindi	:	Chhativan, Satawana
Kannada	:	Maddale, Hale, Eleyalaga
Malayalam	:	Daivaphal, Ezilampala
Marathi	:	Satveen
Oriya	:	Chbatiana, Chatiana
Punjabi	:	Sathi, Satanna
Tamil	:	Ezilampalai
Telugu	:	Edakula Ponna
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark occurs in channelled or occasionally quilled pieces, 3-4mm thick from branches and cut or broken irregularly into curved or flat pieces, about 7 mm thick from stem, externally younger bark dark grey to brown, older bark very rough, uneven and much fissured transversely and longitudinally, both marked with numerous rounded or transversely elongated, grey to whitish brown lenticels, internally brownish-buff to dark greyish-brown, somewhat striated and indented, fracture, short and smooth, fractured

surface shows a narrow, inner portion traversed by numerous, fine, medullary rays and a varying spongy outer portion

### **b) Microscopic**

Transverse section of bark shows a multi-layered, thick and thin-walled cork, a broad zone of secondary cortex composed of thin-walled, parenchymatous cells, including many rounded latex cavities, scattered throughout tissue, containing numerous rhombic to polygonal calcium oxalate crystals, numerous stone cells forming a non-continuous layer of 4-8 cells, irregular, rounded to linear, fibre-like, blunt at both ends, internal to secondary cortex a secondary phloem cells containing many sieve tubes, cork cells brick shaped to almost square in transverse and longitudinal sections and polygonal in surface view, cork cambium forms a region of two rows of cells identical to cork cells, situated in between cork and secondary cortex, secondary phloem cells smaller in dimension than cortical cells consisting of phloem parenchyma, many sieve tubes and companion cells, fibres absent.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

### **ASSAY**

**Assay**-Contains not less than 0.2 per cent of total alkaloids when assayed by the following method:-

Take 25 g in No. 60 mesh powder. Transfer to a continuous extraction apparatus and extract with 90 per cent Alcohol for 4 hours (at least 3 extractions are essential). Remove the solvent and transfer to a separating funnel with the help of a little water and 5 ml of 95 per cent Alcohol. Add about 15 ml of Water and 2 ml of solution of 20

percent Sodium Hydroxide to make the solution alkaline and extract with successive quantities of Chloroform till the extraction of alkaloid is complete. Shake the combined Chloroform extract with successive quantities of a mixture of 4 volumes of 0.2 N Sulphuric Acid and 1 volume of Alcohol until complete extraction of alkaloid is effected. Wash the mixed acid solution twice with 10 ml portion of Chloroform and then twice with 10 ml portion of Ether. Wash the combined Chloroform and Ether solution with 20 ml of 0.1 N Sulphuric acid. Transfer this washed acid extract to the original acid extract, make distinctly alkaline with solution of Sodium Hydroxide and shake with successive portions of chloroform till the extraction of the alkaloids is complete. Wash the combined chloroform solution with about 5 ml of water. Remove most of the chloroform and transfer the remainder to a small open dish. When the removal of chloroform is almost complete on water bath, add about 2 ml Dehydrated Alcohol and evaporate to dryness. Dry at 100° to constant weight and weigh as total alkaloids.

### **T.L.C.**

**CONSTITUENTS** - Alkaloids (echitamine, ditamine and echitamidine).

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Sara, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣaghna, Dīpana, Anulomana, Raktaśodhaka, Kuṣṭhaghna, Jvaraghna

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa, Amṛtāriṣṭa, Vajraka Taila

**THERAPEUTIC USES** - Śūla, Gulma, Kṛmiroga, Kuṣṭha, Jvara, Sāndrameha

**DOSE** - 20-30 g of the drug for decoction.

## ŚAṬĪ (Rhizome)

Śaṭī consists of sliced, dried rhizomes of *Hedychium spicatum* Ham.ex Smith (Fam. Zingiberaceae), a perennial rhizomatous herb, measuring upto 1 m occurs in parts of western and central regions of sub-tropical Himalayas at an altitude of 1500-2000 m, grows abundantly in Kumaon and Punjab.

### SYNONYMS

Sanskrit	:	Śathī, Gandhamūlikā
Assamese	:	Katuri, Sati
Bengali	:	Shati, Kachri
English	:	Spiked ginger lily
Gujrati	:	Kapurkachri, Kapurkachali
Hindi	:	Kapurkachri
Kannada	:	Goul Kachora, Seenakachora, Kachora
Kashmiri	:	Kapoorkachara
Malayalam	:	Katcholam, Katchooram
Marathi	:	Kapurakachari, Gablakachari
Oriya	:	Gandhasunthi
Punjabi	:	Kachur, Kachoor
Tamil	:	Kichili Kizongu, Poolankizangu
Telugu	:	Gandha Kachuralu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Rhizomes 15-20 cm long, 20-25 mm in diameter, externally yellowish-brown but changed to dark brown on storage, drug available in pieces of 2.5 cm diameter, edge of each piece is covered by a rough reddish-brown layer marked with numerous scars and circular rings, rudiments of root-lets visible, odour, camphoraceous, taste, bitter.

## b) Microscopic

Transverse section of rhizome shows an outermost thick layer of suberised, dark brown cells of outer cork consisting of 10-15 or more layers of irregular parenchymatous cells, inner cork consisting of a few layered light brown, rectangular, radially arranged cells followed by a wide zone of cortex, 30-40 cells thick, some cortical cells filled with flattened and oval-oblong starch grains, numerous oleo-resin cells also found in this region which have suberised walls containing green-yellow oil, a thin endodermal layer present beneath cortex, central cylinder distinguished by presence of peripheral plexus of irregular congested vascular bundles with poorly developed mechanical tissues, vascular bundles scattered irregularly throughout ground tissue, bundles closed and collateral possessing group of two or more xylem elements, ground tissue composed of large parenchymatous cells with abundant starch grains and oil.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## CONSTITUENTS - Essential oil

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphavātaghna, Mukhaśodhana, Grāhī, Śūlahara

## IMPORTANT FORMULATIONS - Agastyaharītakī Rasāyana, Śaṭyādi Cūrṇa

## THERAPEUTIC USES - Kāsa, Śvāsa, Mukharoga, Śūla, Chardi, Kaṇḍū

**DOSE** - 1-3 g of the drug in powder form.

## SNUHĪ (Stem)

Snuhī consists of stem of *Euphorbia neriifolia* Linn. (Fam. Euphorbiaceae), a large branched, erect, glabrous, succulent, xerophytic shrub occurring wild on rocky ground throughout central India and extensively grown as a hedge plant.

### SYNONYMS

Sanskrit	:	Sudhā, Vajradrumā, Snuk
Assamese	:	--
Bengali	:	Manasasij
English	:	Milkhedge
Gujrati	:	Thor, Kantalo
Hindi	:	Thuhar, Sehunda
Kannada	:	Muru Kanina Kalli
Malayalam	:	Kalli, Kaikalli
Marathi	:	Nivadung
Oriya	:	Thor, Kantalothor
Punjabi	:	Thohar
Tamil	:	Elaikalli, Perumbu Kalli
Telugu	:	Kadajemudu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Stem, green, cylindrical, showing, spiral ridge portion only, dried stem, tough with pairs of sharp stipular thorns, with hollow space in centre containing white reticulate mass, taste, acrid.

#### b) Microscopic

Transverse section shows a single layered epidermis composed of squarish, thin-walled, parenchymatous cells, followed by a thick zone of cortex, differentiated into two parts, outer of thin walled, rectangular, oval and oblong parenchymatous cells of about 20 layers depth, inner wider zone, consisting of about 30-40 layers of thin-walled, oblong or ovoid, elongated parenchymatous cells having a number of rounded and oval

latex cells, some contain dark yellowish latex, the number of latex cells gradually reduce towards outer side, below cortex, about 10 layers of phloem present, containing group of fibres towards cortex, xylem consists of vessels, tracheids, fibres and xylem parenchyma, pith consists of thin-walled, rounded or oval, parenchymatous cells, starch and calcium oxalate crystals absent.

**Powder-** Cream yellow, under microscope shows, vessels, fibres and cortical cells, starch and calcium oxalate crystals absent.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Resin, gum and triterpenes

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Guru, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tīkṣṇavirecana, Bhedana, Āmakaphavāhara

**IMPORTANT FORMULATIONS** - Citrakādi Taila, Abhayā Lavaṇa, Avittolādi Bhasma, Vajrakṣāra

**THERAPEUTIC USES** - Gulma, Udararoga, Meha, Kuṣṭha, Śoṭha

**DOSE** - 125 -250 mg of the drug in powder form

Note- Śōdhana of this drug is to be done before use as described in appendix.

## SŪKṢMAILĀ (Fruit)

Sūkṣmailā consists seeds of dried fruits of *Elettaria cardamomum* (Linn.) Maton and its varieties (Fam. Zingiberaceae), a stout large perennial herb, growing naturally in moist forests of western ghats up to 1500 m, also cultivated in many other parts of south India at an elevation from 750-1500m.

### SYNONYMS

Sanskrit	:	Truṭi, Elā
Assamese	:	Saroplaachi
Bengali	:	Chota elaich
English	:	Cardamom
Gujrati	:	Elchi, Elachi, Elayachi
Hindi	:	Choti Ilayachi
Kannada	:	Elakki, Sanna Yalakki
Malayalam	:	Elam, Chittelam
Marathi	:	Velloda, Lahanveldoda, Velchi
Oriya	:	Gujrati, Chotaa leicha, Alaicha
Punjabi	:	Illachi, Chhoti Lachi
Tamil	:	Siruelam
Telugu	:	Chinne Elakulu, Sanna Elakulu
Urdu	:	Heel Khurd

### DESCRIPTION

#### a) Macroscopic

**Fruit** - 1-2 cm long ovoid or oblong and more or less three sided with rounded, angles, greenish to pale-buff or yellowish in colour, base rounded or with the remains of pedicle, apex shortly beaked, surface almost smooth or with slight longitudinal striations, small trilocular fruit, each containing about 15-20 seeds in a row of doubles, adhering together to form compact mass.

**Seed**-dark brown to black, about 4 mm long and 3 mm broad, irregularly angular, transversely wrinkled but not pitted, with a longitudinal channel containing raphe, enclosed in a colourless, membranous aril, odour, strongly aromatic, taste, characteristic.

### **b) Microscopic**

Transverse section of seed shows flattened, aril, thin-walled parenchymatous cells, testa with outer epidermis of thick-walled, narrow, elongated cells, followed by a layer of collapsed parenchyma, becoming 2 or 3 layered in the region of raphe, composed of large, thin-walled rectangular cells containing volatile oil, a band of 2 or 3 layers of parenchyma and an inner epidermis of thin-walled, flattened cells, inner integument 2 layered, an outer palisade sclerenchyma with yellow to reddish-brown beaker shaped cells, 20  $\mu$  long in radial direction and 12  $\mu$  wide, thickened on inner and anticlinal walls, each cell with a small bowl shaped lumen containing a warty nodule of silica and an inner epidermis of flattened cells, perisperm cells thin-walled, packed with minute rounded polyhedral starch grains, about 1-2 to 4-6  $\mu$  in diameter and containing 1-7 small prismatic crystals of calcium oxalate, about 10-20  $\mu$  long, endosperm of thin-walled parenchyma containing protein as a granular hyaline mass in each cell, embryo, of small thin-walled cells containing aleurone grains, starch absent in endosperm and embryo, fibres sclerenchymatous, large vessels present in pericarp.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	Nil per cent, Appendix	2.2.2.
Total Ash	Not more than	6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10 per cent, Appendix	2.2.7.
Volatile oil	Not less than	4 per cent, v/w, Appendix	2.2.10

### **CONSTITUENTS** - Essential oi

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Madhura
<b>Gūṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta

**Vipāka** : Madhura

**Karma** : Rocana, Dīpana, Anulomana, Hṛdya, Mūtrala

**IMPORTANT FORMULATIONS** - Elādi Modaka, Elādi Cūrṇa, Sitopalādi Cūrṇa

**THERAPEUTIC USES** - Kāsa, Śvāsa, Aruci, Chardi, Mūtrakṛcchra

**DOSE** - 250-500 mg of the drug in powder form.

## ŚUNṬHĪ (Rhizome)

Śunṭhī consists of dried rhizome of *Zingiber officinale* Roxb. (Fam. Zingiberaceae), widely cultivated in India, rhizomes dug in January-February, buds and roots removed, soaked overnight-in water, decorticated, and some times treated with lime and dried.

### SYNONYMS

Sanskrit	:	Auṣadha, Muhaṣadha, Nāgara, Viśva, Viśvabheṣaja, Śṛṅgavera, Viśvā, Viśvauāṣadha
Assamese	:	Adasuth, Aadar Shuth
Bengali	:	Suntha, Sunthi
English	:	Ginger root, Ginger
Gujrati	:	Sunth, Sundh, Suntha
Hindi	:	Sonth
Kannada	:	Shunthi
Kashmiri	:	Shonth
Malayalam	:	Chukku
Marathi	:	Sunth
Oriya	:	Sunthi
Punjabi	:	Sund
Tamil	:	Sukku, Chukku
Telugu	:	Sonthi, Sunti
Urdu	:	Sonth, Zanjabeel

### DESCRIPTION

#### a) Macroscopic

Rhizome, laterally compressed bearing short, flattish, ovate, oblique, branches on upper side each having at its apex a depressed scar, pieces about 5-15 cm long, 1.5-6.5 cm wide (usually 3-4 cm) and 1-1.5 cm thick, externally buff coloured showing longitudinal striations and occasional loose fibres, fracture short, smooth, transverse surface exhibiting narrow cortex (about one-third of radius), a well-marked endodermis and a wide stele showing numerous scattered fibro-vascular bundles and yellow

secreting cells, odour agreeable and aromatic, taste, agreeable and pungent.

### **b) Microscopic**

Transverse section of rhizome shows cortex. of isodiametric thin-walled parenchyma with scattered vascular strands and numerous isodiametric idioblasts, about 40-80  $\mu$  In diameter containing a yellowish to reddish-brown oleo-resin, endodermis slightly thick walled, free from starch immediately inside endodermis a row of nearly continuous collateral bundles usually without fibres stele of thin-walled, parenchyma cells, arranged radially around numerous scattered, collateral vascular bundles, each consisting of a few unlignified, reticulate or spiral vessels upto about 70  $\mu$  in diameter, a group of phloem cells, unlignified, thin-walled, septate fibres upto about 30  $\mu$  wide and 600  $\mu$  long with small oblique slit, like pits, present, numerous scattered idioblasts, similar those of cortex, and associated with vascular bundles, also present, idioblasts about 8-20  $\mu$  wide and up to 130  $\mu$  long with dark reddish-brown contents: in single or in axial rows, adjacent to vessels, present, parenchyma of cortex and stele packed with flattened, rectangular, ovate, starch grains, mostly 5-15  $\mu$  - 30-60  $\mu$  long about 25  $\mu$  wide and 7  $\mu$  thick, marked by five transverse striations.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil, pungent constituents (gingerol and shogaol), resinous matter and starch.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu
<b>Guna</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Madhura

**Karma** : Dīpana, Pācana, Anulomana, Āmadoṣahara, Vātakaphāpaha, Hr̥dya

**IMPORTANT FORMULATIONS** - Saubhāgyaśuṅṭhī, Trikaṭu Cūrṇa, Saubhāgya Vaṭī, Vaiśvānara Cūrṇa

**THERAPEUTIC USES** - Agnimāndya, Ādhmāna, Pāṇḍu, Śvāsa, Udararoga, Āmavāta

**DOSE** - 1-2 g of the drug in powder form.

## SVARNĀPATRĪ (Leaf)

Svarṇāpatrī consists of dried leaves of *Cassia angustifolia* Vahl (Fam. Leguminosae), a small shrub, 60-75 cm high, found throughout the year, cultivated largely in Southern India, especially in districts of Tinnevely, Madurai and Tiruchirapally and has also been introduced in Mysore, fully grown, thick bluish colour leaves stripped off by hand, collected and dried in shade for 7-10 days, till assume a yellowish-green colour, graded and then packed into large bales.

### SYNONYMS

Assamese	:	Sonamukhi
Bengali	:	Svamamukhi, Sonapata
English	:	Indian Senna. Tinnevely Senna
Gujrati	:	Mindhiaval, Sonamukhi
Hindi	:	Sanaya, Hindisana
Kannada	:	Nelavarika, Sonamukhi, Nelaavare, Nelavarike, Nela Avariake
Kashmiri	:	Sna
Malayalam	:	Sunnamukhi, Nilavaka, Chinnukki, Adapatiyan
Marathi	:	Sonamukhi
Oriya	:	Sunamukhi
Punjabi	:	Sannamakhi, Sanapati, Sarnapatta
Tamil	:	Nilapponnai, Avarai
Telugu	:	Sunamukhi
Urdu	:	Sena, Barg-e-Sana

### DESCRIPTION

#### a) Macroscopic

Leaflets, 2.5-6 cm long and 7-15 mm wide at centre, pale yellowish-green, elongated lanceolate, slightly asymmetric at base, margins entire, fiat apex acute with a sharp spine, both surfaces smooth with sparse trichomes, odour, faint but distinctive, taste mucilagenous and disagreeable but not distinctly bitter.

## b) Microscopic

Transverse section of leaflet through midrib shows an isobilateral structure, epidermal cells, straight walled containing mucilage, both surfaces bear scattered, unicellular hair, often conical, curved near base, thick-walled, non-lignified, warty cuticle, stomata, paracytic, numerous on both surfaces, mesophyll consists of upper and lower palisade layers with spongy layer in between, palisade cells of upper surface longer than those of lower surface the latter having wavy anticlinal walls, prismatic crystals of calcium oxalate present on larger veins and clusters of calcium oxalate crystals distributed throughout the palisade and spongy tissues, midrib biconvex, bundles of midrib and larger veins, incompletely surrounded by a zone pericyclic fibres and a crystal sheath of parenchymatous cells containing prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Anthraquinone, glucoside, flavonoids, steroids and resin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Recana

**IMPORTANT FORMULATIONS** - Pañcasakāra Cūrṇa, Sārivādyāsava

**THERAPEUTIC USES** - Vibandha, Udararoga

**DOSE** - 0.5-2 g of the drug in powder form.

## ŚVETAJĪRAKA (Fruit)

Śvetajīraka consists of ripe fruits of *Cuminum cyminum*, Linn. (Fam. Umbelliferae), a glabrous, annual herb, 30-90 cm high, flowers very small, white, about 38 mm long stalk in compound umbels, mostly cultivated in plains, plants pulled out, dried thrashed for collecting mature fruits.

### SYNONYMS

Sanskrit	:	Ajājī, Jīraka, Ajājikā
Assamese	:	Jira
Bengali	:	Jira, Sadajira
English	:	Cumin seed. Cumin
Gujrati	:	Jirautmi, Jiru, Jiraugi, Jeeru, Jirun
Hindi	:	Jira, Safed jira
Kannada	:	Jirage, Bilejirege
Kashmiri	:	Safed Zoor
Malayalam	:	Jeerakam
Marathi	:	Pandhare jire
Oriya	:	Dhalajeera, Dalajira, Jira
Punjabi	:	Safed Jira, Chitta Jira
Tamil	:	Sheeragam, Chirakam, Jeerakam
Telugu	:	Jilakarra, Tella Jilakarra
Urdu	:	Zirah, Zirasafed

### DESCRIPTION

#### a) Macroscopic

Fruit, a cremocarp, often separated into mericarps, brown with light coloured ridges ellipsoidal, elongated, about 4-6 mm long, 2 mm wide, tapering at ends and slightly compressed laterally, mericarps with 5 longitudinal hairy primary ridges from base to apex, alternating with 4 secondary ridges which are flatter and bear conspicuous emergences, seeds orthospermous, odour umbelliferous characteristic, taste, richly spicy.

## b) Microscopic

Transverse section of fruit shows epidermis consisting of short polygonal, tabular cells densely covered with short, bristle hairs on ridges, mesocarp with few layers of parenchyma and five vascular bundles under five primary ridges, six vittae under secondary ridges, four on dorsal and two on commissural surface, endocarp consists of polygonal cells containing fixed oil and aleurone grains carpophore consists of slender fibres.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## CONSTITUENTS - Essential oil

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Rucya, Dīpana, Pācana, Grāhī, Kṛmighna, Kaphavātahara

**IMPORTANT FORMULATIONS** - Jīrakādyariṣṭa, Jīrakādi Modaka, Hingvādi Cūrṇa, Hiṅguvacādi Cūrṇa

**THERAPEUTIC USES** - Agnimāndya, Atīsāra, Kṛmiroga

**DOSE** - 1-3 g of the drug in powder form.

## ŚVETA SĀRIVĀ (Root)

Śveta Sārivā consists of root of *Hemidesmus indicus* (Linn.) R. Br. (Fam. Asclepiadaceae), a prostrate or semi-erect shrub found throughout India from upper Gangetic plains east-wards to Assam, throughout Central, Western and Southern India upto an elevation of 600 m.

### SYNONYMS

Sanskrit	:	Anantā, Gopasutā, Sārivā
Assamese	:	Vaga Sariva
Bengali	:	Anantamul, Shvetashariva
English	:	Indian Sarsaparilla
Gujrati	:	Upalsari, Kabri
Hindi	:	Anantamul
Kannada	:	Namada veru, Bili Namadaberu, Anantamool, Sogadeberu, Namadaberu
Kashmiri	:	Anant mool
Malayalam	:	Nannari, Nannar, Naruneendi
Marathi	:	Upalsari, Anantamula
Oriya	:	Dralashvan Lai, Anantamool
Punjabi	:	Anantmool, Ushbah
Tamil	:	Ven Nannar
Telugu	:	Sugandhi Pala, Tella Sugandhi
Urdu	:	Ushba Hindi

### DESCRIPTION

#### a) Macroscopic

Roots occur in pieces, about 30 cm long and 3-8 mm in diameter, cylindrical, thick, hard, somewhat tortuous, sparsely branched, provided with few thick rootlets and secondary roots, external appearance dark brown, sometimes with violet grey tinge, centre yellow, woody, surrounded by a mealy white cortical layer, bark brownish, corky, marked with transverse cracks and longitudinal fissures and easily detachable from the hard central core, odour, characteristic, taste, sweetish, slightly acrid and aromatic.

## b) Microscopic

Transverse section of root shows periderm consisting of three layers of tissues, cork, cork cambium and secondary cortex, cork cells radially flattened and rectangular in appearance filled with dark brown contents giving reactions of tannins, cork cambium, 2 or 3 layered, compressed, and filled with deep brown contents, secondary cortex, 3-4 layers of cells, similar to cork cells, with very little or no dark brown contents, secondary phloem consists of sieve elements, parenchyma, phloem ray cells along with several laticiferous ducts, parenchyma cells filled with starch grains, diameter 7-10  $\mu$ , occasional prismatic crystals of calcium oxalate, laticiferous ducts scattered in parenchymatous tissue, cambium very narrow: xylem traversed by narrow medullary rays, vessels and tracheids characterised by the presence of pitted markings, pith absent and central region occupied by woody tissues.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13 per cent, Appendix	2.2.7.

## T.L.C.

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**CONSTITUENTS** - Essential oil, saponin, resin, tannins, sterols and glucosides

## PROPERTIES AND ACTION

**Rasa** : Madhura  
**Guna** : Snigdha, Guru

**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Tridoṣanāśana, Dīpana, Raktaśodhaka, Āmanāśana, Viṣaghna,  
Jvarahara

**IMPORTANT FORMULATIONS** - Sārivādyāsava

**THERAPEUTIC USES** - Aruci, Agnimāndya, Atīśāra, Kāsa, Śvāsa, Kaṇḍū, Kuṣṭha, Jvara,  
Raktavikāra

**DOSE** - 20-30 g of the drug for decoction.

## **TAGARA (Rhizome)**

Tagara consists of predominantly dried rhizome, stolon and small portion of root of *Valeriana wallichii* DC, (Fam.Valerianaceae): a hairy perennial herb, growing in temperate Himalayas from Kashmir to Bhutan and Khasia hills upto an altitude of 3,000 m, rhizomes dug in autumn, well washed with water and dried.

### **SYNONYMS**

Sanskrit	:	Kālānusāri, Kālānusārikā, Nata
Assamese	:	Tagar
Bengali	:	Tagar Paduka
English	:	Indian Valerian
Gujrati	:	Tagar Ganthoda, Tagar Gantho, Ghodawaj
Hindi	:	Mushkbala, Sugandhabala
Kannada	:	Mandibattal, Mandyavanthu, Mandibattalu, Tagar
Kashmiri	:	Bala, Mushkbala
Malayalam	:	Thakaram
Marathi	:	Tagar, Ganthode
Oriya	:	Tagarapaduka, Jalashiuli
Punjabi	:	Mushkobala, Sugandhbala
Tamil	:	Tagarai
Telugu	:	Grandhi Tagaramu
Urdu	:	Tagar

### **DESCRIPTION**

#### **a) Macroscopic**

Rhizome, of about 4-8 cm long and 4-10 mm thick pieces, dull yellowish-brown. sub-cylindrical and dorsiventrally somewhat flattened, rough, slightly curved and unbranched, upper surface marked with raised encircling leaf scars, under surface bearing numerous, small, circular prominent, root scars and a few stout rootlets, crown bearing remains of aerial stems with scale leaves, fracture short and horny, stolon

connecting rhizomes stout, 1-5 mm long and 2-4 mm thick, yellowish-grey in colour, longitudinally wrinkled, usually with nodes and internodes and bearing adventitious roots, occasionally thin stolons 1-2 mm thick, root, yellowish-brown, 3-5 cm long and 1 mm thick, odour, strong and reminiscent of isovaleric acid, taste, bitter and somewhat camphoraceous.

### **b) Microscopic**

*Rhizome* - transverse section of rhizome shows cork, consisting of 4-14 layers of lignified, cells occasionally containing oil globules, cortex parenchymatous containing numerous starch grain oil globules and yellowish-brown substance, outer 2 or 3 layers of cortex, collenchymatous occasional root traces appear as paler strands, endodermis single layered, pericycle, parenchymatous and within it 12-18 collateral vascular bundles, separated by dark medullary ray present, pith large, parenchymatous, lacunar, containing starch grains, starch occurs as single or occasional compound grains of two components, individual grains being 7-30  $\mu$  mostly, 10-25  $\mu$  in diameter calcium oxalate crystals absent.

*Stolon*--transverse section of stolon shows cork, consisting of 2-5 layers, cortex upto 25 layers, parenchymatous, followed by 20 collateral vascular bundles, which in young stolons separated by cellulosic parenchymatous medullary rays and in older stolons become lignified, pith wide and lacunar, root traces absent.

*Root*- transverse section of root shows small, central parenchymatous pith, surrounded by tetrach to polyarch xylem and a wide parenchymatous bark.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	10	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	30	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	19	per cent, Appendix	2.2.7.

### **CONSTITUENTS** - Essential oil

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣahara, Viṣaghna, Raktadoṣahara, Mānasadoṣahara

**IMPORTANT FORMULATIONS** - Dhānvantara Taila, Mahā Nārāyaṇa Taila, Devadārvādyariṣṭa, Jātīphalādi Cūrṇa

**THERAPEUTIC USES** - Apasmāra, Unmāda, Śīroroga, Netraroga

**DOSE** - 1-3 g of the drug in powder form.

## TĀMALAKĪ (Root, Stem & Leaf)

Tāmalakī consists of root, stem and leaf of *Phyllanthus fraternus* Webst. Syn. *Phyllanthus niruri* Hook. f. non Linn. (Fam. Euphorbiaceae), an annual herb, 20-60 cm high, found in Central and Southern India extending to Ceylon.

### SYNONYMS

Sanskrit	:	Mahidhātrikā, Bhūmyāmalakī, Bahuphalā
Assamese	:	Bhuin Amla
Bengali	:	Bhumamla, Bhumi amalaki
English	:	--
Gujrati	:	Bhoi Amali, Bhony amari, Bhonyamali
Hindi	:	Bhui Amala
Kannada	:	Nelanelli
Malayalam	:	Kizanelli, Keezhanelli, Ajjhada
Marathi	:	Bhuiawali
Oriya	:	Bhuin Amla
Tamil	:	Kizhukai nelli, Kizanelli
Telugu	:	Nela usirika
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

*Root*-small, 2.5-11 .0 cm long. nearly straight, gradually tapering, with a number of fibrous secondary and tertiary roots, external surface light brown, fracture, short.

*Stem*-Slender, gabrous, light brown, cylindrical, 20-75 cm long, branching profuse towards upper region bearing 5-10 pairs of leaves, internode, 1-3.5 cm long, odour, indistinct, taste, slightly bitter.

*Leaf*-compound and leaf-let arranged in two rows with a rachis, alternate, opposite and decussate almost sessile, stipulate, oblong, entire, upto 1.5 cm long and 0.5 cm wide, greenish-brown in colour, odour, indistinct, taste, slightly bitter

## **b) Microscopic**

Root-transverse section shows, 4-6 layers of cork consisting of thin-walled, rectangular, tangentially elongated and radially arranged cells, filled With reddish-brown content, secondary cortex consists of 8-10 layers of thin-walled, tangentially elongated parenchymatous cells, secondary phloem narrow consisting of sieve elements, phloem parenchyma and traversed by narrow phloem rays, secondary xylem represented by a broad zone of tissues, composed of vessels, tracheids, fibres and parenchyma, all elements being thick-walled and lignified having simple pits, xylem rays uniseriate.

*Stem*-transverse section shows, a single layered epidermis composed of thick-walled, flattened, tangentially elongated cells, older stem shows 4-5 layers of cork, composed of thin-walled, tabular, tangentially elongated and radially arranged cells, filled With reddish-brown content, cortex composed of 4-6 layers of oval, tangentially elongated, thin-walled, parenchymatous cells, some cortical cells filled with yellowish-brown content, endodermis quite distinct, pericycle represented by a discontinuous ring, composed of several tangentially elongated strands of lignified fibres with thick walls and narrow lumen, secondary phloem narrow, composed of sieve elements, dispersed in mass of phloem parenchyma, secondary xylem composed of vessels, fibres, parenchyma and traversed by numerous uniseriate rays, vessels mostly simple pitted, a few show spiral thickenings, fibres narrow elongated, with narrow or sometimes blunt ends with simple pits, centre, occupied by a pith composed of thin-walled, circular to oval parenchymatous cells, occasionally cluster crystals of calcium oxalate present in parenchymatous cells of ground tissue.

*Leaf*-transverse section of leaf shows, a biconvex outline, epidermis on either side, single layered covered externally by a thick cuticle, a palisade layer present beneath upper epidermis, intercepted by a few parenchymatous cells in the middle, meristele composed of small strands of xylem towards upper surface and phloem towards lower surface, rest of tissue of leaf composed of thin-walled, parenchymatous cells some having cluster crystals of calcium oxalate, lamina shows a dorsiventral structure, mesophyll differentiated into palisade and spongy parenchyma, epidermis on either side composed of thin-walled, tangentially elongated cells, covered externally by a thick cuticle, anisocytic type stomata present on both epidermises, palisade single layered, mesophyll composed of 3-5 layers of loosely arranged cells having a number of veins traversed in this region, a few cluster crystals of calcium oxalate present in spongy parenchyma.

**Powder**-Powder of the drug, brown coloured, under microscope shows, fragments of cork cells, vessels and fibres.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 16 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 7 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 13 per cent, Appendix	2.2.7.

## T.L.C.

## CONSTITUENTS - Phyllanthin

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Rocana, Dāhanāśanī, Pittaśāmaka, Mūtrala

**IMPORTANT FORMULATIONS** - Citraka Harītaki, Madhuyasṭyādi Taila, Pippalyādi Ghṛta, Cyavanaprāśa, Śatāvarī Guḍa

**THERAPEUTIC USES** - Trṣṇā, Kāsa, Amlapitta, Pāṇḍu, Kṣaya, Kṣata, Kuṣṭha, Prameha, Mūtraroga

**DOSE** - 10-20 ml of the drug in juice form

3-6 of the drug in powder form.

## TVAK (Bark)

Tvak is the dried inner bark (devoid of cork and cortex) of the coppiced shoots of stem of *Cinnamomum zeylanicum* Blume. (Fam. Lauraceae), a moderate sized evergreen tree usually attaining a height of 6-7 .5 m, cultivated on the Western Ghats and adjoining hills, bark collected during April-July and October-December.

### SYNONYMS

Sanskrit	:	Dārusitā
Assamese	:	Dalchini, Dalcheni
Bengali	:	Daruchini, Darchini
English	:	Cinnamon bark
Gujrati	:	Dalchini
Hindi	:	Dalchini
Kannada	:	Dalchini Chakke
Kashmiri	:	Dalchini, Dalchin
Malayalam	:	Karuvapatta, Ilavarngathely
Marathi	:	Dalchini
Oriya	:	Dalechini, Guda twak
Punjabi	:	Dalchini, Darchini
Tamil	:	Lavangapattai, Karuvapattai
Telugu	:	Lavangapatta, Dalchini chekka
Urdu	:	Darchini

### DESCRIPTION

#### a) Macroscopic

Bark pieces about 0.5 mm thick, brittle, occurs as single or double, closely packed compound quills, upto a metre or more in length and upto about 1 cm in diameter, outer surface, dull yellowish-brown, marked with pale wavy longitudinal lines with occasional small scars or holes, inner surface darker in colour, striated with

longitudinally elongated reticulation, fracture, splintery, free from all but traces of cork, odour, fragrant, taste, sweet, aromatic with sensation of warmth.

### **b) Microscopic**

Transverse section of bark (devoid of cork and cortex) shows except at certain places pericyclic sclerenchyma, 3 or 4 rows of isodiametric cells, sometimes tangentially elongated, inner and radial walls often being thicker than the outer, some containing starch grains, small groups of pericyclic fibres embedded at intervals in the sclerenchyma, phloem of tangential bands of sieve tissue alternating with parenchyma, and containing axially elongated secreting cells containing volatile oil or mucilage, phloem fibres with very thick walls, upto 30  $\mu$  in diameter, isolated or in short tangential rows, sieve tubes narrow with transverse sieve plates, collapsed in outer periphery, medullary rays of isodiametric cells, mostly 2 cells wide, cortical parenchyma and medullary rays containing small starch grains mostly below 10  $\mu$  in diameter, minute acicular crystals of calcium oxalate present.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, v/w, Appendix	2.2.10.

**CONSTITUENTS** - Essential oil, tannin and mucilage

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Madhura
<b>Gūṇa</b>	:	Rūkṣa, Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu

**Karma** : Kaphavātahara, Viṣaghna, Kaṇṭhaśuddhikara, Rucya

**IMPORTANT FORMULATIONS** - Sitopalādi Cūrṇa, Caturjāta Cūrṇa

**THERAPEUTIC USES** - Mukhaśoṣa, Tṛṣṇā, Kaṇṭhamukharoga, Pīnasa, Kṛmiroga, Vastiroga, Arśa, Hṛdroga

**DOSE** - 1-3 g of the drug in powder form.

## TVAKPATRA (Leaf)

Tvakpatra consists of dried mature leaves of *Cinnamomum tamala* (Buch. Ham.) Nees & Eberm. (Fam. Lauraceae): a small evergreen tree upto 7.5 m high and occurs in tropical, sub-tropical Himalayas between 900-2300 m, often raised from seeds, sown in nursery, leaves collected in dry weather from about ten years old plant during October-March.

### SYNONYMS

Sanskrit	:	Patra, Varāṅga, Coca
Assamese	:	Tejpat, Mahpat
Bengali	:	Tejpatra, Tejpatra
English	:	Indian Cinnamon
Gujrati	:	Tamala patra, Develee
Hindi	:	Tejpatra
Kannada	:	Tamalapatra, Dalchini Ele
Kashmiri	:	Dalchini pan, Tajpatra
Malayalam	:	Karuvapatta patram
Marathi	:	Tamalpatra
Oriya	:	Tejapatra
Punjabi	:	Tajpater
Tamil	:	Lavangapatri
Telugu	:	Akupatri
Urdu	:	Tezpat

### DESCRIPTION

#### a) Macroscopic

**Leaves**-12.5-20 cm long, 5-7.5 cm wide at the centre, 3 converging nerves from base to apex young leaves pink, petiole 7.5-13 mm long, margin entire, apex acute or acuminate, both surfaces smooth, stomata paracytic odour, aromatic, taste, slightly sweet, mucilaginous and aromatic.

## b) Microscopic

**Petiole and midrib**-transverse section of petiole and midrib shows epidermis externally covered with cuticle, uniseriate, multicellular (1 to 3 cells), trichomes present, oil cells single or in group, isolated large stone cells, much lignified showing striations found scattered, most of the parenchymatous cells of cortex with reddish-brown contents, pericycle represented by a few layers of sclerenchymatous cells, stele more or less planoconvex as in the midrib of leaf, xylem on upper and phloem on lower side consisting of usual elements, present.

**Lamina**-transverse section of lamina shows dorsiventral structure, represented by palisade tissue on upper and spongy parenchyma on lower side, epidermis same as in midrib, externally covered with cuticle, below upper epidermis single row of closely packed palisade layer followed by multilayered, irregular, thin-walled cells of spongy parenchyma without intercellular spaces, idioblasts containing oil globules present in mesophyll and also in palisade, lower epidermis covered externally with cuticle, lamina intervened by several small veinlets: vascular bundles covered with thick-walled fibres on both side.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, v/w, Appendix	2.2.10.

**CONSTITUENTS** - Essential oils (d- $\alpha$  phellandrene and eugenol)

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Madhura
<b>Guṇa</b>	:	Laghu, Picchila, Tīkṣṇa

**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Rucya, Kaphavātahara, Arśoghna

**IMPORTANT FORMULATIONS** - Citrakādi Taila, Kāsīsādi Taila, Vajraka Taila

**THERAPEUTIC USES** - Aruci, Hṛllāsa, Arśa, Pīnasa

**DOSE** - 1-3 g of the drug in powder form.

## UDUMBARA (Bark)

Udumbara consists of dried bark of *Ficus racemosa* Linn. Syn. *Ficus glomerata* Roxb. (Fam. Moraceae), a large deciduous tree distributed all over india, found throughout the year, grows in evergreen forests, moist localities and bank of streams to the elevation of 1800 m, often cultivated in villages for shade and its edible fruits.

### SYNONYMS

Sanskrit	:	Sadāphala
Assamese	:	Jangedumuru, Yagyadimru
Bengali	:	Jagnadumur, Yagnadumur
English	:	Country fig, Cluster Fig
Gujrati	:	Umbro, Umerdo, Umardo, Umarado
Hindi	:	Gulara, Gular
Kannada	:	Attihanninamara, Oudumbara, Athimara, Attigida
Kashmiri	:	Rumbal
Malayalam	:	Athi
Marathi	:	Atti, Gular, UMBER
Oriya	:	Jajnadimbri, Dimbiri
Punjabi	:	Kath Gular, Gular
Tamil	:	Atti
Telugu	:	Atti, Medi
Urdu	:	Gular

### DESCRIPTION

#### a) Macroscopic

Bark greyish-green, surface soft and uneven, 0.5-1.8 cm thick, on rubbing white papery flakes come out from outer surface, inner surface light brown, fracture fibrous, taste, mucilaginous without any characteristic odour.

## b) Microscopic

Transverse section of bark shows cork, 3-6 layers of thin-walled cells filled with brownish content, cork cambium single layered, secondary cortex 6-12 layered, composed of thin-walled rectangular cells arranged regularly, a number of secondary cortex cells contain starch grains and some contain rhomboidal crystals of calcium oxalate, most of the cells filled with chloroplast giving green appearance, cortex a fairly wide zone composed of circular to oblong, thin-walled cells, containing orange-brown content, most of the cells filled with simple and compound starch grains, a number of cells also contain cubical and rhomboidal crystals of calcium oxalate, some cortical cells get lignified with pitted walls found scattered singly or in large groups throughout cortical region, secondary phloem a very wide zone composed of parenchyma with patches of sieve tubes, companion cells by medullary rays, phloem parenchyma circular to oval and thin-walled, phloem fibres much elongated, lignified, very heavily thickened and possess a very narrow lumen: medullary rays uni to pentaseriate widen towards peripheral region, a number of ray cells also get lignified and show pitted wall as described above, laticiferous cells also found in phloem region similar to parenchyma but filled with small granular masses, starch grains and rhomboidal crystals of calcium oxalate also found in most of phloem parenchyma and ray cells, cambium, when present, 2-3 layered, of tangentially elongated thin-walled cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## CONSTITUENTS - Tannins

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Mūtrasaṃgrahaṇīya, Vraṇaśodhaka, Vraṇaropaka, Medohara, Kaphapittaśāmaka, Raktastambhana

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa, Mūtrasaṃgrahaṇīya Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Dāha, Medoroga, Yonidoṣa

**DOSE** - 3-6 g of the drug in powder form  
20-30 g of the drug for decoction.

## UPAKUÑCIKĀ (Seed)

Upakuñcikā consists of seeds of *Nigella sativa* Linn. (Fam. Ranunculaceae), a small herb, 45 -60 cm high, mostly cultivated in Punjab, Himachal Pradesh, Bihar and Assam.

### SYNONYMS

Sanskrit	:	Sthūlajīraka, Upakuñcī, Suṣavī
Assamese	:	--
Bengali	:	Mota Kalajira, Kalajira
English	:	Small Fennel, Nigella Seed
Gujrati	:	Kalonji jeeru, Kalounji
Hindi	:	Kalaunji, Mangaraila
Kannada	:	Karijirige
Malayalam	:	Karinjirakam
Marathi	:	Kalaunji jire, Kalejire
Oriya	:	--
Punjabi	:	Kalvanji
Tamil	:	Karunjeerakam, Karunjiragam
Telugu	:	Peddajilakarra
Urdu	:	Kalongi

### DESCRIPTION

#### a) Macroscopic

Seeds, flattened, oblong, angular, rugulose tubercular, small, funnel shaped, 0.2 cm. long and 0.1 cm. wide, black, odour, slightly aromatic, taste, bitter.

#### b) Microscopic

Transverse section of seed shows single layer of epidermis consisting of elliptical, thick-walled cells covered externally by a papillose cuticle, filled with reddish-brown content, epidermis followed by 2-4 layers of thick-walled, tangentially elongated, parenchymatous cells, followed by a pigmented layer composed of tangentially elongated, cylindrical thick-walled cells filled with reddish-brown pigment,

below pigmented layer, parenchyma composed of thick-walled rectangular, radially elongated cells, present in a layer, endosperm consists of moderately thick-walled, rectangular to polygonal cells, a few filled with oil globules, embryo embedded in endosperm.

**Powder**-Black, oily to touch, under microscope show, groups of parenchyma, endosperm cells and oil globules.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 15 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil, fixed oil, resin, saponin and tannin

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Rucya, Saṃgrāhī, Cakṣuṣya, Garbhāśayaviśodhana, Pittala, Dīpana, Pācana, Medhya, Hṛdya, Vātakaphāpaha, Kṛmighna

**IMPORTANT FORMULATIONS** - Nārāyaṇa Cūrṇa, Kāṅkāyana Guṭikā

**THERAPEUTIC USES** - Gulma, Ādhmāna, Atīśāra, Kṛmiroga

**DOSE** - 1-3 g of the drug in powder form.

## VARUᅇA (Stem bark)

Varuᅇa consists of dried stem bark of *Crataeva nurvala* Buch-Ham (Fam. Capparidaceae), a small wild or cultivated tree found throughout the year in India, often found along streams, also in dry, deep boulder formation in Sub-Himalayan tracts.

### SYNONYMS

Sanskrit	:	Varaᅇa
Assamese	:	--
Bengali	:	Varuna
English	:	Three leaved caper
Gujrati	:	Vayvarno, Varano
Hindi	:	Baruna, Barna
Kannada	:	Bipatri, Mattamavu, Neervalamara
Malayalam	:	Neermatalam
Marathi	:	Vayavarna, Haravarna, Varun
Oriya	:	Baryno
Punjabi	:	Barna, Barnahi
Tamil	:	Maralingam
Telugu	:	Bilvarani
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Thickness of bark varies, usually 1-1.5 cm according to the age and portion of the plant from where the bark is removed, outer surface, greyish to greyish-brown with ash-grey patches, at places, surface rough due to a number of lenticels, shallow fissures and a few vertical or longitudinal ridges, inner most surface smooth and cream white in colour, fracture tough and short, odour, indistinct, taste, slightly bitter.

#### b) Microscopic

Transverse section of mature stem bark shows, an outer cork composed of thin-walled, rectangular and tangentially elongated cells, phellogen single layered, thin-walled, tangentially elongated cells followed by a wide secondary cortex, consisting of thin-walled, polygonal to tangentially elongated cells with a number of starch grains, starch grains mostly simple, occasionally compound with 2-3 components also present', large number of stone cells in groups of two or more, found scattered in secondary cortex, single stone cells not very common, stone cells vary in size and shape, being circular to rectangular or elongated with pits and striations on their walls, stone cells distributed somewhat in concentric bands in phloem region except in inner region of phloem which is devoid of stone cells, secondary phloem comparatively a wide zone, consisting of sieve tubes, companion cells, parenchyma and groups of stone cells, alternating with medullary rays, sieve elements found compressed forming ceratenchyma in outer phloem region, whereas in inner region of phloem, intact, medullary rays mostly multiseriate composed of thin-walled, radially elongated cells, tangentially elongated towards outer periphery, a number of starch grains similar to secondary cortex also present in phloem and ray cells, few rhomboidal crystals of calcium oxalate also found in this region, inner most layer is cambium.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

#### **CONSTITUENTS** - Saponin and tannin

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Bhedī, Vātaśleṣmahara

**IMPORTANT FORMULATIONS** - Varuṇādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Aśmarī, Mūtrakṛcchra, Gulma, Vidradhi

**DOSE** - 20-30 g of the drug for decoction.

## VĀSĀ (Leaf)

Vāsā consists of fresh, dried, mature leaves of *Adhatoda vasica* Nees (Fam. Acanthaceae), a sub-herbaceous bush, found throughout the year in plains and sub-Himalayan tracts in India, ascending upto 1200m, flowers during February-March and also at the end of rainy season, leaves stripped off from older stems and dried in drying sheds.

### SYNONYMS

Sanskrit	:	Vṛṣa, Āṭarūṣa, Vāsaka
Assamese	:	Titabahak, Bahak, Vachaka
Bengali	:	Baksa, Vasaka
English	:	Vasaka
Gujrati	:	Aduso, Ardusi, Adulso
Hindi	:	Aduss, Arusa
Kannada	:	Adsale, Adusoge, Atarusha, Adsole, Adasale
Kashmiri	:	Vasa
Malayalam	:	Attalatakam, Atalotakam
Marathi	:	Vasa, Adulsa
Oriya	:	Basanga
Punjabi	:	Bhekar, Vansa, Arusa
Tamil	:	Vasambu, Adathodai
Telugu	:	Addasaramu
Urdu	:	Adusa, Basa

### DESCRIPTION

#### a) Macroscopic

Leaves, 10-30 cm long and 3-10 cm broad, lanceolate to ovate-lanceolate, slightly acuminate, base tapering, petiolate, petioles 2-8 cm long, exstipulate, glabrescent, 8-10 pairs of lateral vein bearing few hairs, dried leaves dull brown above, light greyish brown below, odour, characteristic, taste, bitter.

**b) Microscopic**

Transverse section of leaf shows, dorsiventral surface with 2 layers of palisade cells, in surface view, epidermal cells sinuous with anomocytic stomata on both surfaces, more numerous on the lower, clothing trichomes few, 1-3, rarely upto 5 celled, thin-walled, uniseriate, upto 500  $\mu$  and glandular trichomes with multicellular stalk and 4 celled head measuring, 25-36  $\mu$  in diameter in surface view, cystoliths in mesophyll layers, elongated and cigar shaped, acicular and prismatic forms of calcium oxalate crystals present in mesophyll, palisade ratio, 5-6, 5-8.5, stomatal index, 10.8-14.2-18.1 for lower surface.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	21	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids and essential oil**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittahara, Raktasaṃgrāhikā, Kāsaghna, Hṛdya

**IMPORTANT FORMULATIONS** - Vāsakāsava, Vāsāvaleha**THERAPEUTIC USES** - Kāsa, Śvāsa, Kṣaya, Raktapitta, Prameha, Kāmalā, Kuṣṭha

**DOSE** - 10-20 ml of the juice of fresh leaves /par10-20 g of the dried drug for decoction.

## VIDAṄGA (Fruit)

Vidaṅga consists of dried mature fruits of *Embelia ribes* Burm. F. (Fam. Myrsinaceae), large scandent shrub with long slender, flexible branches, distributed throughout hilly parts of India upto 1600 m,

### SYNONYMS

Sanskrit	:	Jantughna, Kṛmighna, Vella, Kṛmihara, Kṛmiripu
Assamese	:	Vidang
Bengali	:	Vidang
English	:	--
Gujrati	:	Vavding, Vavading, Vayavadang
Hindi	:	Vayavidanga, Bhabhiranga, Baberang
Kannada	:	Vayuvilanga, Vayuvidanga
Kashmiri	:	Babading
Malayalam	:	Vizhalari, Vizalari
Marathi	:	Vavading, Vavding
Oriya	:	Bidanga, Vidanga
Punjabi	:	Babrung, Vavaring
Tamil	:	Vayuvilangam, Vayuvidangam
Telugu	:	Vayuvidangalu
Urdu	:	Baobarang, Babrang

### DESCRIPTION

#### a) Macroscopic

Fruit brownish-black, globular 2-4 mm in diameter, warty surface with a beak like projection at apex, often short, thin pedicel and persistent calyx with usually 3 or 5 sepals present, pericarp brittle enclosing a single seed covered by a thin membrane, entire seed, reddish and covered with yellowish spots (chitra tandula), odour slightly aromatic, taste, astringent.

## b) Microscopic

Transverse section of fruit shows epicarp consisting of single row of tabular cells of epidermis, usually obliterated, in surface view cells rounded with wrinkled cuticle, mesocarp consists of a number of layers of reddish-brown coloured cells and numerous fibrovascular bundles and rarely a few prismatic crystals of calcium oxalate, inner part of mesocarp and endodermis composed of stone cells, endodermis consisting of single layered, thick-walled, large, palisade-like stone cells, seed coat composed of 2-3 layered reddish-brown coloured cells, endosperm cells irregular in shape, thick-walled, containing fixed oil and proteinous masses, embryo small when present otherwise most of the seeds sterile.

**Powder**-Reddish, under microscope shows reddish parenchyma and stone cells.

## IDENTITY, PURITY AND STRENGTH-

### Identification :-

(I) Shake 1 g of the powdered seeds with 20ml of *Solvent Ether* for five minutes and filter. To a portion of the filtrate add 5 per cent *v/v* solution of *Sodium Hydroxide*, a deep violet colour is developed in the aqueous layer. To the other portion add 2 drops of *Dilute Ammonia solution*, a bluish violet precipitate is obtained.

(II) Boil 5 g of the powdered seeds :with 25 ml *alcohol* and filter. Divide the deep red coloured filtrate into two portions. To one portion, add *solution of lead Acetate*, a dirty green precipitate is produced. To the other portion add *solution of ferric chloride* a reddish-brown precipitate is produced.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 9 per cent, Appendix	2.2.7.

## ASSAY

**Assay**:-Contains not less than 2 per cent *w/w* of embelin (limits 1.85 to 2.15) when assayed as follows:-

Weigh accurately about 10 g of powder (40 mesh) and transfer to a 500 ml glass stoppered flask Shake occasionally for thirty minutes with 150 ml of *Solvent Ether*. Pack

the whole mass in a percolator, allow to macerate for thirty minutes and extract with *Solvent Ether* till the ethereal solution ceases to give a pink colour with a drop of *Dilute Ammonia Solution*. Distil off the *Ether*, treat the residue with small quantity of *light Petroleum* (b.p. 40° C to 60° C) cool in ice, filter through a Buchner funnel under suction and reject the filtrate. Wash the residue with further small quantities of cooled *Ether* (b. p. 40° C to 60° C). Transfer the residue to a tared beaker with sufficient quantity of *Solvent Ether*, remove the *Light Petroleum* and dry the residue of embelin to constant weight at 80°. The melting range of the residue is 142° C to 144° C .

**CONSTITUENTS** - Benzoquinones, alkaloid (Christembine), tannin and essential oil

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Rūkṣa, Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kṛmināśana, Dīpana, Anulomana, Vātakaphāpaha

**IMPORTANT FORMULATIONS** - Viḍaṅgāriṣṭa, Viḍaṅga Lauha, Viḍaṅgādi Lauha

**THERAPEUTIC USES** - Kṛmiroga, Ādhmāna, Śūla, Udararoga

**DOSE** - 5-10 g of the drug in powder form.

## VIJAYĀ (Leaf)

Vijayā consists of dried leaves of cultivated or wild plants of *Cannabis sativa* Linn. (Fam. Cannabinaceae) , an annual, erect, dioecious herb, one to two m high, found almost throughout the year, practically naturalised in the Sub-Himalayan tracts in India and abundantly found in waste lands from Punjab eastwards to Bengal and extending Southwards.

### SYNONYMS

Sanskrit	:	Bhaṅga, Mādanī
Assamese	:	Bhan, Bhang
Bengali	:	Bhang, Sidhi
English	:	Indian Hemp
Gujrati	:	Bhang
Hindi	:	Bhaang, Bhanga
Kannada	:	Bhangigida, Ganjagida
Kashmiri	:	Pang, Bangi
Malayalam	:	Kanchavu
Marathi	:	Bhang, Ganja
Oriya	:	Bhanga, Ganjei
Punjabi	:	Bhang
Tamil	:	Ganja
Telugu	:	Ganjayi
Urdu	:	Qinaab, Bhang

### DESCRIPTION

#### a) Macroscopic

Leaves palmately compound, leaflets linear, lanceolate with serrate margins, 5-20 cm long, pointed, narrow at base, upper surface dark green and rough, lower pale, downy, leaves of female plants longer than the male, odour, strong and characteristic, taste, slightly acrid.

## b) Microscopic

Transverse section of leaves and bracts, shows dorsiventral surface, upper epidermis with unicellular, pointed, curved, conical trichomes with enlarged bases containing cystoliths of calcium carbonate, mesophyll contains cluster crystals of calcium oxalate in many cells consisting of usually one layer of palisade cell and spongy tissue, trichomes on lower epidermis conical, longer, 340-500 $\mu$  but without cystoliths, numerous glandular trichomes, sessile or with a multicellular stalk and a head of about eight radiating, club-shaped cells secreting oleo-resin, present in the lower epidermis especially on mid-rib, bracteoles with undifferentiated mesophyll and on lower surface bear numerous glandular trichomes.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 15 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 13 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Resin (Cannabinols, particularly tetrahydrocannabinol)

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guna</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Grāhī, Kaphahara, Vājīkara, Vākvardhana, Nidrājanana, Vyavāyī, (Prabhāva: Madakāri)

**IMPORTANT FORMULATIONS** - Jātīphalādi Cūrṇa, Madanānanda Modaka

**THERAPEUTIC USES** - Agnimāndya, Atīśāra, Grahaṇīroga, Klaihya, Anidrā

**DOSE** - 125-250 mg of the drug in powder form. /par Note:-Sodhana of this drug to be done before use as described in the appendix

## YAṢṬĪ (Stem & Root)

Yaṣṭī consists of dried, unpeeled, stolon and root of *Glycyrrhiza glabra* Linn, (Fam. Leguminosae), a tall perennial herb, upto 2 m high found cultivated in Europe, Persia, Afghanistan and to little extent in some parts of India.

### SYNONYMS

Sanskrit	:	Yaṣṭīmadhūka, Yaṣṭikā, Madhuka, Madhuyaṣṭī, Yaṣṭyāhvā
Assamese	:	Jesthimadhu, Yeshtmadhu
Bengali	:	Yashtimadhu
English	:	Liquorice root
Gujrati	:	Jethimadha, Jethimard, Jethimadh
Hindi	:	Mulethi, Mulathi, Muleti, Jethimadhu, Jethimadh
Kannada	:	Jestamadu, Madhuka, Jyeshtamadhu, Atimadhura
Kashmiri	:	Multhi
Malayalam	:	Irattimadhuram
Marathi	:	Jesthamadh
Oriya	:	Jatimadhu, Jastimadhu
Punjabi	:	Jethimadh, Mulathi
Tamil	:	Athimadhuram
Telugu	:	Atimadhuramu
Urdu	:	Mulethi, Asl-us-sus

### DESCRIPTION

#### a) Macroscopic

Stolon consists of yellowish brown or dark brown outer layer, externally longitudinally wrinkled, with occasional small buds and encircling scale leaves, smoothed transversely, cut surface shows a cambium ring about one-third of radius from outer surface and a small central pith, root similar without a pith, fracture, coarsely fibrous in bark and splintery in wood, odour, faint and characteristic, taste, sweetish.

## b) Microscopic

*Stolon*- transverse section of stolon shows cork of 10-20 or more layers of tabular cells, outer layers with reddish-brown amorphous contents, inner 3 or 4 rows having thicker, colourless walls, secondary cortex usually of 1-3 layers of radially arranged parenchymatous cells containing isolated prisms of calcium oxalate, secondary phloem a broad band, cells of inner part cellulosic and outer lignified, radially arranged groups of about 10-50 fibres, surrounded by a sheath of parenchyma cells, each usually containing a prism of calcium oxalate about 10-35  $\mu$  long, cambium form tissue of 3 or more layers of cells, secondary xylem distinctly radiate with medullary rays, 3-5 cells wide, vessels about 80-200  $\mu$  in diameter with thick, yellow, pitted, reticulately thickened walls, groups of lignified fibres with crystal sheaths similar to those of phloem, xylem parenchyma of two kinds, those between the vessels having thick pitted walls without inter-cellular spaces, the remaining with thin walls, pith of parenchymatous cells in longitudinal rows, with inter-cellular spaces.

*Root*-transverse section of root shows structure closely resembling that of stolon except that no medulla is present, xylem tetrarch, usually four principal medullary rays at right angles to each other, in peeled drug cork shows phelloderm and sometimes without secondary phloem all parenchymatous tissues containing abundant, simple, oval or rounded starch grains, 2-20  $\mu$  in length.

## IDENTITY, PURITY AND STRENGTH

Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Glycyrrhizin, glycyrrhizic acid, glycyrrhetic acid, asparagine, sugars, resin and starch

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guna</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta

**Vipāka** : Madhura

**Karma** : Vātapittajit, Raktaprasādana, Balya, Varṇya, Vṛṣya, Cakṣuṣya

**IMPORTANT FORMULATIONS** - Elādi Guṭikā, Yaṣṭīmadhuka Taila, Madhuyaṣṭyādi Taila

**THERAPEUTIC USES** - Kāsa, Svarabheda, Kṣaya, Vraṇa, Vātarakta

**DOSE** - 2-4 g of the drug in powder form.

## YAVĀNĪ (Fruit)

Yavānī consists of dried fruit of *Trachyspermum ammi* (Linn.) Sprague ex Turril  
Syn. *Carum copticum* Benth & Hook. f. *Ptychotis ajwan* DC. (Fam. Umbelliferae), an  
annual, erect herb, upto 90 cm tall, cultivated almost throughout India, uprooted and  
thrashed for collecting the fruits

### SYNONYMS

Sanskrit	:	Dīpyaka, Yamāni, Yamānikā, Yavānikā
Assamese	:	Jain
Bengali	:	Yamani, Yauvan, Yavan, Javan, Yavani, Yoyana
English	:	Bishop's weed
Gujrati	:	Ajma, Ajmo, Yavan, Javain
Hindi	:	Ajwain, Jevain
Kannada	:	Oma, Yom, Omu
Malayalam	:	Oman, Ayanodakan
Marathi	:	Onva
Oriya	:	Juani
Tamil	:	Omam
Telugu	:	Vamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Fruit, consists of two mericarps, greyish brown, ovoid, compressed, about 2 mm long and 1 mm wide with pale coloured protuberances, 5 ridges and 6 vittae in each mericarp, usually separate, 5 primary ridges pale in colour, odour, characteristic, thymolic, taste, pungent.

#### b) Microscopic

Transverse section of fruit shows two hexagonal structures attached with each

other by a carpophore, epicarp consists of a single layer of tangentially elongated tabular cells, externally covered with cuticle at some places having thick-walled, unicellular trichomes as protuberances with serrate wall, mesocarp consists of moderately thick-walled, rectangular to polygonal tangentially elongated cells having some vascular bundles and vittae, carpophore present as groups of thick-walled radially elongated cells, integument, barrel shaped of tangentially elongated cells, endosperm consists of thin-walled cells filled with oil globules, embryo, small and circular, composed of polygonal thin walled cells.

**Powder**-Oily, greyish-brown, under microscope, presence of Oil globules and groups of endosperm cells, characterised.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	5 per cent, Appendix	2.2.2.
Total Ash	Not more than	9 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13 per cent, Appendix	2.2.7.
Volatile Oil	Not less than	2.5 per cent, Appendix	2.2.10.

**CONSTITUENTS** - Essential oil and fixed oil

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Rūkṣa, Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Pācana, Rucya, Anulomana, Śūlahara, Kṛmighna

**IMPORTANT FORMULATIONS** - Yavānī Śāḍava

**THERAPEUTIC USES** - Ādhmāna, Ānāha, Udararoga, Gulma, Kṛmimiroga, Śūla

**DOSE** - 3-6 g of the drug in power form



# **THE AYURVEDIC PHARMACOPOEIA OF INDIA**

## **PART- I VOLUME – II**



**GOVERNMENT OF INDIA  
MINISTRY OF HEALTH AND FAMILY WELFARE  
DEPARTMENT OF AYUSH**

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## **LEGAL NOTICES**

In India there are laws dealing with drugs that are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by these laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of the law are being complied with.

In general, the Drugs & Cosmetics Act, 1940 (subsequently amended in 1964 and 1982), the Dangerous Drugs Act, 1930 and the Poisons Act, 1919 and the rules framed thereunder should be consulted.

Under the Drugs & Cosmetics Act, the Ayurvedic Pharmacopoeia of India (A.P.I.), Part-I, Vol. II, is the book of standards for single drugs included therein and the standards prescribed in the Ayurvedic Pharmacopoeia of India, Part-I, Vol. II would be official. If considered necessary these standards can be amended and the Chairman of the Ayurvedic Pharmacopoeia Committee authorised to issue such amendments. Whenever such amendments are issued the Ayurvedic Pharmacopoeia of India, Part-I, Vol. II, would be deemed to have been amended accordingly.

## GENERAL NOTICES

**Title** - The title of the book is "Ayurvedic Pharmacopoeia of

**Name of the Drugs** - The name given on the top of each monograph of the drug is in Sanskrit as mentioned in the Ayurvedic classics and/or in the Ayurvedic Formulary of India, Part-I and Part-II will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

**Introductory Para** - Each monograph begins with an introductory paragraph indicating the part, scientific name of the drug in Latin with short description about its habit, distribution and method of collection, if any.

**Synonyms** - Synonyms of each drug appearing in each monograph in Sanskrit, English, Hindi, Urdu and other Indian regional languages have been mentioned as found in the classical texts, Ayurvedic Formulary of India, Part-I and Part-II as procured from the experts, scholars of Ayurveda and officials in the field from different states.

**Italics** - Italic type has been used for scientific name of the drug appearing in the introductory paragraph of each monograph as also for chemicals and reagents, substances or processes described in Appendix.

**Odour and Taste** - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description, as large numbers of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour.

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case if poisonous drugs, indicated in monograph.

**Mesh Number** - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

**Weights and Measures** - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gramme (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube, which delivers in 20 drops 1 gram of distilled water at 15°C.

Metric measures are required by the Pharmacopoeia to be graduated at 20°C and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

**Identity, Purity and Strength** - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects, pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive, water-soluble extractive, ether-soluble extractive, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method, which he uses, will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

**Limits for Heavy Metals** – All Ayurvedic Drugs (Single/Compound formulation) must comply with the limits for Heavy Metals prescribed in individual Monograph and wherever limit is not given then they must comply with the limits given in WHO publication "Quality Control Methods for Medicinal Plants and Material".

**Standards** - For statutory purpose, statements appearing in the API, Part-I, Vol. V, under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

**Thin Layer Chromatography (T.L.C.)** - Under this head, wherever given, the number of spots and R<sub>f</sub> values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

**Quantities to be weighed for Assays and Tests** - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

**Constant Weight** - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

**Constituents** - Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

**Percentage of Solutions** - In defining standards, the expression per cent (%), is used, according to circumstances, with one of the four meanings given below.

Per cent w/w (percentage weight in weight) expresses the number of grammes of active substance, in 100 grammes of product.

Per cent w/v (Percentage weight in volume) expresses the number of grammes of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent v/w (percentage volume in weight) expresses the number of millilitres of active substance in 100 grammes of product.

**Percentage of alcohol** - All statements of percentage of alcohol (C<sub>2</sub>H<sub>5</sub>OH) refer to percentage by volume at 15.56 °C.

**Temperature** - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

**Solutions** - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

**Reagents and Solutions** - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

**Solubility** - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities, which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that 1 gramme of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

<b>Descriptive terms</b>	<b>Relative quantities of solvent</b>
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1000 parts
Very slightly soluble	From 1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

**Therapeutic uses and important formulations** –Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognised Ayurvedic classics and in the Ayurvedic Formulary of India, Part –I and Part-II.

**Doses** – The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in Ayurvedic texts. A conversion table is appended giving classical weights of Ayurvedic System of Medicine with their metric equivalents. Doses mentioned in the Ayurvedic Pharmacopoeia of India (A.P.I.) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

The abbreviations commonly employed are as follows:

<b>Abbreviations of technical terms</b>	
m	Metre
l	Litre
mm	Millimetre
cm	Centimetre
μ	Micron (0.001 mm)
kg	Kilogram
g	Gramme
mg	Milligram
ml	Millilitre
in	Normal solution
0.5 N	Half-normal solution
0.1 N	Decinormal solution
1M	Molar solution
Fam.	Family
PS	Primary Standards
TS	Transverse Section

### Abbreviations used for Languages

Sansk.	Sanskrit
Assam.	Assamese
Beng.	Bengali
Eng.	English
Guj.	Gujrati
Kan.	Kannada
Kash.	Kashmiri
Mal.	Malayalam
Mar.	Marathi
Ori.	Oriya
Punj.	Punjabi
Tam.	Tamil
Tel.	Telugu

### ABBREVIATIONS FOR PARTS OF PLANTS

Cotyledon	Cotldn.
Flower	Fl.
Fruit	Fr.
Heart Wood	Ht. Wd.
Leaf	Lf.
Pseudo-bulb	Pseudo-bulb
Root Bark	Rt. Bk.
Root	Rt.
Rhizome	Rz.
Seed	Sd.
Stem Bark	St. Bk.
Stem	St.
Tuberous Root	Tub. Rt.
Wood	Wd.
Whole Plant	Wh. Pl.

## **ĀKĀRAKARABHA (Root)**

Ākārakarabha consists of dried roots of *Anacyclus pyrethrum* DC. (Fam. Asteraceae); an annual, hairy herb with numerous spreading prostrate or ascending branched stems.

### **SYNONYMS**

Sanskrit	:	Ākallaka
Assamese	:	Kulekhara
Bengali	:	Akarakara
English	:	Pellitory
Gujrati	:	Akkalkaro, Akkalgaro
Hindi	:	Akalkara
Kannada	:	Akkallakara, Akallakara, Akalakarabha, Akkallaka Hommugulu
Kashmiri	:	--
Malayalam	:	Akikaruka, Akravu
Marathi	:	Akkalakara, Akkalakada
Oriya	:	Akarakara
Punjabi	:	Akarakarabh, Akarakara
Tamil	:	Akkaraka, Akkarakaram
Telugu	:	Akkalakarra
Urdu	:	Aqaraqarha

### **DESCRIPTION**

#### **a) Macroscopic**

Roots tough, cylindrical, 7-15 cm in length, tapering slightly at both ends, with a few hairy rootlets and occasionally topped by bristly remains of leaves, external surface rough, brown, shrivelled, bark upto 3 mm thick, not easily separable, odour, slightly aromatic,

taste, characteristically astringent and pungent, on chewing gives tingling sensation to tongue and lips and causes excessive flow of saliva.

#### **b) Microscopic**

**Root** - Mature root shows cork consisting of tabular cells, many of which developed as sclerenchyma; a few innercork cells contain rosette crystals of calcium oxalate; secondary cortex consisting of isodiametric or tangentially, elongated, thin-walled, parenchymatous cells; a few sclerenchymatous cells also found scattered in secondary cortex; secondary phloem consisting of usual elements, cambium 2-5 layered, secondary xylem very wide consisting of xylem vessels, tracheids and xylem parenchyma; vessels pitted, more or less in groups distributed throughout xylem, more and wider vessels found towards periphery, xylem fibres thick-walled, 1.37-28.8  $\mu$  in width, 53.2 - 231  $\mu$  in length having narrow lumen, medullary rays numerous, running straight, bi to tri and multiseriate, uniseriate rays very rare, starting from primary xylem and reaching upto secondary cortex; ray cells thick-walled, radially elongated, inulin present in cells of secondary cortex, secondary phloem and medullary rays; oleo-resinous schizogenous glands found scattered in secondary cortex, secondary phloem and medullary rays; calcium oxalate crystals in rosette form present in secondary cortex, secondary phloem, secondary xylem and medullary ray cells.

**Powder** - Ash coloured; shows vessels having scalariform thickening, rosette crystals of calcium oxalate and fragments of sclerenchyma; also gives positive tests for inulin.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 percent, Appendix	2.2.2.
Total Ash	Not more than 10 percent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2 percent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 8 percent, Appendix	2.2.6.
Water-soluble extractive	Not More than 22 percent, Appendix	2.2.7.

**CONSTITUENTS** - Volatile oil and Alkaloid (Pyrethrin).

#### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu  
**Guṇa** : Rūkṣa, Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Pittahara, Kaphahara, Śukrala, Vājikara, Svedakara, Dīpana, Buddhivardhaka, Balakāraka

**IMPORTANT FORMULATIONS** - Kumāryāsava, Kastūryādi (Vāyu) Guṭikā, Nāgavallabha  
Rasa

**THERAPEUTIC USES** - Pratiśyāya, Śoṭha, Ajīrṇa, Kāsa, Śvāsa, Gṛdhrasī, Pakṣāghāta, Udararoga, Naṣṭārtava, Śūlaroga, Dantaśūla

**DOSE** - 0.5 -1 g of the drug in powder form.

## AKᅒODA (Cotyledon)

Akᅒoda consists of dried cotyledons of *Juglans regia* Linn. (Fam. Juglandaceae); a large deciduous, monoecious tree with tomentose shoots, found throughout the Himalayas upto an altitude of 900-3300 m.

### SYNONYMS

Sanskrit	:	Akᅒoᅒa, Sailabhava, Karparala
Assamese	:	Akalbasing
Bengali	:	Aakharotu
English	:	Walnut
Gujrati	:	Akharoda
Hindi	:	Akharot
Kannada	:	Akrod pappu
Kashmiri	:	--
Malayalam	:	Akrottu
Marathi	:	Akrod
Oriya	:	Akhrot
Punjabi	:	Akharota
Tamil	:	Akrotu
Telugu	:	Akrotu
Urdu	:	Akhrot

### DESCRIPTION

#### a) Macroscopic

Cotyledons available in 2-3 cm long, slightly curved, coriaceous, irregularly corrugated, broken pieces, creamish-brown, odour, not distinct; taste, oily sweet.

**b) Microscopic**

**Cotyledon** - Shows 1-2 layered, radially elongated, thin-walled, parenchymatous cells, raised stomata with more or less curved guard cells, followed by more or less compressed, collapsed, paranchymatous cells having vascular bundles; under this, indistinct tangentially elongated cells present; endosperm mostly single layered; cotyledons consisting of a wide zone of oval to polygonal, thin-walled, parenchymatous cells, small aleurone grains and fat present in endosperm and cotyledons.

**Powder** - Cream coloured, shows groups of cells of cotyledon, abundance of round oil globules and rarely vessels.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 5 percent, Appendix	2.2.2.
Total Ash	Not more than 2 percent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 percent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10.0 percent, Appendix	2.2.6.
Water-soluble extractive	Not less than 7.0 percent, Appendix	2.2.7.

**CONSTITUENTS** - Walnut oil and Tannin.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Kaphakara, Bṛmhaṇa, Śukrala, Balya, Vṛṣya, Viṣṭambhi, Hṛdya

**IMPORTANT FORMULATIONS** - Amṛtaprāśa Ghr̥ta

**THERAPEUTIC USES** - Kṣata, Kṣaya, Vātaroga

**DOSE** - 10 - 25 g

## ĀMRĀTA (Stem Bark)

Āmrāta consists of dried stem bark of *Spondias pinnata* Linn. f. Kurz. Syn. *S. mangifera* Willd.; *S. acuminata* Roxb. non Gamble (Fam. Anacardiaceae); a small aromatic, deciduous tree, upto 27 m high and 2.5 m in girth, found wild or cultivated almost throughout the country and in the Andamans ascending upto an altitude of 1500 m in the Himalayas.

### SYNONYMS

Sanskrit	:	Āmrātaka, Markaṭāmra
Assamese	:	--
Bengali	:	Amada, Amra
English	:	Indian Hog Plum, Wild Mango
Gujrati	:	Ambada, Ambado, Ranamba, Jangali Ambo, Ranambo
Hindi	:	Ambada, Amra, Jangli Aam
Kannada	:	Ambate, Amvara
Kashmiri	:	--
Malayalam	:	Mampusli, Ambalam, Ambazham, Mampuiti, Ampozham Njettikuzhiyan mavu.
Marathi	:	Ambado
Oriya	:	--
Punjabi	:	Amada
Tamil	:	Mambulichi Amputtai, Ambadam
Telugu	:	Amratakamu, Anbalamu, Adavimamidi
Urdu	:	Jangli Aam

### DESCRIPTION

#### a) Macroscopic

Drug occurs in the form of 2-7 cm long cut pieces, curved, thin, external surface smooth, grey having lenticels, internal surface reddish-yellow; fracture, laminated.

#### **b) Microscopic**

**Stem Bark-** Mature bark shows cork as a wide zone of 15-25 rows, consisting of tangentially elongated, radially arranged, thin-walled cells, a few outer cells exfoliated; secondary cortex consisting of tangentially elongated, parenchymatous cells, which are thick-walled towards periphery, first followed by a zone of compactly arranged cells filled with rosette and prismatic crystals of calcium oxalate and next by another wider zone of compactly arranged stone cells; rest of the cells following the stone cell zone are thin-walled, tangentially elongated, parenchymatous, with reddish-brown contents, and also rosette crystals of calcium oxalate; simple, round to oval starch grains measuring 2.75-14  $\mu$  in dia., a few prismatic crystals present in this zone; secondary phloem consisting of usual elements, phloem fibres arranged in tangential bands, thick-walled, lignified, alternating with the patches of phloem fibres, prominent lysogenous cavities are present, surrounded by a number of tannin sacs; phloem parenchyma consisting of thin walled cells, containing rosette crystals and starch grains, similar to those found scattered in secondary cortex.

**Powder** - Light brown; shows cork cells, stone cells, phloem fibres measuring 800-1000  $\mu$  in length and 14-28  $\mu$  in width, rosette and prismatic crystals of calcium oxalate and numerous rounded to oval starch grains, measuring 3-14  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 1 per cent, Appendix	2.2.2.
Total Ash	Not more than 13 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 7 per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' using n-Butanol : Acetic acid: Water (4:1 :5) shows three spots at Rf. 0.33, 0.40 and 0.87 (all greyish brown). Under U.V. (366 nm) one fluorescent zone is visible at Rf. 0.96. On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.33.(greyish brown), 0.87 (blue) and 0.96 (blue).

**CONSTITUENTS** - Tannin and Starch

### **PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Amla

**Guṇa** : Guru, Sara

**Vīrya** : Uṣṇa

**Vipāka** : --

**Karma** : Vātahara, Pittakara, Kaphakara, Rucikṛt, Kaṇṭhya, Āmadoṣahara, Hṛdya, Vahnikara

**IMPORTANT FORMULATIONS** - Dādhika Ghṛta

**THERAPEUTIC USES** - Raktapitta, Kṣaya, Kṣata, Dāha

**DOSE** - 5-10 g of the drug in powder form for decoction.

## APĀMĀRGA (Whole Plant)

Apāmārga consists of dried whole plant of *Achyranthes aspera* Linn. (Fam. Amaranthaceae); a stiff, erect, 0.3-0.9 m high herb, found commonly as a weed throughout India up to 900 m.

### SYNONYMS

Sanskrit	:	Mayūra, Mayūraka, Pratyakpuṣpa, Kharamañjar, Śikhari
Assamese	:	--
Bengali	:	Apamg
English	:	Prickly Chaff Flower
Gujrati	:	Aghedo
Hindi	:	Chirchita, Latjira
Kannada	:	Uttarani
Kashmiri	:	--
Malayalam	:	Katalati
Marathi	:	Aghada
Oriya	:	--
Punjabi	:	Puthakanda
Tamil	:	Nayuruvi
Telugu	:	Uttarenu
Urdu	:	Chirchita

### DESCRIPTION

#### a) Macroscopic

Root - Cylindrical tap root, slightly ribbed, 0.1-1.0 cm in thickness, gradually tapering, rough due to presence of some root scars, secondary and tertiary roots present, yellowish-brown; odour, not distinct.

Stem - 0.3 - 0.5 cm in cut pieces, yellowish-brown, erect, branched, cylindrical, hairy, solid, hollow when dry.

Leaf - Simple, subsessile, exstipulate, opposite, decussate, wavy margin, obovate, slightly acuminate and pubescent due to the presence of thick coat of long simple hairs.

Flower - Arranged in inflorescence of long spikes, greenish-white, numerous, sessile, bracteate with two bracteoles, one spine lipped, bisexual, actinomorphic, hypogynous; perianth segments 5, free, membranous, contorted or quincuncial, stamens 5, opposite, the perianth lobes, connate forming a membranous tube-like structure, alternating with truncate and fimbriate staminodes, filament short; anther, two celled, dorsifixed; gynoecium bicarpellary, syncarpous; ovary superior, unilocular with single ovule; style, single; stigma, capitate.

Fruit - An indehiscent dry utricle enclosed within persistent, perianth and bracteoles,

Seed - Sub-cylindric, truncate at the apex, round at the base, endospermic, brown.

#### **b) Microscopic**

Root - Mature root shows 3-8 layered, rectangular, tangentially elongated, thin-walled cork cells; secondary cortex consisting of 6-9 layers, oval to rectangular, thin-walled, parenchymatous cells having a few scattered single or groups of stone cells; followed by 4-6 discontinuous rings of anomalous secondary thickening composed of vascular tissues; small patches of sieve tubes distinct in phloem parenchyma, demarcating the xylem rings; xylem composed of usual elements; vessels simple pitted; medullary rays 1-3 cells wide; small prismatic crystals of calcium oxalate present in cortical region and numerous in medullary rays.

Stem - Young stem shows 6-10 prominent ridges, which diminish downwards upto the base where it becomes almost cylindrical; epidermis single layered, covered by thick cuticle having uniseriate, 2-5 celled, covering trichomes and glandular with globular head, 3-4 celled stalk; cortex 6-10 layered, composed of parenchymatous cells, most of them containing rosette crystals of calcium oxalate; in the ridges cortex collenchymatous; vascular bundles lie facing each ridge capped by pericyclic fibres; transverse section of mature stem shows lignified, thin-walled cork cells; pericycle a discontinuous ring of lignified fibres; vascular tissues show anomalous secondary growth having 4-6 incomplete rings of xylem and phloem; secondary phloem consisting of usual elements form incomplete rings; cambial strip present between secondary xylem and phloem; secondary xylem consisting of usual elements, fibres being absent; vessels annular, spiral, scalariform and pitted, fibres pitted, elongated, lignified; pith wide consisting of oval to polygonal, parenchymatous cells; two medullary bundles, either separate throughout or found in some cases, present in pith; micro-sphenoidal silica crystals present in some epidermal, cortical and pith cells.

Leaf-

Petiole - Shows crescent-shaped outline, having single-layered epidermis with thick cuticle; ground tissues consisting of thin-walled, parenchymatous cells containing rosette crystals of calcium oxalate; 4-5 vascular bundle situated in mid region.

Midrib - Shows a single layered epidermis, on both surfaces; epidermis followed by 4-5 layered collenchyma on upper side and 2-3 layered on lower side; ground tissue consisting of thin-walled, parenchymatous cells having a number of vascular bundles; each vascular bundle shows below the xylem vessels, thin layers of cambium, followed by phloem and a pericycle represented by 2-3 layers of thick-walled, non-lignified cells; rosette crystals of calcium oxalate found scattered in ground tissues.

Lamina - Shows single layered, tangentially elongated epidermis cells covered with thick cuticle having covering trichomes which are similar to those of stem found on both surfaces; mesophyll differentiated into palisade and spongy parenchyma; palisade 2-4 layered of thick parenchyma larger, slightly elongated in upper, while smaller and rectangular in lower surface; spongy parenchyma 3-5 layers thick, more or less isodiametric parenchymatous cells; idioblast containing large rosette crystals of calcium oxalate distributed in palisade and spongy parenchyma cells; stomata anisocytic and anomocytic in both surface; stomatal index 4.5-9.0 on upper surface, 9.0-20.0 on lower surface; palisade ratio 7.0-11; vein islet number 7-13 per sq. mm.

Powder - Light yellow; shows fragments of elongated, rectangular, thin-walled epidermal cells, aseptate fibres, vessels with annular, spiral, scalariform and pitted thickening, uniseriate hair with bulbous base, rosette and prismatic crystals of calcium oxalate.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 17 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 12 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Saponins

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Tīkṣṇa, Sara
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Kaphahara, Vātahara, Medohara, Chedana, Dīpana, Pācana, Vāmaka,  
Śirovirecana

**IMPORTANT FORMULATIONS** - Apāmārgakṣāra, Apāmārgakṣāra Taila, Abhayā Lavaṇa,  
Guḍapippali, Jyotiṣmatī Taila

**THERAPEUTIC USES** - Śūla, Udara Roga, Apacī, Arśa, Kaṇḍū, Medoroga

**DOSE** - 20-50 g of the drug for decoction.

## APARĀJITĀ (Root)

Aparājītā consists of dried root of *Clitoria ternatea* Linn. (Fam. Fabaceae); a perennial climber with slender downy stem, found throughout the tropical regions of the country being cultivated in gardens every where and often also found growing over hedges and thickets.

### SYNONYMS

Sanskrit	:	Girikarṇikā, Viṣṇukrāntā
Assamese	:	Aparajita
Bengali	:	Aparajita
English	:	Clitoria
Gujrati	:	Gokarni
Hindi	:	Aparajita
Kannada	:	Girikarnika Balli, Girikarnika
Kashmiri	:	--
Malayalam	:	Shankhapushapam
Marathi	:	Gokarna, Aparajita
Oriya	:	Aparajita
Punjabi	:	Koyal
Tamil	:	Kakkanam
Telugu	:	Dintena
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug consisting of a stout tap root with a few tortuous branches, cylindrical, 1-5 mm in thickness, a few places show cracks due to presence of lenticels, colour, light-brown, fracture, fibrous; taste, bitter.

## **b) Microscopic**

**Root** - Shows 10-20 or more layers of rectangular, thin-walled, tangentially elongated exfoliating cork cells; secondary cortex consists of 10-12 rows of large, polygonal, thin walled cells filled with starch grains, a few cells contain prismatic crystals of calcium oxalate in this region; single or groups of 2-10 lignified cortical fibres, distributed in the lower half of the cortex; secondary phloem consists of usual elements; phloem fibres 2-8 in groups, a few solitary fibres also present, very long, thin-walled with narrow lumen and pointed tips; secondary xylem consists of usual elements; vessels pitted with oblong, bordered pits and have short conical tail at one end, mostly occur 2 or 3 in groups; xylem fibres similar to those of phloem fibres, a few showing slit-like pits; medullary rays 1-5 cells wide, oblong and pitted; xylem parenchyma irregular in shape and pitted walls;

starch grains simple as well as compound having 2-6 components, single grains measuring 3-13  $\mu$  in dia., found in secondary cortex, phloem and xylem parenchyma.

Powder - Yellowish-brown; shows simple and compound starch grains, measuring 3-13  $\mu$  in dia., vessels with oblong bordered pits and fragments of fibres.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 8 per cent, Appendix	2.2.7.

## **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' using Chloroform:

Ethylacetate : Formic Acid (5:4:1) v/v shows one spot at Rf. 0.79 (dull yellow) in visible light. Under U.V. (366 nm) a spot is seen at Rf. 0.79 (blue). On exposure to Iodine vapour two spots appear at Rf. 0.54 and 0.79 (both yellow). On spraying with 10% aqueous solution of Ferric

Chloride and heating the plate at 105° C for about fifteen minutes one spots appears at Rf. 0.79 (grey).

**CONSTITUENTS** - Tannin, Starch, Resin, Taraxerol & Taraxerone.

**PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṣāya, Kaṭu  
**Guṇa** : --  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Pittahara, Kaphahara, Kaṇṭhya, Medhya, Cakṣuṣya, Viṣahara, Buddhiprada

**IMPORTANT FORMULATIONS** - Miśraka Sneha, Vātaraktāntaka Rasa

**THERAPEUTIC USES** - Mūtraroga, Kuṣṭha, Śoṭha, Vraṇa, Śūla

**DOSE** - 1 - 3 g of the drug in powder form.

## **ĀRDRĀKA (Rhizome)**

Ārdraka consists of fresh rhizome of *Zingiber officinale* Rosc. (Fam. Zingiberaceae); a herbaceous rhizomatous perennial, reaching up to 90 cm in height, widely cultivated in India. Rhizomes are dug in January-February, buds and roots are removed and washed well.

### **SYNONYMS**

Sanskrit	:	Kaṭubhadra, Śṛṅgavera
Assamese	:	Kulekhara
Bengali	:	Ada
English	:	Ginger
Gujrati	:	Adu
Hindi	:	Adarakha
Kannada	:	Alla, Hasishunti
Kashmiri	:	--
Malayalam	:	Inchi
Marathi	:	Ardrak, Ale
Oriya	:	--
Punjabi	:	Adi, Adrak
Tamil	:	Injee, Allam, lakottai, Inji
Telugu	:	Allamu, Allam
Urdu	:	Adrak

### **DESCRIPTION**

#### **a) Macroscopic**

Drug occurs as entire rhizome or in pieces, rhizome laterally compressed bearing flattish ovate, oblique branches on upper side, each having a depressed scar at its apex, pieces 5-15 cm long, 1.5-6.5 cm wide (usually 3-4 cm) and 1-1.5 cm thick, fracture, short

with projecting fibres, transversely cut surface shows a wide central stele having numerous greyish cut ends of fibres and yellow secreting cells; odour, gingery; taste, pungent.

**b) Microscopic**

Rhizome - Shows a few layered, irregularly arranged, tangentially elongated, brown cells of outer cork and 6-12 rows of thin-walled, colourless, radially arranged cells of inner cork; secondary cortex consisting of hexagonal to polygonal, isodiametric, thin-walled, parenchymatous cells containing numerous circular to oval starch grains with striations and hilum at one end with clear concentric striations, measuring 5-25µ in dia., idioblasts containing large yellowish to brownish globules of oleo-resin; walls of oil cells suberised; numerous closed, conjoint, collateral, cortical fibro-vascular bundles scattered throughout cortical zone, greater number occurring in inner cortical region, larger bundles consists of 2-7 vessels, small cells of sieve tube, polygonal cells of parenchyma and group of fibres; vessels showing reticulate, scalariform and spiral thickening; fibres septate with a few oblique pores on their walls; endodermis single layered, free from starch; pericycle single layered enclosing central stele; stele consisting of thin-walled polygonal, isodiametric cells of parenchyma, filled with abundant starch grains, oleo-resin cells similar to those present in cortex; fibrovascular bundles of two types, those arranged along pericycle in a definite ring are smaller in size and devoid of fibres, vessels 2-5 in number, larger bundles found scattered throughout stele, composed of xylem, phloem, parenchyma and sheath of sclerenchyma.

Powder -Light yellow; shows thin-walled parenchymatous cells, septate fibres with oblique, elongated pits on their walls, reticulate and spiral vessels, oleo-resin cells abundant, single starch grains of varying shapes with eccentric hilum, measuring 5-25 µ in diameter.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 0.5 per cent, Appendix	2.2.2.
Total Ash	Not more than 8 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 2 per cent, Appendix	2.2.7.
Moisture content	Not more than 90 per cent, Appendix	2.2.9

## T.L.C.

T.L.C. of alcoholic extract of drug on Silica gel 'G' plate using Benzene: Ethyl acetate (9: 1) in visible light four spots are seen at Rf 0.16, 0.35, 0.63 & 0.69 (all light yellow). Under U.V. (366 nm) three fluorescent zones appear at Rf. 0.16 (blue), 0.63 (grey) & 0.69 (grey). On exposure to Iodine vapour eleven spots appear at Rf. 0.03, 0.08, 0.13, 0.16, 0.35, 0.47, 0.63, 0.69, 0.76, 0.83 & 0.92 (all yellow). On spraying with Vanillin Sulphuric acid reagent & heating the plate for ten minutes at 110°C eight spots appear at Rf. 0.08 (violet), 0.16 (brownish violet), 0.35 (light violet), 0.47 (light violet), 0.63 (light violet), 0.69 (light violet), 0.76 (violet) & 0.92 (violet).

**CONSTITUENTS** - Volatile Oil containing Cineole zingiberol, and sesquiterpene like zingiberene, bisobolene and sesqui phellandrene, gingerosol in the oleo-resin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Tīkṣṇa, Rūkṣa, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Kaphahara, Rocana, Dīpana, Bhedana, Svarya, Hṛdya, Vṛṣya

**IMPORTANT FORMULATIONS** - Ārdraka Khaṇḍāvāleha, Sārasvatāriṣṭa

**THERAPEUTIC USES** - Vibandha, Ānāha, Śūla, Śopha, Kaṇṭharoga

**DOSE** - 2-3 ml of the drug in juice form with honey.

## ARIMEDA (Stem Bark)

Arimeda consists of dried stem bark of *Acacia leucophloea* Willd. (Fam. Fabaceae); a moderate-sized deciduous tree, upto 3 m in height, characteristic of dry regions, found in the plains of Punjab and in the dry forest tracts throughout the country.

### SYNONYMS

Sanskrit	:	Irimeda, Viḍkhadir
Assamese	:	--
Bengali	:	Guyababla, Sadabala
English	:	--
Gujrati	:	Haramibaval, Pilobaval, Haribaval
Hindi	:	Arimeda
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Karivelam, Velvelam, Velvelakam
Marathi	:	Pandal Babal
Oriya	:	Arimeda
Punjabi	:	--
Tamil	:	Velvelam
Telugu	:	--
Urdu	:	Guar babool

### DESCRIPTION

#### a) Macroscopic

Mature bark 0.5-1 cm thick, hard, rough, incurved, exfoliating in irregular scales, externally yellowish-grey or almost black and longitudinally fissured, internally light brown

to reddish-brown, internal surface longitudinally striated and fibrous, fracture, fibrous; odour and taste, not distinct.

### **b) Microscopic**

Stem Bark -Mature bark shows dead tissues of rhytidoma consisting of cork cells, thin-walled cortical cells, stone cells and phloem cells, traversed by multiseriate medullary rays; cork consisting of 4-8 layers of thin-walled, square to rectangular cells, followed by numerous groups of sclereids of various shapes and sizes; secondary phloem wide, consisting of sieve elements, parenchyma, fibres and crystal fibres, all traversed by medullary rays; sieve elements get collapsed in outer and middle region forming tangential bands of ceratenchyma; phloem parenchyma thin-walled some cells contain prismatic crystals of calcium oxalate; phloem fibres thin-walled, lignified, with tapering ends, arranged in more or less concentric bands forming tangential strips alternating with thin-walled phloem elements; crystal fibres elongated, thick-walled having numerous chambers containing a prismatic crystals of calcium oxalate in each chamber; medullary rays multiseriate dilating towards outer side, composed of thin-walled, radially elongated cells.

**Powder** - Reddish-brown; shows groups of cork cells, sclereid, fibres, crystal fibres and prismatic crystals of calcium oxalate.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	11 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract of drug on Silica gel 'G' plate using Chloroform: Ethylacetate : Formic Acid (5 :4:1) only one spot at Rf 0.69 (grey) is seen in visible light. Under U.V. (366 nm) two fluorescent zones appear at Rf.0.78 and 0.91 (both blue).On exposure to Iodine vapour a yellow coloured tailing appears from Rf.0 to 0.39 and a spot at

Rf. 0.91 (yellow). On spraying with 10% aqueous Ferric Chloride solution a bluish grey coloured tailing appears from Rf. 0 to 0.39 and a spot at Rf. 0.91 (bluish grey)

**CONSTITUENTS** - n-Hexacosanol,  $\beta$ -Amyrin,  $\beta$ -Sitosterol and Tannin.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Uṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphaśoṣaka, Medośoṣaka, Viṣanāśana

**IMPORTANT FORMULATIONS** - Khadirādi Guṭikā (Mukharoga), Arimedādi Taila (For external use i.e. Kavalagraha and Nasya)

**THERAPEUTIC USES** - Kuṣṭha, Meha, Mukharoga, Kaṇḍū, Viṣajavraṇa, Śopha, Atīśāra, Visarpa, Pāṇḍu, Dantaroga, Kāsa, Kṛmi, Udardapraśamana

**DOSE** - 40 g for decoction. 3-5 g in powder form.

## ARJUNA (Stem Bark)

Arjuna consists of the stem bark of *Terminalia arjuna* W.& A. (Fam. Combretaceae); a large deciduous tree, commonly found throughout the greater parts of the country.

### SYNONYMS

Sanskrit	:	Kakubha, Pārtha, Śvetavāha
Assamese	:	Arjun
Bengali	:	Arjuna
English	:	--
Gujrati	:	Sadad, Arjuna, Sajada
Hindi	:	Arjuna
Kannada	:	Matti, Bilimatti, Neermatti, Mathichakke, Kudare Kivimase
Kashmiri	:	--
Malayalam	:	Nirmasuthu, Vellamaruthi, Kellemasuthu, Mattimora, Torematti
Marathi	:	Arjuna, Sadada
Oriya	:	Arjuna
Punjabi	:	Arjon
Tamil	:	Marudam
Telugu	:	Maddi
Urdu	:	Arjun

### DESCRIPTION

#### a) Macroscopic

Bark available in pieces, flat, curved, recurved, channelled to half quilled, 0.2-1.5 cm thick, market samples upto 10 cm in length and upto 7 cm in width, outer surface somewhat smooth and grey, inner surface somewhat fibrous and pinkish, transversely cut smoothed



Total Ash	Not more than 25 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 20 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Tannins

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Pittahara, Hṛdya, Vraṇanāśana, Bhagnasandhānakara, Vyaṅghara

**IMPORTANT FORMULATIONS** - Pārthādyariṣṭa, Nāgārjunābhra Rasa, Arjuna Ghr̥ta

**THERAPEUTIC USES** - Hṛdroga, Kṣatakṣaya, Medoroga, Prameha, Vraṇa, Tṛṣṇā, Vyaṅga

**DOSE** - 3-6 g of the drug in powder form.

## BHALLĀTAKA (Fruit)

Bhallātaka consists of mature fruit of *Semecarpus anacardium* Linn. (Fam. Anacardiaceae), a medium sized tree found in moist deciduous forests all over the country.

### SYNONYMS

Sanskrit	:	Aruṣkara, Bhallāta
Assamese	:	Bhelaguti
Bengali	:	Bhela
English	:	Marking Nut
Gujrati	:	Bhilam
Hindi	:	Bhilawa
Kannada	:	Bhallataka
Kashmiri	:	--
Malayalam	:	Chera
Marathi	:	Bibba
Oriya	:	Bhollataki, Bholai
Punjabi	:	Bhilawa
Tamil	:	Tatamkottai, Scramkotati
Telugu	:	Nallajidi, Nallajidiginga
Urdu	:	Baladur, Bhilavan

### DESCRIPTION

#### a) Macroscopic

Fruit laterally flattened, drupaceous, dark brown, nut 2.5-3 cm long, obliquely ovoid, smooth, shining with residual receptacle.

## b) Microscopic

**Fruit** - Pericarp differentiated into epicarp, mesocarp and endocarp; in longitudinal section pericarp shows outer epicarp consisting of single layer of epidermal cells which are elongated radially and lignified, characteristic glands found in pericarp which exude oil globules and arise as small protuberances in epicarp and due to pressure exerted by cells of mesocarp, some of epidermal cells and cuticle rupture and oil globules exude from oil glands; mesocarp a very broad zone, 30-40 layers thick, composed mostly of parenchymatous cells having lysigenous cavities and fibro-vascular bundles, below epidermis a few outer cells of parenchyma smaller as compared to rest; rosette crystals of calcium oxalate found scattered in parenchymatous cells, some cells get dissolved and form lysigenous cavities which increase in size with maturity of fruit, cavities do not have any special lining and contain an acrid and irritant yellowish oily secretion; endocarp consists of two distinct layers, innermost prismatic, very much elongated radial walls, being highly thickened, outer layer shorter and thinner than prismatic layer but cells similar to the former; number of mesocarp parenchyma contain rosette crystals of calcium oxalate and oil drops in oil glands; lysigenous cavities of mesocarp contain oily vesicating substance, insoluble in water and soluble in alcohol, ether, chloroform.

**Powder** - Dark-brown; shows rosette crystals of calcium oxalate and oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 1 per cent, Appendix	2.2.2.
Total Ash	Not more than 4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 11 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 5 per cent, Appendix	2.2.7.

**CONSTITUENTS** - A Tarry Oil containing Anacardic Acid, Non-Volatile Alcohol (Cardol).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Tīkṣṇa, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura

**Karma** : Vātahara, Kaphahara, Dīpana, Pācana, Chedi, Bhedi, Medhya

**IMPORTANT FORMULATIONS** - Bhallātaka Rasāyana, Bhallātakādi Modaka, Amṛta  
Bhallātaka Leha, Sañjīvanī Vaṭī

**THERAPEUTIC USES** - Ānāha, Grahaṇī, Gulma, Arśa, Kṛmi, Kuṣṭha

**DOSE** - 1.2 g of the drug in Ksirapaka form. Note - For Bhallātaka ṣodhan see A.F.I., Part-I

## BHR̄NGARĀJA (Whole Plant)

Bhr̄ngarāja consists of whole plant of *Eclipta alba* Hassk. (Fam. Asteraceae); a herbaceous annual, 30 - 50 cm high, erect or prostrate, much branched, strigosely hirsute, often rooting at nodes, a common weed of moist places found throughout India ascending upto 1700 m.

### SYNONYMS

Sanskrit	:	Keśarāja, Tekarāja, Bhr̄nga, Mārkaḥ, Bhr̄ngaja
Assamese	:	Bhrngaraja
Bengali	:	Bheemraja, Kesuriya, Kesari
English	:	--
Gujrati	:	Bhangaro, Bhangro
Hindi	:	Bhangara, Bhangaraiya
Kannada	:	Garujalu, Gurugada, Soppu, Keshavardhana, Kodigaraju
Kashmiri	:	--
Malayalam	:	Kayyonni, Knnunni
Marathi	:	Bhangra, Bhringiraja, Maka
Oriya	:	--
Punjabi	:	Bhangra
Tamil	:	Karisalankanni, Karisalanganni, Karisalai
Telugu	:	Guntakalagara, Guntagalagara
Urdu	:	Bhangra

### DESCRIPTION

#### a) Macroscopic

**Root** - Well developed, a number of secondary branches arise from main root, upto about 7 mm in dia., cylindrical, greyish.

**Stem** - Herbaceous, branched, occasionally rooting at nodes, cylindrical or flat, rough due to oppressed white hairs, node distinct, greenish, occasionally brownish.

**Leaf** - Opposite, sessile to subsessile, 2.2 - 8.5 cm long, 1.2 - 2.3 cm wide, usually oblong, lanceolate, sub-entire, sub-acute or acute, strigose with appressed hairs on both surfaces.

**Flower** - Solitary or 2, together on unequal axillary peduncles; involucre bracts about 8, ovate, obtuse or acute, herbaceous, strigose with oppressed hairs; ray flowers ligulate, ligule small, spreading, scarcely as long as bracts, not toothed, white; disc flowers tubular, corolla often 4 toothed; pappus absent, except occasionally very minute teeth on the top of achene; stamen 5, filaments epipetalous, free, anthers united into a tube with base obtuse; pistil bicarpellary; ovary inferior, unilocular with one basal ovule.

**Fruit** - Achenial cypsella, one seeded, cuneate, with a narrow wing, covered with warty excrescences, brown.

**Seed** - 0.2 - 0.25 cm long, 0.1 cm wide, dark brown, hairy and non endospermic.

#### **b) Microscopic**

Root - Mature root shows poorly developed cork, consisting of 3-5 rows of thin-walled, tangentially elongated cells; secondary cortex consists of outer one or two rows of tangentially elongated or rounded cells with air cavities, inner secondary cortex of tangentially elongated to irregular shaped, parenchymatous cells with conspicuous air cavities; stone cells found scattered in secondary cortex and cork, in singles or in groups of various shape and size; pericyclic fibres in tangentially arranged bands of many cells or in singles; secondary phloem consists of sieve elements including phloem fibres traversed by multiseriate phloem rays; phloem rays broader towards periphery, consisting of rounded cells; xylem composed of vessels, fibre tracheids, fibres and xylem parenchyma, traversed by xylem rays; vessels numerous, found scattered throughout wood, in macerated preparation vessels small, drum-shaped, cylindrical elongated with pitted walls and perforations, simple, rarely slightly oblique; fibre tracheids, pitted, with very pointed tips, xylem fibres long with pointed tapering ends and short lumen, a few fibres show peg-like outgrowths towards the tapering ends; xylem parenchyma sparse usually squarish to rectangular having simple pits on their walls, xylem ray distinct, run straight in tangential section, generally 5-32 cells in height and 3-5 cells in width although very rarely uniseriate and biseriate rays also found, ray cells pitted.

Leaf-

*Petiole* - shows single layered upper and lower epidermis consisting of tubular cells, covered with striated cuticle; trichomes of two types, non-glandular, uniseriate, 1-5 celled,

warty, and with pointed apical cell; epidermis followed by wide cortex, consisting of 2-5 layered collenchyma on both, upper and lower side with distinct angular thickening; parenchyma 4-6 layered on upper side and 5-8 layered on lower side consisting of isodiametric, thin-walled cells with intercellular spaces; five vascular bundles central one largest while four others small flanking to either side of central bundle, consists of xylem on dorsal side and phloem on ventral side; xylem vessels arranged in radial rows traversed by xylem rays.

*Midrib* - cut at basal region shows both upper and lower single layered epidermis, externally covered with cuticle, a few epidermal cells elongate outwards to form uniseriate hairs; epidermis followed by cortex, consisting of 3-5 layered collenchymatous cells on both sides; section cut at middle region shows 3-4 layered collenchymatous cells on dorsal and 1-3 layered on ventral side, while the section cut at apical region, shows 2 layered collenchymatous cells on both sides, similarly transverse section cut at a basal, middle and apical regions shows 4-6 layered parenchymatous cells on dorsal side and 6-9 layered parenchyma on ventral side, in section cut at basal region 4-6 layered parenchyma on both the sides in the middle region with thin-walled cells and intercellular spaces, 2-3 layered parenchymatous cells on both side in the apical region; in the basal region section shows vascular bundle similar to that of petiole while in the section cut at middle and apical region section shows 4 smaller bundles shifting towards lamina.

*Lamina* - shows a dorsal ventral structure, epidermis single layered, externally covered with cuticle, followed by single layered palisade parenchyma containing chlorophyll contents; spongy parenchyma irregularly arranged with distinct intercellular spaces and filled with chlorophyll contents; mesophyll traversed by number of veins; anisocytic and anomocytic stomata present on both surface, more abundant on lower surfaces; stomatal index 20.0-22.5 on upper and 23.5 -26.0 on lower surface; palisade ratio 3.8 -4.5; hairs stiff, pointed, wide at the base, about 3 celled, uniseriate, middle cells longest, uppermost generally not exceeding the basal cell in length, septa thick-walled.

*Stem* - Mature stem shows single layered epidermis, externally covered with cuticle, a few epidermal cells elongate to form characteristic non-glandular trichomes, the cork where formed, poorly developed consisting of rectangular cells; secondary cortex composed of large, rounded or irregular shaped parenchymatous cells having wide air spaces; endodermis single layered consists of tangentially elongated cells; pericyclic fibres distinct, arranged in tangential strands; vascular bundles in a ring, collateral, endarch, of varying sizes traversed by medullary rays; phloem a narrow strip composed of sieve elements and phloem parenchyma; xylem consists of large number of vessels, xylem fibres and xylem parenchyma; xylem vessels appear evenly distributed throughout the xylem; in macerated preparation vessels barrel-shaped, some elongated with simple perforations, pitted with spiral thickening; xylem fibres with wide lumen, pointed tips and pitted walls, a few often bifurcate and a few other large, peg-like outgrowth; xylem parenchyma rectangular with pitted thickening; xylem rays triseriate to pentaseriate, normally biseriate and uniseriate, 8-15 cells in height and 3-5 cells in width; centre occupied by a wide pith consisting of isodiametric cells of parenchyma.

Powder - Dark green; shows vessels in large groups or single broken pieces with pitted walls, numerous fibres entire or in pieces, trichomes entire or in pieces, warty, a few attached with epidermal and subsidiary cells, anomocytic and anisocytic stomata.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 22 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 11 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 15 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids, Ecliptine and Nicotine.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Āmahara, Balya, Rasāyana, Keśya, Tvacya, Dantya, Cakṣuṣya, Viṣahara

**IMPORTANT FORMULATIONS** - Bhṛṅgāmalakādi Taila, Bhṛṅgarāja Taila, Nīlī Bhṛṅgādi Taila (For external use only), Bhṛṅgarājāsava, Tekarāja marica

**THERAPEUTIC USES** - Yakṛdroga, Kṛmiroga, Śoṭha, Pāṇḍu, Śvāsa, Kāsa, Śiraḥ Śūla, Hṛdroga

**DOSE** - 3 - 6 ml of the drug in juice form. 12 - 36 g of the drug in powder form for decoction.

## BRĀHMĪ (Whole Plant)

{\rtf1\ansi\deff0{\fonttbl{\f0\fnil\fcharset0 AS1-TTBidisha;}}}

\viewkind4\uc1\pard\lang1033\f0\fs41 Br'a1hm'a2 consists of dried whole plant of \i Bacopa monnieri \i0 (Linn.) Wettst., Syn. \i Herpestis monniera \i0 (Linn.) H.B.& K. (Fam. Scrophulariaceae); a glabrous, succulent, small, prostrate or creeping annual herb, found throughout India in wet and damp places.

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### SYNONYMS

Sanskrit	:	Sarasvatī, Kapotavaṅka
Assamese	:	Brahmi
Bengali	:	--
English	:	Thyme Leaved Gratiola
Gujrati	:	Neerbrahmi, Bamaneveri
Hindi	:	Manduka Parni
Kannada	:	Nirubrahmi, Valabrahmi, Ondelaga, Mandukaparni
Kashmiri	:	--
Malayalam	:	Bhahmi
Marathi	:	Jalnam, Brahmi, Birami
Oriya	:	Brahmi
Punjabi	:	Brahmibuti
Tamil	:	Nirabrahmi, Brahmi vazhukkai
Telugu	:	Sambarenu, Sambrani
Urdu	:	Brahmi

### DESCRIPTION

**a) Macroscopic**

Root - Thin, wiry, small, branched creamish-yellow.

Stem - Thin, green or purplish green, about 1-2 mm thick, soft, nodes and internodes prominent, glabrous; taste, slightly bitter.

Leaf - Simple, opposite, decussate, green, sessile, 1-2 cm long, obovate-oblong; taste, slightly bitter.

Flower - Small, axillary and solitary, pedicels 6-30 mm long, bracteoles shorter than pedicels.

Fruit - Capsules upto 5 mm long, ovoid and glabrous.

**b) Microscopic**

Root - Shows a single layer of epidermis, cortex having large air cavities; endodermis single layered; pericycle not distinct; stele consists of a thin layer of phloem with a few sieve elements and isolated material from xylem shows vessels with reticulate thickenings.

Stem - Shows single layer of epidermis followed by a wide cortex of thin-walled cells with very large intercellular spaces; endodermis single layered; pericycle 3 consisting of 1-2 layers; vascular ring continuous, composed of a narrow zone of phloem towards periphery and a wide ring of xylem towards centre; centre occupied by a small pith with distinct intercellular spaces; starch grains simple, round to oval, present in a few cells of cortex and endodermis, measuring 4-14  $\mu$  in dia., and 8.0-14.0 x 2.5-9.0  $\mu$  in dia. respectively.

Leaf -Shows a single layer of upper and lower epidermis covered with thin cuticle; glandular hairs sessile, subsidiary cells present on both surfaces; a few prismatic crystals of calcium oxalate occasionally found distributed in mesophyll cells; mesophyll traversed by small veins surrounded by bundle sheath; no distinct midrib present.

Powder - Yellowish-brown; shows xylem vessels with reticulate thickening, glandular hairs, simple, round and oval starch grains, measuring 4-14  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 15	per cent, Appendix	2.2.7.

## CONSTITUENTS - Alkaloids

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Kaphahara, Rasāyana, Āyusya, Medhya, Matiprada, Svarya, Prajāsthāpana, Viśahara, Mohahara

**IMPORTANT FORMULATIONS** - Sārasvatāriṣṭa, Brāhmī Ghṛta, Ratnagiri Rasa, Brāhmī Vaṭī, Sārasvata Cūrṇa, Smṛtisāgara Rasa

**THERAPEUTIC USES** - Kuṣṭha, Jvara, Śopha, Pāṇḍu, Prameha, Mānasavikāra

**DOSE** - 1-3 g in powder form.

## **BR̥HATĪ (Root)**

Br̥hatĪ consists of dried root of *Solanum indicum* Linn. (Fam. Solanaceae); a very prickly, much branched perennial under shrub, upto 1.8 m high, mostly found throughout warmer parts of the country upto an elevation of 1500 m.

### **SYNONYMS**

Sanskrit	:	Śanhika
Assamese	:	Tilabhakuri
Bengali	:	Byakud
English	:	--
Gujrati	:	Umimuyaringani, Ubhibharingani, Ubhibhuyaringa
Hindi	:	Vanabharata, Badikateri
Kannada	:	Kirugullia, Heggulla, Gulla
Kashmiri	:	--
Malayalam	:	Cheru Vazhuthina, Putirichunda
Marathi	:	Dorli, Chichuriti, Dorale
Oriya	:	Dengabheji
Punjabi	:	Kandiarivaddi
Tamil	:	Chiru vazhuthalai, Papparamulli, Mullamkatti
Telugu	:	Tella Mulaka
Urdu	:	Kateli

### **DESCRIPTION**

#### **a) Macroscopic**

Root well developed, long, ribbed, woody, cylindrical, pale yellowish-brown, 1-2.5 cm in dia., a number of secondary roots and their branches present, surface rough due to

presence of longitudinal striations and root scars, fracture, short and splintery; no distinct odour and taste.

#### **b) Microscopic**

Root - Shows thin cork composed of 5 - 15 layers of thin-walled, tangentially elongated, rectangular cells filled with yellowish-brown content; cork cambium single layered; secondary cortex composed of 5 - 9 layers of thin-walled, oval and tangentially elongated cells; stone cells present in singles or in groups of 2-5 or more in this region; secondary phloem composed of sieve elements, parenchyma and stone cells, traversed by phloem rays; phloem parenchyma much abundant, thin-walled; stone cells present in outer phloem region in singles or in groups of 2-5, varying greatly in shape and size; phloem rays 1-3 cells wide, isodiametric to slightly radially elongated in inner phloem region and radially elongated in outer phloem region, occasionally stone cells also found in medullary rays; wood occupies bulk of root and composed of vessels, tracheids, fibres and xylem parenchyma, traversed by xylem rays, all elements being lignified, vessels occur singly or in groups of 2-5 with simple pits; xylem fibres moderately thick-walled with simple pits and pointed ends found in abundance; xylem parenchyma have simple pits or reticulate thickening; xylem rays uni to biseriate, thick-walled, cells radially elongated and pitted, microspenoidal crystals of calcium oxalate as sandy masses and simple starch grains present in some cells of secondary cortex, phloem and medullary rays; simple and rounded to oval starch grains, measuring 5.5 -11.6  $\mu$  in diameter.

Powder - Cream coloured; shows groups of thin-walled, parenchymatous cells, aseptate fibres, vessels with simple pits, oval to elongated stone cells and simple, rounded to oval starch grains, measuring 5.5 - 11.6  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 6.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 4	per cent, Appendix	2.2.7.

**T.L.C.**

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**CONSTITUENTS** - Steroidal Alkaloids and Steroids

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Guṇa** : Laghu

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Dīpana, Pācana, Hṛdya, Grāhī

**IMPORTANT FORMULATIONS** - Daśamūla Ghṛta, Daśamūlāriṣṭa

**THERAPEUTIC USES** - Hṛdroga, Jvara, Śvāsa, Śūla, Agnimāndya

**DOSE** - 10-20 g of the drug for decoction.

## CAVYA (Stem)

Cavya consists of dried stem of *Piper retrofractum* Vahl. Syn. *P. chaba* Hunter non Blume., *P. officinarum* DC. (Fam. Piperaceae); a glabrous, fleshy climber, cultivated mainly in Southern India.

### SYNONYMS

Sanskrit	:	Cavika
Assamese	:	Chepaan
Bengali	:	Chei
English	:	Cubeb
Gujrati	:	Chavka, Chavaka
Hindi	:	Chavya
Kannada	:	Kadumenasinaballi, Chavya
Kashmiri	:	--
Malayalam	:	Kattumulaku, Kattumulakunveru
Marathi	:	Chavaka
Oriya	:	Chainkath
Punjabi	:	Chabak
Tamil	:	Chavyam, Chevuyam
Telugu	:	Chevuyamu
Urdu	:	Peepal Chab, Kababah

### DESCRIPTION

#### a) Macroscopic

Drug consists of dried cut pieces of stem of variable length and usually 0.5-2.0 cm in width, cylindrical and somewhat twisted, greyish-brown, surface smooth with

a few longitudinal wrinkles, nodes and internodes distinct, fracture, short; odour, peppery; taste, acrid.

#### **b) Microscopic**

Stem - Shows a thin cork consisting of 3-4 layers of rectangular, brownish cells; cork cambium not distinct; secondary cortex a wide zone, consisting of round, oval to rectangular, thin-walled, parenchymatous cells with prominent intercellular spaces; plenty of simple starch granules present; endodermis single layered; stelar region composed of five wedge-shaped vascular bundles alternating with wide medullary rays; phloem lies towards outer side and composed of sieve elements, parenchyma and phloem fibres occurring singly or in groups; xylem lies towards centre and composed of vessels, tracheid, fibres and xylem parenchyma; isolated vessels barrel-shaped with pitted and reticulate thickenings; fibres needle and spindle-shaped, medullary rays multi seriate, cells thin walled, filled with simple, round to oval, starch grains, measuring 3 - 14  $\mu$  in diameter.

**Powder** - Greyish-brown; shows fragments of vessels, fibres and simple, round to oval starch grains, measuring 3-14  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 10 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 6 per cent, Appendix	2.2.7.

#### **T.L.C.**

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**CONSTITUENTS** - Alkaloids, Glycosides and Steroids.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Pācana, Recana, Bhedana

**IMPORTANT FORMULATIONS** - Candrāmṛta Rasa, Prāṇadā Guṭikā

**THERAPEUTIC USES** - Arśa, Kṛmi, Plīhā Roga, Gulma, Ānāha, Udara Roga, Śūla

**DOSE** - 1-2 g. of the drug in powder form.

## DĀDĪMA (Seed)

Dāḍima consists of dried seed of *Punica granatum* Linn. (Fam. Punicaceae); a large deciduous shrub or a small tree, found growing wild in the warm valley, outer hills of Himalayas between 900- 1800 m and cultivated in many parts of the country.

### SYNONYMS

Sanskrit	:	Dāḍimācchada, Lohitapuṣpa, Dantabīja
Assamese	:	Kulekhara
Bengali	:	Ddima
English	:	Pomegranate
Gujrati	:	Dadama
Hindi	:	Anar
Kannada	:	Dalimba
Kashmiri	:	--
Malayalam	:	Matalam
Marathi	:	Dadimba
Oriya	:	--
Punjabi	:	Anar
Tamil	:	Madalai, Maadalai. Madalam
Telugu	:	Danimma
Urdu	:	Anar, Rumman

### DESCRIPTION

#### a) Macroscopic

Seeds brown, angular, wedge-shaped, 0.5-0.6 cm long, 0.1-0.2 cm wide; taste, sweetish-sour.

**b) Microscopic**

Seed - Shows testa consisting of thin-walled, parenchymatous cells followed by stony tegmen consisting of lignified, round, oval, triangular and rectangular, thick-walled stone cells having narrow and wide lumen; beneath this, reddish-brown pigmented layer present; endosperm absent; cotyledons coiled, consisting of oval to polygonal, thin walled, parenchymatous cells, containing a few oil globules; starch grains present in testa, round to oval, simple, measuring 3-17  $\mu$  in diameter.

**Powder** - Reddish-brown; shows stone cells, oil globules, and a few simple round to oval starch grains measuring 3-17  $\mu$  in diameter.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 35 per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform:Ethylacetate : Formic acid (5:4:1) v/v three spots at Rf. 0.62, 0.87 (both grey) and 0.97 (pink) are seen in visible light. Under U.V. (366 nm) four fluorescent zones are visible at Rf. 0.12 (sky blue), 0.45 (sky blue), 0.62 (blue) & 0.87 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.62, 0.87 & 0.97 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110° C three spots appear at Rf. 0.62, 0.87 (both violet) & 0.97 (greyish blue).

**CONSTITUENTS** - Sugars, Vitamin C, Sitosterol, Ursolic acid, Protein, Fat and Mineral matters, Nicotinic acid, Pectin, Riboflavin, Thiamine, Delphinidin diglycoside, Aspartic, Citric, Ellagic, Gallic and Malic acids, Glutamine, Isoquercetin, Estrone and Punicic acid.

**PROPERTIES AND ACTION**

**Rasa** : Madhura (Kaṣāyānūrasa) / for Madhura Amla fruit: Madhura, Amla  
**Guṇa** : Laghu, Snigdha, / for Madhura Amla fruit: Laghu  
**Vīrya** : Uṣṇa, / --  
**Vipāka** : Madhura, / --  
**Karma** : Vātahara, Pittahara, Kaphahara, Tarpaṇa, Śukrala, Hṛdya, Kaṇṭhya, Mukhagandhahara, Grāhī, Medhya, Balya

**IMPORTANT FORMULATIONS** - Dāḍimāṣṭaka Cūrṇa, Dāḍima Ghr̥ta, Dādhika Ghr̥ta, Bhāṣkara Lavaṇa, Śukra Mātr̥ka Vaṭī

**THERAPEUTIC USES** - Tṛṣṇā, Dāha, Jvara

**DOSE** - 5 to 10 g of the drug in powder form.

## **DĀRUHARIDRĀ (Stem)**

Dāruharidrā consists of dried stem of *Berberis aristata* DC. (Fam. Berberidaceae); an erect, spinous, deciduous shrub, usually 1.8-3.6 m in height found in the Himalayan ranges at an elevation of 1000-3000 m, and in the Nilgiri hills in South India.

### **SYNONYMS**

Sanskrit	:	Katamkateri, Dārvi
Assamese	:	Kulekhara
Bengali	:	Daruharidra
English	:	Indian Berberry
Gujrati	:	Daruharidra, Talimkhana
Hindi	:	Talmakhana, Darhald
Kannada	:	Nirmulli, Kolavalike, Kolavankae
Kashmiri	:	--
Malayalam	:	Vayalchulli, Maramanjal
Marathi	:	Talimakhana
Oriya	:	Koilrekha, Koillekha
Punjabi	:	---
Tamil	:	Nirmulle, Varatiu manjal
Telugu	:	Nirugobbi
Urdu	:	Talmakhana

### **DESCRIPTION**

#### **a) Macroscopic**

Drug available in pieces of variable length and thickness, bark about 0.4 - 0.8 cm thick, pale yellowish-brown, soft, closely and rather deeply furrowed, rough, brittle, xylem portion yellow, more or less hard, radiate with xylem rays, pith mostly absent, when

present small, yellowish-brown when dried, fracture short in bark region, splintery in xylem; taste, bitter.

#### **b) Microscopic**

Stem -Shows rhytidoma with cork consisting of 3-45 rectangular and squarish, yellow coloured, thin-walled cells, arranged radially; sieve elements irregular in shape, thin walled, a few cells containing yellowish-brown contents; phloem fibres arranged in tangential rows, consisting of 1-4 cells, each fibre short thick-walled, spindle-shaped, lignified having wide lumen; half inner portion of rhytidoma traversed by secondary phloem rays; phloem rays run obliquely consisting of radially elongated parenchymatous cells, almost all phloem ray cells having single prismatic crystals of calcium oxalate, a few cells of rhytidoma also contain prismatic crystals of calcium oxalate; stone cells also found scattered in phloem ray cells in groups, rarely single, mostly elongated, a few rounded, arranged radially, some of which contain a single prism of calcium oxalate crystals; secondary phloem, a broad zone, consisting of sieve elements and phloem fibres, traversed by multi seriate phloem rays; sieve elements arranged in tangential bands and tangentially compressed cells alternating with single to five rows of phloem fibres, phloem fibres short, lignified, thick-walled having pointed ends; secondary xylem broad consisting of xylem vessels, tracheids, xylem fibres and traversed by multi seriate xylem rays; xylem vessels numerous, small to medium sized, distributed throughout xylem region in groups or in singles, groups of vessels usually arranged radially; isolated vessels cylindrical with rounded or projected at one or both ends with spiral thickening; xylem fibres numerous, lignified, large, thick-walled with wide lumen, and pointed tips; xylem rays quite distinct, straight, multiseriate, consisting of radially arranged rectangular cells, each ray 30-53 cells high, 8-12 cells wide, a few ray cells containing brown contents.

**Powder** - Yellow; shows mostly fragments of cork cells, sieve elements, yellow coloured phloem fibres entire or in pieces, stone cells in singles or in groups, numerous prismatic crystals of calcium oxalate, xylem vessels having spiral thickening, thick-walled, lignified xylem fibres and ray cells.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 14 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 5 per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than 6 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 8 per cent, Appendix	2.2.7.

**T.L.C.**

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**CONSTITUENTS** - Alkaloids

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	--
<b>Karma</b>	:	Stanya Śodhana, Stanya Doṣahara, Doṣa Pācana

**IMPORTANT FORMULATIONS** - Aśvagandhādyariṣṭa, Bhr̥ṅgarāja Taila, Khadirādi Guṭikā (Mukharoga), Khadirāriṣṭa, Jātyādi Taila, Triphalā Ghṛta

**THERAPEUTIC USES** - Āmātisāra, Medoroga, Urustambha, Kapharoga, Karṇaroga, Mukharoga, Netraroga, Kaṇḍū, Vraṇa, Meha

**DOSE** - 5-10 ml of the drug in Kvatha form.

## DRONAPUṢPĪ (Whole Plant)

Dronapūṣpī consists of dried whole plant of *Leucas cephalotes Spreng.* (Fam. Lamiaceae), an annual, erect, scaberulous, stout herb, about 0.6-0.9 m in high, found on the Himalayas at an altitude of 600-1800 m and on waste lands throughout the country.

### SYNONYMS

Sanskrit	:	Katumba
Assamese	:	Dronaphool
Bengali	:	Bholghasiya
English	:	--
Gujrati	:	Kubo
Hindi	:	Guma
Kannada	:	Tumbe
Kashmiri	:	--
Malayalam	:	Tumba
Marathi	:	Tumba
Oriya	:	Gaisha
Punjabi	:	Gomobati, Gumma, Mal-bheda
Tamil	:	Tumbai
Telugu	:	Tummi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Cylindrical, zig-zag, smooth, long with numerous wiry, fine rootlets, size variable, fracture, fibrous; taste, characteristic.

**Stem** - Light greenish-yellow, surface rough, hairy, quadrangular with four prominent

furrows, upto 4 mm thick, nodes and internodes distinct; taste, slightly bitter.

**Leaf** - Yellowish-green, 3-9 cm long, 1-2.5 cm wide, ovate or ovate- lanceolate, subacute, more or less pubescent, crenate, serrate; taste, pungent.

**Inflorescence** - Sessile, white, crowded in dense, globose, about 2-3.5 cm across, surrounded by numerous foliaceous bracts, thin, lanceolate, acute, ciliate, 1.2-1.5 cm long and 0.3-0.35 cm wide; calyx, tubular, slightly curved, 1-2.25 cm long, glabrous in lower part, hairy on upper part, 10 dentate with a villous throat; corolla, white, 1.7-2 cm long, bilipped, upper lip about 4 mm long, wooly, lower lip nearly twice as long as upper one; lateral lobes small.

**Fruit** - Schizocarpic carcerule, nutlets 3 mm smooth, brown.

**Seed** - 0.3 cm long and 0.1 cm wide, oblong, trigonous, smooth, dark brown.

## **b) Microscopic**

Root - Shows a single layered epidermis composed of rectangular, thin-walled cells; secondary cortex consists of thin-walled, tangentially elongated, parenchymatous cells; secondary phloem consists of sieve elements and phloem parenchyma; secondary xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels long with spurs, vessels and tracheids have simple pits, xylem fibres much elongated with pointed ends and have moderately thick walls, some having simple pits; medullary rays 1-2 seriate, upto 8 cells high.

Stem - Shows squarish outline with four ridges and furrows, consists of a single layered epidermis, composed of oval to rectangular, thin-walled cells having a number of uni to tricellular trichomes; secondary cortex 5-9 layered, consisting of 3-5 layers of circular, oval or irregular collenchymatous cells at the ridge and 2-4 layers of thin-walled, tangentially elongated, parenchymatous cells; endoderm is single layered, consisting of barrel shaped, thin-walled cells; pericycle single layered of thin-walled cells comparatively smaller than the cells of endodermis, a few pericyclic cells converted into pericyclic fibres; phloem very narrow consisting of usual elements; xylem consists of vessels, tracheids, fibres and large amount of xylem parenchyma; vessels mostly cylindrical with simple pits and spiral thickening; tracheids and xylem parenchyma have simple pits on their walls; pith wide consisting of circular to oval, thin-walled, parenchymatous cells.

Leaf-

*Petiole* - shows a single layered epidermis, uni to tricellular trichomes with pointed ends, cortex consisting of single layered, round to angular collenchyma; parenchyma consists of thin-walled cells containing prismatic crystals of calcium oxalate, vascular bundles 4, 2 smaller located towards each corner and 2 larger in centre.

*Midrib* - shows epidermis on either side with uni to tricellular trichomes, followed by 1-2 layers collenchyma towards lower surface, 3-4 layers towards upper surface, followed by round to oval parenchyma, 4 - 7 layered; vascular bundle arc-shaped, present in centre.

*Lamina* - shows epidermis on either side with uni to tricellular trichomes rarely on upper surface; palisade single layered; spongy parenchyma 3-5 layered, irregular, thin-walled cells; a few veins present in this region; stomata diacytic, present on both surfaces; stomatal index 16.6-40.5 on lower surface, 16.6-30.7 on upper surface; palisade ratio 7-9.

Powder - Dull yellow; shows groups of round to polygonal parenchymatous cells, pitted and spiral vessels, aseptate fibres, uni to tricellular trichomes and diacytic stomata.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 17 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 6 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 14 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloid, Glycoside,  $\beta$ -Sitosterol and Flavonoid.

## **PROPERTIES AND ACTION**

**Rasa** : Madhura, Lavaṇa, Kaṭu  
**Guṇa** : Guru, Rūkṣa, Tīkṣṇa

**Vīrya** : Uṣṇa  
**Vipāka** : Madhura  
**Karma** : Vātakara, Pittakara, Kaphahara, Bhedani, Rucya

**IMPORTANT FORMULATIONS** - Plīhāri Vaṭikā, Gorocanādi Vaṭī.

**THERAPEUTIC USES** - Kāmalā, Śoṭha, Tamaka Śvāsa, Kāsa, Agnimāndya, Viṣamajvara

**DOSE** - 1-3 g of the drug in powder form. 5-10 ml of the drug in juice form.

## ERVĀRU (Seed)

Ervāru consists of seeds of *Cucumis melo* var. *utilissimus* Duthie & Fuller Syn. *C. utilissimus* Roxb. (Fam. Cucurbitaceae), an annual creeping herb, cultivated in many parts of the country, especially in upper India and particularly in Uttar Pradesh and Punjab.

### SYNONYMS

Sanskrit	:	Bahukanda, Bṛhatphala, Hastipani. Hastipani, Karkaṭī.
Assamese	:	Kulekhara
Bengali	:	Kakur, Karikuda
English	:	Snake Cucumber
Gujrati	:	Kakadi
Hindi	:	Karkri, Kakadi
Kannada	:	Saute
Kashmiri	:	--
Malayalam	:	Kamkadi, Vellarika
Marathi	:	Kakadi, Valnka
Oriya	:	--
Punjabi	:	Kakri
Tamil	:	Kakkarikkay, Vellarikkai
Telugu	:	Dosakaya
Urdu	:	Kakari

### DESCRIPTION

#### a) Macroscopic

Seed compressed, more or less ellipsoid, 0.7-10 cm long, 0.3-0.4 cm wide, surface smooth, glossy, creamish-yellow; taste, sweetish oily.

## b) Microscopic

**Seed** -Shows seed coat consisting of a layer of round to oval stone cells, lignified with distinct lumen and striations, followed by a narrow zone of endosperm consisting of cellulosic, thin-walled, rounded and tangentially elongated, parenchymatous cells, containing a few oil globules and aleurone grains; cotyledons two, straight, consisting of single layered epidermal cells, covered with thick cuticle, mesophyll cells thin-walled, radially elongated to squarish, parenchymatous, containing numerous oil globules and aleurone grains.

**Powder** \_ Creamish-yellow and oily; shows stone cells, mesophyll cells and numerous oil globules and aleurone grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 1 per cent, Appendix	2.2.2.
Total Ash	Not more than 4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 5 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene :  
Ethylacetate (90:10) shows one fluorescent zone at Rf.0.91 (blue) under U.V. (366 nm). On exposure to Iodine vapour ten spots appear at Rf. 0.19, 0.26, 0.35, 0.51, 0.58, 0.64, 0.77,0.83,0.91 and 0.97 (all yellow) .On spraying with 5% Methanolic Phosphomolybdic acid reagent and on heating the plate for fifteen minutes at 105°C ten spots appear at Rf. 0.19, 0.26, 0.35, 0.51, 0.58, 0.64, 0.77, 0.83, 0.91 and 0.97 (all grey).

**CONSTITUENTS** - Oil & Sugars.

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Tikta

**Guna** : Guru, Rūkṣa

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātakara, Kaphakara, Pittahara, Rucya, Dīpana, Bhedi, Raktadoṣakara, Grāhī

**IMPORTANT FORMULATIONS** - Dādhika Ghṛta

**THERAPEUTIC USES** - Aśmarī, Mūtrakṛcchra, Gulma, Raktapitta, Tṛṣṇā, Dāha, Jvara

**DOSE** - 3-6 g of seeds.

## GAJAPIPPALĪ (Fruit)

GajapippalĪ consists of dried, transversely cut pieces of mature female spadix of *Scindapsus officinalis* Schoott. (Fam. Araceae); a large epiphytic climber, found all along the sub-Himalayan tract between an altitude of 330-1000 m in West Bengal, Orissa, Andhra Pradesh and the Andaman Islands.

### SYNONYMS

Sanskrit	:	Gajakṛṣṇa, HastipipalĪ
Assamese	:	Kulekhara
Bengali	:	Gajapeepal
English	:	--
Gujrati	:	Motopeepar
Hindi	:	Gajapeepal
Kannada	:	Adkebeeluvalli
Kashmiri	:	--
Malayalam	:	Attipali
Marathi	:	Gajapipalee
Oriya	:	--
Punjabi	:	Gajapeepal
Tamil	:	Anaitippalee
Telugu	:	Enugopippal
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Fruit** - Occurs in transversely cut circular pieces of about 2.0-3.0 cm in diameter and 2.0-3.5 cm thick, brownish-grey, rough and scaly, cut surface has a central core, surrounded by fruits enclosing the seed covered partly by aril; odour and taste not distinct.

**Seed** - Kidney-shaped, 0.3-0.4 cm wide, 0.4-0.6 cm long, smooth, shiny, greyish-brown with a dent, odour and taste not distinct.

**b) Microscopic**

**Fruit** - Shows more or less loosely arranged, thin-walled, parenchymatous cells having more or less isodiametric cells filled with brown content and numerous acicular crystals of calcium oxalate.

**Seed** - Shows a single layered, oval to polygonal, thin-walled testa followed by 2-3 layered, thick-walled, oval to polygonal, non-lignified, sclereid-like cells having wide lumen and concentric striations; 2-4 layered, oval to polygonal, thick-walled, lignified stone cells having very narrow lumen, pitted and with concentric striations; thin-walled, irregular parenchymatous cells containing oil globules and aleurone grains.

**Powder** - Dark brown; shows lignified, oval to polygonal stone cells having lumen and striations; numerous needle-like acicular crystals of calcium oxalate, measuring 120-130  $\mu$  in length and oil globules.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 11	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract of drug on Silica gel 'G' plate using Chloroform : Methanol (1:1) shows two spots at Rf. 0.65 and 0.73 (both light yellow) in visible light Under U.V. (366

nm) four fluorescent zones at Rf. 0.27, 0.65, 0.73 and 0.93 (all blue) are visible. On exposure to Iodine vapour five spots appear at Rf. 0.20, 0.27, 0.65, 0.73 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C. Three spots appear at Rf. 0.65, 0.73 (both light brown) and 0.93 (brown).

**CONSTITUENTS** - Glucosides viz. Scindapsin A & Scindapsin B, Sugars & Fixed Oil.

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu  
**Guṇa** : Rūkṣa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Agnivardhaka, Kaṇṭhya, Dīpana, Malaviśoṣana, Stanya, Varṇya

**IMPORTANT FORMULATIONS** - Punarnavāsava, Śivāguṭikā, Mahāyogarāja Guggulu, Prasārīni Taila, Candraprabhā vaṭī

**THERAPEUTIC USES** - Śvāsa, Kṛmiroga, Atīsāra, Kaṇṭha Roga

**DOSE** - 2-3 g in extract (Phant) form.

## GAMBHĀRĪ (Fruit)

Gambhari consists of dried fruit of *Gmelina arborea* Roxb. (Fam. Verbenaceae), an unarmed tree, found scattered in deciduous forests throughout the greater part of the country upto an altitude of 500 m, planted in gardens and also as an avenue tree.

### SYNONYMS

Sanskrit	:	Kāśmarī, Kāśmarya, Pītakarohiṇī, Srīparṇī, Bhadraparṇī
Assamese	:	Gomari
Bengali	:	Gamargachha, Gambar
English	:	--
Gujrati	:	Seevan
Hindi	:	Gambhari
Kannada	:	Seevani, Shivani, Hannu
Kashmiri	:	--
Malayalam	:	Kumbil, Kumizhu
Marathi	:	Sivan
Oriya	:	Gambhari, Bhodroparṇi
Punjabi	:	Khambhari
Tamil	:	Perunkurmizh, Komizhpazham
Telugu	:	Gumaditeku
Urdu	:	Gambhari

### DESCRIPTION

#### a) Macroscopic

**Fruit** - A drupe, ovoid, crinkled, black, 1.5-2.0 cm long, sometimes with portion of attached pedicel, two seeded, sometimes one seeded; taste, sweetish sour.

**Seed** - Seed ovate, 0.5-1 cm long, 0.4-0.6 cm wide, light yellow, surface smooth, seed coat

thin, papery; taste, oily.

#### **b) Microscopic**

**Fruit** - Shows pericarp differentiated into single layered epicarp, multilayered, fleshy mesocarp, hard and stony endocarp: epicarp consisting of single layered, thin-walled cells; mesocarp a wide zone consisting of isodiametric, thin-walled, parenchymatous cells; endocarp consisting of multilayered sclerenchymatous cells.

**Seed** - Shows outer integument consisting of 3-5 rows of crushed, parenchymatous cells followed by inner integument consisting of 2-3 rows of thin-walled, tangentially elongated, parenchymatous cells; cotyledons consisting of single layered, radially elongated epidermal cells; mesophyll consisting of thin-walled cells, filled with oil globules and aleurone grains.

**Powder** - Blackish-brown; shows stone cells, oil globules and aleurone grains.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 1 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 8 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 25 per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform : Methanol (4 : 1) shows one spot at Rf. 0.98 (yellow) in visible light. Under U.V. (366 nm) five fluorescent zones appear at Rf. 0.03, 0.12, 0.22, 0.94 and 0.98 (all blue). On exposure to Iodine vapour eight spots appear at Rf. 0.03, 0.08, 0.18, 0.26, 0.42, 0.52, 0.93 and 0.98 (all

yellow). On spraying with Dragendorff reagent followed by 5% Ethanolic -Sulphuric acid reagent one spot appears at Rf. 0.98 (orange).

**CONSTITUENTS** - Butyric acid, Tartaric acid, Alkaloid, Resin and Saccharine.

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Amla, Kaṣāya

**Guṇa** : Guru, Snigdha, Sara

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātahara, Pittahara, Rasāyana, Bṛṃhaṇa, Keśya, Medhya, Śukrala, Hṛdya

**IMPORTANT FORMULATIONS** - Aravindāsava, Drākṣādi Kvātha Cūrna

**THERAPEUTIC USES** - Rakta Pitta, Dāha, Tṛṣṇā, Kṣata, Kṣaya, Mūtrakṛcchra, Hṛdroga

**DOSE** - 1-3 g of the drug in powder form.

## GĀṄGERU (Stem bark)

Gāṅgeru consists of dried stem bark of *Grewia tenax* (Forsk.) Aschers & Schwf., Syn. *Grewia populifolia* Vahl, (Fam. Tiliaceae), a shrub 0.6-1.0 m high, occurring in North Western and central part of the country and in Deccan Peninsula.

### SYNONYMS

Sanskrit	:	Gāṅgeruki
Assamese	:	Kulekhara
Bengali	:	Garakshachakule
English	:	--
Gujrati	:	Gangeti
Hindi	:	Gangeran
Kannada	:	Turuve
Kashmiri	:	--
Malayalam	:	Oorakam
Marathi	:	Gangeti
Oriya	:	Ghodaguli
Punjabi	:	Ganger
Tamil	:	Achchu
Telugu	:	Gangeruki
Urdu	:	Gangeran

### DESCRIPTION

#### a) Macroscopic

Drug occurs as cut pieces; 1.5-5 cm long, light yellow, channelled, fibrous; external surface smooth; fracture, fibrous; taste, mucilaginous.

## b) Microscopic

**Stem Bark** - Shows a wide cork, consisting of 12-20 layered, rectangular, radially arranged cells, a few inner cells contain rectangular crystals of calcium oxalate; secondary cortex wide, consisting of tangentially elongated, thin-walled, parenchymatous cells, a few cortical cells towards cork also contain prismatic crystals of calcium oxalate; oval, elliptical, thick-walled, lignified cells with wide lumen and clear pit canals, moderately large in size, a few stone cells, found scattered in groups throughout secondary cortex and in a row towards inner cortical region; secondary phloem composed of sieve elements, parenchyma and numerous thick-walled, cellulosic fibres with wide lumen, blunt tips and moderately long in size, arranged in radial groups, traversed by wide phloem rays; a few ray cells contain prismatic crystals of calcium oxalate.

**Powder** - Light yellow and fibrous; under microscope shows phloem fibres in groups or singles, stone cells and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 1	per cent, Appendix	2.2.2.
Total Ash	Not more than 9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (90 :10). Two spots are seen at Rf. 0.17, 0.35 (both light yellow) in visible light. Under U.V. (366 nm) six fluorescent zones visible at Rf. 0.08 (blue) 0.13 (blue), 0.29 (blue), 0.35 (dark blue), 0.55 (blue) & 0.64 (blue). On exposure to Iodine vapour ten spots appear at Rf. 0.08, 0.17, 0.27, 0.35, 0.41, 0.48, 0.55, 0.61, 0.68 & 0.88 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent seven spots appear at Rf. 0.08 (violet). 0.17 (light violet), 0.27 (light violet), 0.35 (violet), 0.48 (violet), 0.68 (light violet) & 0.88 (light violet).

**CONSTITUENTS** - Sugar, Tannin and Sterols (Triacontan-1-ol,  $\alpha$ -amyirin,  $\beta$ -amyirin etc.).

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Amla, Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣahara, Saṅgrāhaka

**IMPORTANT FORMULATIONS** - Jīrakādi Modaka.

**THERAPEUTIC USES** - Vraṇa, Pittavikāra

**DOSE** - 2-3 g of the drug in powder form.

## GUÑJĀ (Root)

Guñjā consists of dried root of *Abrus precatorius* Linn. (Fam. Fabaceae); a climber, all along Himalayas ascending to 900 m, spreading throughout the plains; flowering in August-September, fruits ripen during winter.

### SYNONYMS

Sanskrit	:	Raktikā, Kakananti
Assamese	:	Rati
Bengali	:	Kunch, Shonkainh
English	:	Jequirity
Gujrati	:	Rati, Chanothee, Chonotee
Hindi	:	Ratti, Ghungchi
Kannada	:	Guluganji, gulagunja
Kashmiri	:	--
Malayalam	:	Kunni, Cuvanna Kunni
Marathi	:	Gunja
Oriya	:	Kainch
Punjabi	:	Ratti
Tamil	:	Kunrimani, Kundumani
Telugu	:	Gurigingga, Gurivinda
Urdu	:	Ghongchi, Ratti

### DESCRIPTION

#### a) Macroscopic

Root, simple or branched, cylindrical, most often irregularly curved, light brown, surface profusely warty and somewhat rough on account of eruptive development of numerous small lenticels; bark thin, slightly corky, soft, exfoliating in small flakes, exposing internally both cream or yellowish-white; internal bark yellow with a leathery fibrous

texture; wood hard light-yellowish or cream coloured; odourless; taste, feebly sweetish, becoming mildly bitter.

#### **b) Microscopic**

**Root** - Shows thin cork of 3-5 layers of narrow, tangentially elongated cells, some with brownish content; cork cambium, when distinct, composed of 1-2 cells wide, thin-walled, comparatively larger and slightly tangentially elongated cells, followed by 2-4 rows of spherical ovoid or slightly elongated stone cells with thick, pitted walls, small groups of 4-10 sclerenchymatous cells, smaller than stone cells, present at short intervals; secondary phloem consists of usual elements traversed by medullary rays diverging towards periphery; parenchyma thin-walled, mostly tangentially elongated with occasional patches of sieve elements in somewhat collapsed form; small groups of sclerenchyma, similar to those occurring in cortex are also present; cells in inner phloem region appear circular to polyhedral; in older samples phloem elements usually found in compressed condition forming obliquely and tangentially arranged irregular patches; medullary rays distinct and 1-6 cells wide, thin-walled and rectangular, tangentially elongated towards distal end of ray and radially elongated in xylem parts and bast region, mostly containing starch grains of various sizes; cambium forms a complete ring of 1-2 rows of very narrow cells outside the wood; wood composed of narrow concentric, annular bands of very thick-walled wood fibres alternating with similar but wider zone of thick-walled parenchyma; vessels of varying sizes with thick, pitted walls; medullary rays usually uni or biseriate but a few broader rays, 5-10 or more rows of cells occasionally present; parenchyma cells of wood and bast filled with simple, rounded to oval starch grains measuring 5.5-13.75  $\mu$  in diameter.

**Powder** - Greyish-brown; shows fragments of cork, stone cells, groups of sclerenchymatous cells, numerous xylem fibres, xylem vessels with pitted walls, rounded to oval simple starch grains measuring 5.5 -13.75  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 9 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 10 per cent, Appendix	2.2.7.

**T.L.C.**

-

**CONSTITUENTS** - Glucoside (Glycyrrhizin).

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Rūkṣa, Śīta
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Keśya

**IMPORTANT FORMULATIONS** - Nīlī Bhr̥ṅgādi Taila

**THERAPEUTIC USES** - Indralupta, Mukhaśoṣa, Śula

**DOSE** - 1 - 3 g of the drug in powder form.

## **IKṢU (Stem)**

Ikṣu consists of the dried stem of *Saccharum officinarum* Linn. (Fam. Poaceae), a shrub, grown and generally cultivated in all hotter parts and in warm climate throughout India.

### **SYNONYMS**

Sanskrit	:	Ikṣu
Assamese	:	Kusiyar
Bengali	:	Ganna
English	:	Sugarcane
Gujrati	:	Sherdi, Serdi
Hindi	:	Ikha, Ganna
Kannada	:	Kabbu
Kashmiri	:	--
Malayalam	:	Karumbu, Karimpu
Marathi	:	Ush
Oriya	:	Akhu
Punjabi	:	Ganna
Tamil	:	Karumbu
Telugu	:	Gheraku
Urdu	:	Ganna, Naishkar

### **DESCRIPTION**

#### **a) Macroscopic**

Stem upto 6 m high, cylindrical, solid, with, distinct node and internode, 3-8-12 cm long and 2-4 cm in dia; smooth, shining and polished pale or dark green to dark yellow, red violet and often striped having a bud at each node; odour, characteristic; taste, juicy and sweet.

## b) Microscopic

**Stem** - Shows a single layered epidermis consisting of thick-walled, lignified, rectangular cells followed by 2-3 layers of sclerenchymatous hypodermis; ground tissue consisting of thin-walled, parenchymatous cells having a number of collateral, conjoint, closed type of vascular bundles, scattered throughout the ground tissue, more numerous and closer towards periphery; each vascular bundle surrounded by a fibrous sheath of sclerenchyma, thickness of the sheath gradually decreasing in the bundles towards the centre; besides the xylem and phloem elements, each bundle surrounds a water containing cavity.

**Powder** - Powder light brick red; shows pieces of epidermis, ground tissue, vessels and sclerenchyma.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 17 per cent, Appendix	2.2.7.

## T.L.C.

-

**CONSTITUENTS** - Sucrose.

## PROPERTIES AND ACTION

**Rasa** : Madhura  
**Guna** : Sara, Snigdha, Guru

**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Vātahara, Pittahara, Kaphahara, Mūtrala, Balya, Vṛṣya, Br̥ḥṇaṇa

**IMPORTANT FORMULATIONS** - Balā Taila, Navaratnarājamṛ̥gāṅka Rasa

**THERAPEUTIC USES** - Raktapitta, Mūtra Kṣaya

**DOSE** - 200 - 400 ml in the juice form.

## INDRAVĀRUṆĪ (Root)

Indravāruṇī consists of dried root of *Citrullus colocynthis* Schrad. (Fam. Cucurbitaceae); an annual or perennial, wild herb with prostrate or climbing stem, occurring throughout the country.

### SYNONYMS

Sanskrit	:	Indravallī, Indravāruṇikā, Gavākṣī, Śatakratulatā, Endrī
Assamese	:	Kulekhara
Bengali	:	Rakhal Sasa Mul
English	:	Colocynth, Bitter apple
Gujrati	:	Indravarān, Indrayān, Indramānoa, Indarvarānova
Hindi	:	Indrayān
Kannada	:	Havumekke, Havumakke, Indraravuni, Tuntikai, Kadukavadi
Kashmiri	:	--
Malayalam	:	Valiyakattuvell, Valiya Pekkumatti, Cheeyakattuvellari
Marathi	:	Endrayāna, Indraravāna
Oriya	:	Gothakakucti, Indrayānalata, Garukhiya
Punjabi	:	Kaudatumma, Tumbi
Tamil	:	Paikamatti, Paythumatti, Varithummati, Aruthununatti
Telugu	:	Chedu Puchcha
Urdu	:	Hanzal, Indrayān

### DESCRIPTION

#### a) Macroscopic

Root available in cut pieces of 2-7 cm long, 0.2-2.5 cm thick, cylindrical, slightly twisted; dull yellow; longitudinal fissures present; fracture, short; taste, intensively bitter.

## b) Microscopic

**Root** - Mature root shows wavy outline consisting of 6-10 layers of rectangular, thick walled, tangentially elongated cork cells, a few filled with dark brown contents; secondary cortex consists of 10-15 layers of elliptical, tangentially elongated, thin walled, parenchymatous cells; secondary phloem a narrow-zone, composed of sieve elements, parenchyma and medullary rays; xylem forms bulk of root, consisting of vessels, fibres, parenchyma and medullary rays; vessels mostly solitary or in groups of two to four having reticulate and spiral thickenings; fibres aseptate, thick-walled, pitted, elongated with pointed ends, lying around vessels; medullary rays poorly developed and uniseriate; starch grains oval to round in shape 2,5-7.5  $\mu$  in dia. mostly simple or rarely compound having 2-3 components, found scattered throughout but more abundantly in phloem parenchyma.

**Powder** - Dirty yellow; shows aseptate fibres, reticulate and spiral vessels, starch grains simple or occasionally compound measuring 2.5 - 7.5  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 8 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 6.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 20 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform:Methanol (85:15) shows under U.V. (366 nm) two fluorescent spots at Rf. 0.16 and 0.30 (both blue). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C two spots appear at Rf. 0.16 and 0.30 (both greyish blue).

**CONSTITUENTS** - Saponin and traces of Alkaloid.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Recana

**IMPORTANT FORMULATIONS** - Abhayāriṣṭa, Rodhrāsava, Mṛtasañjīvanī Surā, Bṛhatmañjiṣṭhādi Kvātha Cūrṇa, Nārāyaṇa Cūrṇa, Miśraka Sneha, Triphalādi Taila, Mahāviṣagarbha Taila

**THERAPEUTIC USES** - Kāmalā, Plīhāroga, Śvāsa, Kāsa, Kuṣṭha, Gulma, Kṛmiroga, Prameha, Viṣavikāra, Vraṇa, Apacī, Gaṇḍamālā

**DOSE** - 1-3 g of the drug in powder form.

## INDRAVĀRUNĪ (Leaf)

Indravārunī consists of dried leaves of *Citrullus colocynthis* Schrad. (Fam. Cucurbitaceae); an annual or perennial, wild herb with prostrate or climbing stem, occurring throughout the country.

### SYNONYMS

Sanskrit	:	Śatakratulatā, Eandri, Gavākṣī, Indravārunikā, Indravallī
Assamese	:	Nantiyah
Bengali	:	Rahhalasa, Makhal
English	:	Colocynth, Bitter Apple
Gujrati	:	Indrayana, Indrayanoa, Insbak
Hindi	:	Indrayana
Kannada	:	Havumekke Kayi, Havamikke
Kashmiri	:	--
Malayalam	:	Kattu vellari, Kadu Indrayan, Peykommuti
Marathi	:	Indrayana, Kodu indrayan
Oriya	:	Gothkakudi, Mahakal
Punjabi	:	Tumma, Jamtumma
Tamil	:	Peyakkumutti, Peytumatti, Peyththumatti, Peykhumutti, Verittumatti
Telugu	:	Chedupuchcha
Urdu	:	Hanzal, Indrayan

### DESCRIPTION

#### a) Macroscopic

Leaves very variable, 3.6-6.3 cm long, 2.5-5.0 cm wide, pinnately lobed in outline, generally 3 lobed, sometimes 3-7 lobed, middle lobe largest, each lobe deeply pinnatifid; petiole 1.3-2.5 cm long, entire leaf densely hirsute; taste, very bitter.

## b) Microscopic

### Leaf-

*Petiole* - shows ridged outline; epidermis single layered consisting of oval to rounded cells, covered with thick cuticle; hairs uniseriate, 2-4 celled, present on both surfaces; cortex consisting of 3-7 layers, round collenchymatous cells, followed by a single layered endodermis; pith consisting of thin-walled, isodiametric, parenchymatous cells; vascular bundles generally eight, arranged in discontinuous ring, bicollateral, each bundle surrounded by semilunar patches of sclerenchymatous cells towards endodermis.

*Midrib* - shows single layered epidermis, covered with cuticle on both surface; hair present on both surfaces, uniseriate, consisting of 2-3 cells, apical cells being pointed or blunt; cortex consisting of 2-3 layers of collenchymatous cells on dorsal side, followed by thin-walled, parenchymatous cells; vascular bundles present, two well developed, one smaller and other larger, conjoint, bicollateral, composed of xylem and phloem.

*Lamina* -shows single layered epidermis covered with cuticle, hairs similar to those of midrib and present on both surfaces, but more abundant on lower surface; palisade single layered, spongy parenchyma generally 5-8 layered, composed of thin walled, almost isodiametric cells, filled with chlorophyll contents and traversed by a number of veins, vein islet number 29-38 per sq. mm; palisade *ratio* 2.75-3.75; stomata *anomocytic* present on both surfaces, stomatal index on upper surface 12.5-28.5 and on lower surface 25.0 -31.2.

**Powder** - Coarse, olive green; shows entire or broken pieces of hairs; epidermal cells polygonal, moderately thick-walled, 27.5-49.5 $\mu$  long and 19-27  $\mu$  wide; spongy parenchyma cells, anomocytic type of stomata and xylem vessels.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 18	per cent, Appendix	2.2.7.

## **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol :Acetic acid: Water (4:1:5) shows under U.V. (366 nm) five fluorescent zones at Rf. 0.46, 0.61, 0.75, 0.94 (all green) and 0.97 (red). On spraying with 5% Methanolic-Sulphuric acid reagent and on heating the plate for ten minutes at 105°C four spots appear at Rf. 0.61 (green), 0.75 (green), 0.83 (grey) and 0.94 (grey).

**CONSTITUENTS** - Colocynthin, traces of an Alkaloid and Flavonoids.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Recana

**IMPORTANT FORMULATIONS** - Nīlī Bhr̥ṅgādi Taila (For external use only)

**THERAPEUTIC USES** - Keśapāta, Palita, Kuṣṭharoga

**DOSE** - For external use only

## JAMBŪ (Seed)

Jambū consists of dried seeds of *Syzygium cuminii* (Linn.) Skeels Syn. *Eugenia jambolana* Lam.; *E. cuminii* Druce. (Fam. Myrtaceae); a large evergreen tree, attaining a height of 30 m and a girth of 3.6 m with a bole up to 15 m, found throughout India upto an altitude of 1,800 m.

### SYNONYMS

Sanskrit	:	--
Assamese	:	Kulekhara
Bengali	:	Badjam, Kalajam
English	:	Jambul tree
Gujrati	:	Gambu, Jamun
Hindi	:	Jamuna
Kannada	:	Nerale Beeja, Jambu Nerale
Kashmiri	:	--
Malayalam	:	Njaval
Marathi	:	Jambul
Oriya	:	Jam Kol, Jamu Kol
Punjabi	:	Jaamun
Tamil	:	Naval
Telugu	:	Alla Nereduchettu, Neredu chettu
Urdu	:	Jamun

### DESCRIPTION

#### a) Macroscopic

2-5 seeds, compressed together into a mass resembling a single seed, the whole seed enclosed in a cream coloured, coriaceous covering, smooth, oval or roundish, 1 cm long, 1 cm wide, brownish-black; taste, astringent.

**b) Microscopic**

**Seed** - Shows cotyledons consisting of single layered epidermis, mesophyll composed of isodiametric, thin-walled, parenchymatous cells fully packed with simple starch grains, oval, rounded measuring 7-28  $\mu$  in dia., a few schizogenous cavities are also found.

**Powder** - Brown coloured; shows a few parenchymatous cells and numerous oval, rounded starch grains, measuring 7-28  $\mu$  in diameter.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 1 per cent, Appendix	2.2.2.
Total Ash	Not more than 5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 6 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 15 per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene:Ethylacetate (90: 10) shows under U.V. light (366 nm) one fluorescent zone at Rf. 0.30 (blue). On exposure to Iodine vapour four spots appear at Rf. 0.12, 0.20, 0.30 and 0.95 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C, three spots appear at Rf. 0.20, 0.30 and 0.95 and 0.95 (all violet).

**CONSTITUENTS** - Glycoside (Jamboline), Tannin, Ellagic acid and Gallic acid.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Amla, Kaṣāya
<b>Guṇa</b>	:	Guru, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātala, Pittahara, Kaphahara, Viṣṭambhi, Grāhī

**IMPORTANT FORMULATIONS** - Puṣyānuga Cūrṇa

**THERAPEUTIC USES** - Madhumeha, Udakameha

**DOSE** - 3-6 g of the drug in powder form.

## JAMBŪ (Stem Bark)

Jambū consists of dried stem bark of *Syzygium cuminii* (Linn.) Skeels Syn. *Eugenia jambolana* Lam.; *E. cuminii* Druce. (Fam. Myrtaceae); a large evergreen tree, attaining a height of 30 m and a girth of 3.6 m with a bole up to 15 m, found throughout India upto an altitude of 1,800 m.

### SYNONYMS

Sanskrit	:	Mahajambu, Ksudrajambu
Assamese	:	Jam
Bengali	:	Jaam
English	:	--
Gujrati	:	Jambu, Jambuda
Hindi	:	Jomuna, Raja Jambu
Kannada	:	Merale, Jamneralae, Jambu, Neralamara
Kashmiri	:	--
Malayalam	:	Njaval, Naval
Marathi	:	Jambhool
Oriya	:	Jamukoli, Jamu, Jam
Punjabi	:	Jammu
Tamil	:	Naaval, Navval Sambu, Mahamaram, Nagal
Telugu	:	Nesedu
Urdu	:	Jamun

### DESCRIPTION

#### a) Macroscopic

Drug occurs in slightly curved or flat pieces, 0.5-2.5 cm thick, younger bark

mostly channelled, external surface more or less rough and rugged due to exfoliation and vertical cracks, light grey to ash coloured, internal surface fibrous, rough, and reddish brown, fracture, short and splintery; taste, astringent.

#### **b) Microscopic**

**Stem Bark** -Mature bark shows a wide zone of cork differentiated into upper and lower cork zones, forming a rhytidoma; cork consisting of tangentially elongated rectangular cells, upper few layers thick, stratified and reddish-brown, having groups of 2-4 stone cells and crushed elements of phloem; lower cork thin and colourless; cork cambium not distinct; secondary phloem composed of sieve elements, and phloem rays; phloem parenchyma thin-walled and polyhedral in shape; stone cells, oval to angular, elongated; fibres aseptate; both stone cells and fibres single or in groups present throughout this region; phloem rays 1-4 cells wide; reddish-brown content, rosette crystals of calcium oxalate and simple, round to oval starch grains, measuring 5-11  $\mu$  in diameter

**Powder** - Light brown; shows fragments of thin-walled cork cells, aseptate fibres; single or in groups, oval to angular, elongated, stone cells; rosette and prismatic crystals of calcium oxalate and simple, round to oval starch grains, measuring 5-11  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 11	per cent, Appendix	2.2.7.

**T.L.C.**

-

**CONSTITUENTS** - Tannins

**PROPERTIES AND ACTION**

**Rasa** : Kaṣāya

**Guṇa** : Rūkṣa

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Kaphahara, Pittahara, Vātala, Grāhī, Stambhaka, Kṛmidoṣaghna

**IMPORTANT FORMULATIONS** - Uśīrāsava

**THERAPEUTIC USES** - Atīśāra, Raktapitta

**DOSE** - 10-20 g of the drug for decoction.

## JAYAPĀLA (Seed)

Jayapāla consists of dried seed of *Croton tiglium* Linn. (Fam. Euphorbiaceae); a small evergreen tree, 5-7 m high, found throughout tropical India.

### SYNONYMS

Sanskrit	:	Mukula, Tintidīphala.
Assamese	:	Kanibish
Bengali	:	Jaipala
English	:	Croton
Gujrati	:	Nepalo, Jamalagota
Hindi	:	Jamalgota
Kannada	:	Nepal, Japal beej, Japala, Nervalā
Kashmiri	:	--
Malayalam	:	Nervalam, Neervalam
Marathi	:	Jepal, Japal
Oriya	:	--
Punjabi	:	Japolota
Tamil	:	Nervalam, Neervalam, Valam
Telugu	:	Nepalamu
Urdu	:	Jamalgota

### DESCRIPTION

#### a) Macroscopic

Seed albuminous, ovate, oblong, slightly quadrangular, convex on dorsal and somewhat flattened on ventral surface, about 12 mm in length and resemble castor seed in shape, dull cinnamon-brown, often mottled with black due to abrasion in testa, caruncle easily detached and usually absent, hilum on ventral side less distinct than that of castor seed, raphe runs along ventral surface of seed, terminating in a dark chalaza at opposite extremity, kernel yellowish and oily, consisting of a large endosperm, enclosing papery

cotyledons and a small radicle, no marked odour; kernel gives at first oily taste followed by an unpleasant acidity.

#### **b) Microscopic**

**Seed** - Shows a hard testa, consisting of an epidermal layer, covered externally with a thick cuticle and composed of oval and tangentially elongated cells, filled with brownish content; epidermis followed by a layer of radially elongated cells, slightly bent at middle, upper half portion filled with reddish-brown and lower half filled with yellow contents; inner most zone consists of tangentially elongated, thin-walled cells; endosperm consists of polygonal parenchymatous cells filled with oil globules, a few cells having rosette crystals of calcium oxalate; central region of endosperm shows a dicotyledonous embryo consisting of thin-walled parenchymatous cells.

**Powder** - White with black particles of testa; under microscope shows elongated cells containing reddish-brown and yellow contents, oil globules and a few rosette crystals of calcium oxalate.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

#### **ASSAY**

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic acid : Water (4: 1 :5) shows under U.V. (366 nm) three spots at Rf. 0.34, 0.54 and 0.84 (all violet). On exposure to Iodine vapour six spots appear at Rf. 0.10, 0.29, 0.39, 0.49, 0.63 and 0.90 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.34 (grey), 0.54 (yellow), 0.84 (brown).

**CONSTITUENTS** - Fixed oil, Resins & Phorbol esters.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Recana

**IMPORTANT FORMULATIONS** - Icchābhedī Rasa, Aśvakañcukī Rasa.

**THERAPEUTIC USES** - Udararoga, Vibandha, Jvara

**DOSE** - 6-12 mg of the drug in powder form.

## JAYANTĪ (Leaf)

JayantĪ consists of fresh and dried leaf of *Sesbania sesban* (Linn.) Merr., Syn. *S. aegyptiaca* Pers. (Fam. Fabaceae); a quick growing, short lived shrub, 1.8-6 m high, found cultivated throughout plains of the country upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	JayantĪ, Jayā, Śūkṣma patra,
Assamese	:	Kulekhara
Bengali	:	Jayanti
English	:	--
Gujrati	:	Rajashinganee, Jayanti
Hindi	:	Jaita, jayata
Kannada	:	Arinintajinamgi, Karijimangai, Arishimajingai,
Kashmiri	:	--
Malayalam	:	Semp, Atti, Itthikkanni
Marathi	:	Jait
Oriya	:	Jayantipatra
Punjabi	:	Jainta
Tamil	:	Karum-sempai
Telugu	:	Sominta, Jalugu, Nelichettu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Leaves pinnately compound, 7.5-15.5 cm long, rachis shortly produced above last pair of leaflet; paripinnate, leaflets 6-16 pairs, opposite, linear, oblong, glabrous, entire, mucronate to acuminate, very shortly stalked, 1.0-3.3 cm long, 0.3-0.8 cm wide.

## b) Microscopic

### Leaflet

**Rachis** - shows single layered epidermis, followed by 2-3 layered collenchymatous and 4- 7 layered round, thin-walled parenchymatous cells; vascular bundles arranged in a ring, having secretory cavities in phloem, each bundle covered externally with sclerenchymatous sheath, one smaller vascular bundle present in both the wings; pith small, consisting of thin-walled, polygonal, parenchymatous cells.

*Lamina* - shows single layered epidermis on both surfaces, stomata anisocytic, present on both surfaces, palisade single layered, spongy parenchyma consisting of round cells, small veins situated between palisade and spongy parenchyma cells, stomatal index on upper surface 11-20 and on lower surface 11-25, palisade ratio 3.25-4.50 and vein islet number 27-36 per square mm.

**Powder** - Dull green; shows spongy parenchyma, palisade cells; xylem vessels with scalariform thickening and stomata.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene : Ethylacetate (90: 10) shows under U.V. (366 nm) six fluorescent zones at Rf. 0.05, 0.11, 0.19, 0.29, 0.56 (all pink) and 0.97 (yellow). On exposure to Iodine vapour ten spots appear at Rf. 0.05, 0.11, 0.19, 0.29, 0.37, 0.48, 0.56, 0.69, 0.91 and 0.97 (all yellow). On spraying with 5 % Methanolic-Phosphomolybdic acid reagent and heating the plate at 105°C for ten minutes nine spots appear at Rf. 0.05, 0.11, 0.19, 0.29, 0.37, 0.48, 0.56, 0.91 and 0.97 (all grey).

**CONSTITUENTS** - Protein, Calcium and Phosphorus.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Kaṇṭhaśodhana, Rasāyana

**IMPORTANT FORMULATIONS** - Ratnagiri Rasa, Vajrakapāṭa Rasa.

**THERAPEUTIC USES** - Galagaṇḍa, Mūtrakṛcchra, Viṣaroga

**DOSE** - 3-6 g in powder form.

## JYOTIṢMATĪ (Seed)

Jyotiṣmatī consists of dried, brownish-orange, ripe seeds, devoid of capsule wall of *Celastrus paniculatus* Willd. (Fam. Celastraceae); a large climbing shrub, mostly found all over the hilly parts of the country upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	--
Assamese	:	Kapalphotla
Bengali	:	--
English	:	Staff tree
Gujrati	:	Malkangani
Hindi	:	Malkangani
Kannada	:	Doddaganugae, Gangunge beeja, Gangunge humpu, Kangondiballi
Kashmiri	:	--
Malayalam	:	Ceruppunnari, Uzhinja
Marathi	:	Malkangoni
Oriya	:	Malkanguni, lyotishmati
Punjabi	:	Malkangoni
Tamil	:	Valuluvai
Telugu	:	Malkangani, Peddamaveru
Urdu	:	Malkangani

### DESCRIPTION

#### a) Macroscopic

Dried ripe seeds more or less covered by orange-red crusty aril, seed without aril also present, measuring 5-6 mm in length and 2.5-3.35 mm in breadth, a few roughly three sided being convex on the sides and a few two sided with one convex and other more or less flat side, one edge of many seeds show a faint ridge or raphe on the whole margin;

surface generally smooth and- hard; colour, light to dark brown; odour, unpleasant; taste, bitter.

#### b) Microscopic

**Seed** - Shows single layered epidermis covered externally with thick cuticle and filled with tannin, followed by 4-6 layers of thin-walled, collapsed, parenchymatous cells and layer of radially elongated stone cells; parenchyma of top one or two layers longer than of the below with triangular intercellular spaces; inner most layer of parenchyma containing prismatic crystals of calcium oxalate; beneath stone cells layer quadrangular to octagonal, tangentially elongated cells filled with brownish contents; endosperm composed of polygonal, thin-walled, parenchymatous cells having oil globules and aleurone grains; embryo spatulate in fleshy endosperm containing oil globules and aleurone grains.

**Powder** - Oily, dark brown; under microscope shows groups of endospermic parenchyma, stone cells, oil globules and aleurone grains and shows fluorescence under U.V. light as following :-

Powder as such	:	Grenish -brown
Powder + 1 N NaOH in Methanol	:	Light green
Powder + Nitrocellulose in Amyl Acetate	:	Yellowish-green

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9 per cent, Appendix	2.2.7.
Oil contents	Not less than	45 per cent, Appendix	2.2.8

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of drug on Silica gel 'G' plate using Toluene : Ethylacetate (90 : 10) shows two spots at Rf. 0.82 (pink) & 0.94 (yellow) in visible light. Under U.V. (366 nm) four fluorescent zones visible at Rf. 0.54, 0.82, 0.89, (all blue) & 0.94 (yellow). On exposure to Iodine vapour eight spots appear at Rf. 0.04, 0.15, 0.20, 0.35, 0.54, 0.63, 0.82 & 0.89 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.35, 0.54 (both blue), 0.82, 0.89 (both greenish blue).

**CONSTITUENTS** - Alkaloids, Oil and Tannins.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Sara, Uṣṇa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Vāmaka, Virecaka, Śirovirecanopaga, Dīpana, (Prabhāva : Medhya)

**IMPORTANT FORMULATIONS** - Smṛtisāgara Rasa, Jyotiṣmatī Taila

**THERAPEUTIC USES** - Vātavyādhi, Smṛtidaurbalya, Śvitra

**DOSE** - Seed: 1-2 g Oil : 5-15 drops.

## KADAMBA (Stem Bark)

Kadamba consists of dried stem bark of *Anthocephalus cadamba* Miq., Syn. *A. indicus* A. Rich. (Fam. Rubiaceae), a deciduous, large tree, attaining a height of 18 m with a girth of about 2 m, found all over India on the slopes of evergreen forests upto 500 m and planted in parks and near temples etc.

### SYNONYMS

Sanskrit	:	Vṛtta Puṣpa, Priyka
Assamese	:	Roghu, Kadam
Bengali	:	Kadam
English	:	--
Gujrati	:	Kadamb, Kadam
Hindi	:	Kadam, Kadamba
Kannada	:	Kadamba, Kadamba mara, Kadavala, Neirumavinamara
Kashmiri	:	--
Malayalam	:	Attutekka, Katampu
Marathi	:	Kadamb
Oriya	:	Holiptiya, Kadamba Nipo, Kadambal
Punjabi	:	Kadamb
Tamil	:	Arattam, Indulam, Kadappai, Vellai Kadambam, Vellaikhadambu, Kadambu Needam, Vellai Kadambu
Telugu	:	Kadambamu, Kadimi Chettu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark externally greyish-green with shallow fissures, exfoliating in small irregular woody scales, internally light reddish to reddish-brown, easily separates from

inner bark into tangential strips; taste, bitter.

#### b) Microscopic

**Stem Bark** -Outer most zone of the bark shows rhytidoma with cork 4-6 layers wide, composed of thin-walled, rectangular cells; phloem fibres same in structure as found in inner bark; middle bark composed of rectangular or tangentially elongated cells without intercellular spaces, some cells contain chlorophyll, most cells thick-walled but a few thin-walled containing prismatic crystals of calcium oxalate, a few cells with brown contents; inner bark consists of groups of fibres alternating with phloem, traversed by uni to triseriate, elongated cells of phloem rays; phloem composed of sieve tubes, phloem fibres, companion cells and phloem parenchyma; cells of phloem parenchyma thinwalled and polygonal; phloem fibres lignified with narrow lumen and pointed ends; outer region of inner bark and phloem tissues thin-walled, comparatively large and consisting of rounded to polygonal cells a few phloem cells in this region compressed; phloem rays uni-to triseriate and arranged close to one another, cells distinct and slightly elongated, some cells at the periphery of inner bark filled with chlorophyll contents.

**Powder** - Brown; shows fragments of cork cells, phloem cells, fibres, and a few prismatic crystals of calcium oxalate

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

#### T.L.C.

T. L. C. of alcoholic extract of the drug on Silica gel 'G' plate using Ethylacetate : Methanol : Water (100:13.5:10) shows under U.V (366 nm) nine fluorescent zones at Rf. 0.03, 0.13, 0.21, 0.31, 0.57, 0.64, 0.79, 0.83 and 0.90 (all yellow) On spraying with 5% Methanolic Sulphuric acid reagent on heating the plate at 110°C for ten minutes four spots appear at Rf. 0.63 (yellowish grey), 0.70 (orange yellow), 0.79 (grey) and 0.90 (grey).

**CONSTITUENTS** - Alkaloids, Steroids, Fats and Reducing Sugars

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Madhura, Lavaṇa
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Vraṇaropaṇa, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Nygrodhādi Kvātha Cūrṇa, Grahaṇīmihira Taila

**THERAPEUTIC USES** - Dāha, Yonidoṣa, Vraṇa, Raktapitta, Viṣavraṇa (Daṃṣaja Vraṇa)

**DOSE** - 0.5 - 1.5 g of the drug in powder form.

## KĀKAMĀCĪ (Whole Plant)

Kākamācī consists of the dried whole plant of *Solanum nigrum* Linn. (Fam. Solanaceae); a herbaceous annual weed, 30-45 cm high, found throughout the country in dry parts, quite common in cultivated lands, road sides and gardens.

### SYNONYMS

Sanskrit	:	Dhvankṣamācī
Assamese	:	Kakamachi, Pikachia, Datkachu
Bengali	:	Gudakamai
English	:	Garden Night Shade
Gujrati	:	Piludi
Hindi	:	Makoya
Kannada	:	Ganikayeagida, Ganikegida, ganike, Ganikesopu, Kage hanninagids
Kashmiri	:	--
Malayalam	:	Karinthakkali, Manatakkali, Manjathakkali
Marathi	:	Kamoni
Oriya	:	Lunlunia, Lunilunika
Punjabi	:	Mako
Tamil	:	Manarthakkali, Manaththakkali, Manitakkali, Maniththakkali
Telugu	:	Kamanchi
Urdu	:	Makoh

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap root with a few branches and numerous small lateral roots, externally smooth, pale brown; bark thin, easily peeled off exposing pale yellow wood.

**Stem** - Erect, glabrous or pubescent, green, rounded at the basal region and angular at the

apical region, slightly woody and branched.

**Leaf** - Simple, 2.5-8.5 cm long and 2.5 cm wide, ovate or oblong, sinuate, toothed or lobed, narrowed at both ends; petiolate, thin.

**Flower** - Small, extra-axillary, sub-umbellate, 3-8 flowered cymes, peduncles 6-20 mm long, slender; pedicels 6-10 mm long, very slender; calyx 2-3 mm long, glabrous, five lobed, oblong, obtuse, 1.25 mm long; corolla 4-8 mm long, divided more than half way down into 5 oblong sub-acute lobes, white or pale violet; filaments short, flattened, hairy at base; anther 1.2-2.5 mm long, yellowish, oblong, obtuse notched at apex; ovary globose, glabrous; style cylindric, hairy in lower part.

**Fruit** - A berry, 6mm in dia., obtuse, usually purplish-black but sometimes red, yellow or black; smooth shining

**Seed** - Discoid, 1.5 mm in dia., smooth, minutely pitted, yellow.

#### **b) Microscopic**

**Root** -Shows cork consisting of 2-4 rows of tangentially elongated cells; cortex of large, slightly elongated, thin-walled cells having patches of lignified sclerenchyma fibres, most of the cortical cells contain oval to round, starch grains, measuring 2.5-11  $\mu$  in dia., single or with two or rarely 3 components; a few parenchyma cells contain microsphenoidal crystals of calcium oxalate; phloem consists of thin-walled, polygonal cells, phloem rays uniseriate, filled with starch grains; xylem composed of vessels and parenchyma; vessels arranged in groups of 2-4 in radial rows; parenchyma thick-walled containing microsphenoidal crystals of calcium oxalate; rays composed of thin-walled, radially elongated cells.

**Stem** - Shows single layered, epidermis of cubical to barrel-shaped cells, covered with thick, slightly striated cuticle; trichomes multicellular, uniseriate; secondary cortex composed of 2-4 layered collenchyma, but 4- 10 layered in angular parts; tangentially elongated, oval parenchymatous cells, some containing numerous microsphenoidal crystals of calcium oxalate and simple, oval to round starch grains, measuring 2.5-8.25  $\mu$  in dia., endodermis single layered; pericycle consists of intermittent ring of patches of fibres either isolated or in groups of 2-4; vascular bundles-collateral, conjoint and open; cambium 2-4 layered; xylem vessels arranged radially smaller being towards centre, showing spiral thickening and simple perforations; tracheids pointed tipped and with pitted walls; xylem rays homogenous, uniseriate; internal phloem, in small or large patches, usually accompanied by fibres, embedded in perimedullary zones; pith large, composed of thin-walled, parenchymatous cells with small intercellular spaces, a few cells containing microsphenoidal crystals of calcium oxalate.

**Leaf-**

*Petiole* - shows single layered epidermis of oval or tangentially elongated cells, covered with striated cuticle; covering trichomes, uniseriate, 3-5 celled having pointed tips and warty walls, glandular hairs with 1-2 celled stalk and 2-7 celled head; epidermis single layered; chlorenchyma 2-3 layered, compactly arranged; 5-8 layered parenchyma consisting of round, thin-walled cells with smaller intercellular spaces, a few containing microsphenoidal crystals of calcium oxalate; central vascular bundle shallow, arc-shaped, bicollateral; two smaller bundles present laterally on either side of main vascular bundles one in each lateral wing of the petiole.

*Midrib* - shows upper and lower epidermis of round to oval cells, covered with striated cuticle, trichomes similar to those found on petiole; collenchyma 2-3 layered on both surfaces; parenchyma 4-6 layered, thin-walled with small intercellular spaces; arc-shaped bicollateral vascular bundle placed centrally.

*Lamina* - dorsiventral, both upper and lower epidermis single layered, composed of oval to tangentially elongated cells covered with thick cuticle; palisade single layered; spongy parenchyma 4-6 layered containing chloroplasts with intercellular spaces; a few vessels with spiral thickenings, present beneath palisade parenchyma; in surface preparation a large number of multicellular, warty hairs with pointed tips and glandular hairs are present; epidermis with irregular outline, stomata anisocytic, scattered on both surfaces but more abundant in lower surface; palisade ratio 2-4; vein islet number 7-10; stomatal index 15-17 on upper epidermis and 22-23 on lower epidermis.

**Fruit** - Shows thin, papery epicarp, pulpy mesocarp and exile placentation; seeds at first remain attached to the placenta but afterwards separate from it and lie free in pulp of fruit.

**Powder** - Creamish-green; shows fragments of vessels with spiral thickening; a few broken pieces of pointed, unicellular hairs; single, oval to round and compound with three components of starch grains, measuring 2.5 - 11  $\mu$  in diameter.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene : Ethylacetate (90 : 10) shows two spots at Rf. 0.06 & 0.34 (both brown) in visible light. Under U.V. light (366 nm) two fluorescent zones are visible at Rf. 0.06 & 0.34 (both pink). On exposure to Iodine vapour three spots appear at Rf. 0.06, 0.34 and 0.97 (all yellow).

**CONSTITUENTS** - Alkaloids and Saponins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Sara, Snigdha, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Bhedana, Rasāyana, Vṛṣya, Svarya, Hṛdya

**IMPORTANT FORMULATIONS** - Hṛdayārṇava Rasa, Mahā Viṣagarbha Taila, Rasarāja Rasa

**THERAPEUTIC USES** - Kuṣṭha, Kaṇḍū, Arśa, Prameha, Śoṭha, Hṛdroga, Jvara, Hikkā, Chardi, Netraroga

**DOSE** - 5 -10 ml of the drug in juice form.

## KAMALA (Flower)

Kamala consists of dried flowers (devoid of stalk) of *Nelumbo nucifera* Gaertn. Syn. *Nelumbium speciosum* Willd. (Fam. Nymphaeaceae); a large, aquatic herb with creeping stem, occurring throughout warmer parts of the country upto an altitude of 1000 m.

### SYNONYMS

Sanskrit	:	Abja, Aravinda, Padma, Kalhāra, Sitopala, Pankaja
Assamese	:	Podum
Bengali	:	Padma Phool, Salaphool
English	:	Lotus
Gujrati	:	Kamal,
Hindi	:	Kamal, Kanwal
Kannada	:	Kamal, Tavare, Naidile, Tavaregedd
Kashmiri	:	--
Malayalam	:	Tamara, Venthamara, Chenthamara, Senthamara
Marathi	:	Komala
Oriya	:	Padma
Punjabi	:	Kanwal, Pamposh
Tamil	:	Tamarai, Thamaraipoo, Aravindan, Paduman, Kamalam, Sarojam
Telugu	:	Kaluva, Tamarapuvow
Urdu	:	Kamal

### DESCRIPTION

#### a) Macroscopic

Drug occurs as entire or pieces of flowers, comprising of calyx, corolla, androecium, gynoecium and thalamus; entire flower 10-15 cm in dia., yellowish-brown; sepals leaf-like, crimped, 3-5 cm long, 1.3-2 cm wide, dark brown, broken pieces also occur; petals numerous, crimp led, elliptic, obtuse, membranous, finely veined, 2-4 cm

long, 1.2-2 cm wide yellowish-brown; anther, erect, linear 1.4-2 cm long, extended into clavate appendages; gynoecium apocarpous; carpels many, free, embedded in a creamy, top shaped fleshy thalamus (torus) 3-5 cm long and 2.5-3 cm wide; fruit an etaerio of achenes, becoming loose in their sockets when ripe; seed hard, black, starchy and large.

## **b) Microscopic**

### **Flower**

*Petal* - shows single layered epidermis on both surfaces, consisting of rectangular cells covered with striated cuticle; ground tissue consisting of polygonal, parenchymatous cells with wide air-sacs.

### **Stamen**

*Filament* - filament appears circular in outline, consisting of single layered epidermis covered with striated cuticle; followed by ground tissue of oval, angular, parenchymatous cell; vascular bundle single, present in centre consisting of usual elements of xylem and phloem tissues.

*Anther* - shows four chambered anther, two on either sides, connected by parenchymatous cells containing vascular bundle; anther consists of a single layer of epidermis, composed of thin-walled, rectangular, parenchymatous cells followed by single layer of endothecium consisting of thin-walled, columnar, parenchymatous cells; spore sac contains yellow, spherical pollen grains with smooth exine and intine walls, measuring 50-61  $\mu$  in diameter.

**Powder** - Dusty brown; shows fragments of vessels with spiral thickening, spherical, yellow pollen grains, measuring 50-61  $\mu$  in dia. having smooth exine and intine.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloid (Nelumbine).

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Śīta, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphahara, Pittahara, Santāpahara, Varṇya, Mūtra Virajanīya

**IMPORTANT FORMULATIONS** - Aravindāsava, Catura Kavala Ghr̥ta

**THERAPEUTIC USES** - Tṛṣṇā, Dāha, Raktapitta, Visarpa, Viṣavikāra

**DOSE** - 12 -24 g of the drug for decoction.

## KAPITTHA (Fruit Pulp)

Kapittha consists of dried pulp of mature fruit of *Feronia limonia* (Linn.) Swingle. Syn. *F. elephantum* Correa (Faro. Rutaceae); a deciduous, glabrous tree with strong, sharp, straight, axillary thorns, found throughout the plains of India, Siwalik range and forests, at base of Himalayas upto an elevation of 450 m; often cultivated in many parts of India; fruit rind is removed and the pulp is bruised and dried.

### SYNONYMS

Sanskrit	:	Danta Śatha, Kapipriya
Assamese	:	Kulekhara
Bengali	:	Kayet Bael, Kavataleal, Kavita
English	:	Wood apple
Gujrati	:	Kotha, Kondhu
Hindi	:	Kaitha
Kannada	:	Bekalu, Belada hannu, Bilvara, Belalu, Balada, Haminamara
Kashmiri	:	--
Malayalam	:	Vilar maram, Villanga Kaaya
Marathi	:	Kavatha
Oriya	:	--
Punjabi	:	Kainth
Tamil	:	Vilamaram, Vilangai
Telugu	:	Velaga
Urdu	:	Kaith

### DESCRIPTION

#### a) Macroscopic

Fruit pulp occurs mostly in broken pieces and sometimes entire, measuring about

4-5 cm in dia; semicircular, rough, hard, having longitudinal ridges and furrows; reddish brown; odour, aromatic; taste, sour.

#### b) Microscopic

**Fruit Pulp** - shows irregular, thin-walled, parenchymatous cells; numerous idioblast cells filled with reddish-brown content; stone cells, slightly triangular and oval, with concentric striations and narrow lumen, found in groups; a few fibro-vascular bundles distributed in the pulp; xylem vessels having spiral thickenings.

**Powder** - Reddish-brown; shows fragments of fibro-vascular bundles, stone cells, triangular to oval with concentric striations and narrow lumen, vessels and idioblast filled with cell content.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 25	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform :Ethylacetate : Formic acid (5:4:1) shows one spot at Rf. 0.91 (grey) in visible light. Under U.V. (366 nm) three fluorescent zones appear at Rf 0.14 (sky blue), 0.91 (blue) and 0.95 (blue). On exposure to Iodine vapour six spots appear at Rf. 0.06, 0.12, 0.37, 0.50, 6.91 and 0.95 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 110°C for ten minutes five spots appear at Rf. 0.12 (brown), 0.37 (brown), 0.50 (violet), 0.91 (violet) and 0.95 (violet) .

**CONSTITUENTS** - Citric acid and Mucilage.

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Amla, Kaṣāya, / Unripe Pulp: Amla, Kaṣāya  
**Guṇa** : Laghu, / Unripe Pulp: Guru  
**Vīrya** : Śīta, / Unripe Pulp: Uṣna  
**Vipāka** : Madhura, / Unripe Pulp: Amla  
**Karma** : Vṛṣya, Pittavāhara, Saṅgrāhī, Vraṇanāśaka, / Unripe Pulp: Kaphaghna, Lekhana, Grāhī, Vātala

**IMPORTANT FORMULATIONS** - Kapitthāṣṭaka Cūrṇa, Yavānyādi Cūrṇa

**THERAPEUTIC USES** - Ripe- Tṛṣṇā, Hikkā, Śvāsa, Vami, Unripe- Grahaṇī Roga, Agnimāndya

**DOSE** - 1-3 g of the drug in powder form.

## **KARAMARDA (Stem Bark)**

Karamarda consists of dried stem bark of *Carissa carandas* Linn. (Fam . Apocynaceae); a dichotomously branched large shrub or small tree, met throughout India in wild state, sometimes cultivated.

### **SYNONYMS**

Sanskrit	:	Krsnapakphala
Assamese	:	Kulekhara
Bengali	:	Karamach
English	:	--
Gujrati	:	Karamadan
Hindi	:	Karijige
Kannada	:	Karimkar
Kashmiri	:	--
Malayalam	:	Karimkar
Marathi	:	Karamanda
Oriya	:	--
Punjabi	:	Garna
Tamil	:	Kalakke
Telugu	:	--
Urdu	:	Karaunda

### **DESCRIPTION**

#### **a) Macroscopic**

Bark occurs in small and thin, flat or slightly curved pieces, rough due to longitudinal striations; external surface brownish-grey, internal surface grey and smooth, light in weight; fracture, short.

## b) Microscopic

**Stem Bark** -Mature bark shows a wide zone of stratified cork having lenticels at a few places; secondary cortex composed of thin-walled, tubular, parenchymatous cells having groups of stone cells; cortical fibres in single or groups of 2-3, a few stone cells attached with cortical fibres; secondary phloem consisting of usual elements; prismatic crystals of calcium oxalate found scattered in cortical cells and phloem parenchyma; starch grains simple, measuring 3-7  $\mu$  in dia. and compound having 2-3 components, found scattered in cortical and phloem parenchyma cells.

**Powder** - Greyish-brown, shows single and groups of stone cells, prismatic crystals of calcium oxalate, simple and compound starch grains, measuring 3-7  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' plate using Toluene; Ethylacetate (9 : 1) shows under U.V. (366 nm) one fluorescent zone at Rf. 0.52 (light sky blue). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for about fifteen minutes at 105<sup>0</sup>C four spots appear at Rf. 0.35, 0.58 (both light grey), 0.90 (pink) and 0.97 (violet).

**CONSTITUENTS** - Glycosides and  $\hat{\alpha}$ -Sitosterol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Amla
<b>Guṇa</b>	:	Guru, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittakara, Kaphahara

**IMPORTANT FORMULATIONS** - Marma Guṭīkā

**THERAPEUTIC USES** - Kuṣṭhahara

**DOSE** - 48 g of the drug for decoction.

## KARAÑJA (Root Bark)

Karañja consists of dried root bark of *Pongamia pinnata* (Linn.) Merr., Syn. *P. glabra* Vent. (Fam. Fabaceae), a glabrous tree, upto 18 m or sometimes more in height, found almost throughout the country upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Karañjaka, Naktamāla, Naktāhvā, Ghṛtakarañja
Assamese	:	Korach
Bengali	:	Natakaranja, Dahara karanja
English	:	--
Gujrati	:	Kanaji
Hindi	:	Karanj
Kannada	:	Honge Beru
Kashmiri	:	--
Malayalam	:	Pungu, Ungu
Marathi	:	Karanja
Oriya	:	Karanja
Punjabi	:	Karanj
Tamil	:	Pungai
Telugu	:	Ganuga
Urdu	:	Karanj

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces of varying sizes; reddish-brown externally and yellowishwhite, internally; external surface rough, due to peeling off, of outer thin skin and presence of numerous irregularly scattered and transversely arranged rows of lenticels; fracture, fibrous; taste, very bitter.

## b) Microscopic

**Root Bark** -Shows cork consisting of 5-15 or more rows of rectangular, tangentially elongated, thin-walled, cells; secondary cortex wide composed of polygonal, tangentially elongated cells, most of the cells containing both simple and compound starch grains having 2-5 components round to oval in shape, 3-11  $\mu$  in dia., a few cells contain yellowish-brown contents and prismatic crystals of calcium oxalate; stone cells found scattered in this region in singles and groups, single cells of varying shape and size; secondary phloem very wide, composed of tangentially arranged fibres alternating with sieve tubes and phloem parenchyma, traversed by phloem rays; most of phloem parenchyma cells contain starch grains and crystals, similar to those present in secondary cortex; phloem rays many, mostly straight, 1-2 seriate, consisting of thin-walled, radially elongated cells towards inner region and tangentially elongated towards periphery; most of ray cells contain starch grain, similar to those present in secondary cortex.

**Powder** -Creamish-yellow; shows thin-walled, parenchymatous cells, cork cells, phloem fibres, stone cells and simple and compound starch grains measuring 3-11  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	11 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' plate using Toluene:Ethylacetate (9:1) shows under U.V. (366 nm) eleven fluorescent zones at Rf. 0.04 (blue), 0.08 (greenish blue), 0.13 (Sky blue), 0.18 (blue) 0.25 (sky blue), 0.31 (sky blue), 0.37 (greenish yellow), 0.42 (sky blue), 0.47 (greenish yellow), 0.51 (light blue), 0.80 (light blue). On exposure to Iodine vapour nine spots appear at Rf. 0.09, 0.18, 0.31, 0.37, 0.47, 0.47, 0.51, 0.80 and 0.98 (all yellow).

**CONSTITUENTS** - Flavones Kanugin, Demethoxy-kanugin

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Vātahara, Pittahara, Kaṇḍūghna, Viṣaghna, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Prabhañjana Vimardana Taila

**THERAPEUTIC USES** - Kuṣṭha, Kaṇḍū, Duṣṭavrāṇa, Prameha, Yoniroga, Kṛmiroga, Āntravidradhi

**DOSE** - 1-3 g of the drug for decoction.

## KARAÑJA (Root)

Karañja consists of dried root of *Pongamia pinnata* (Linn.) Merr., Syn. *P. glabra* Vent. (Fam. Fabaceae); a glabrous tree, upto 18 m or sometimes more in height, found almost throughout the country upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Ghṛtakarañja, Karañjaka, Naktāhvā, Naktamāla
Assamese	:	Korach
Bengali	:	Dahara karanja, Natakaranja
English	:	--
Gujrati	:	Kanaji
Hindi	:	Karanj
Kannada	:	Honge Beru
Kashmiri	:	--
Malayalam	:	Pungu, Ungu
Marathi	:	Karanja
Oriya	:	Karanja
Punjabi	:	Karanj
Tamil	:	Pungai
Telugu	:	Ganuga, Kanuga
Urdu	:	Karanj

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces of varying sizes, bark, reddish-brown or dull brown, rough due to the presence of numerous, irregularly distributed, and also transversely arranged rows of lenticels, bark does not easily separate from xylem, internally light yellow, light in weight, fracture, fibrous in bark portion and hard to break in xylem portion where the root is thick when in pieces splits longitudinally; taste, bitter.

## b) Microscopic

**Root** -Shows cork consisting of 5-15 or more rows of rectangular, tangentially elongated, thin-walled, cells; secondary cortex wide composed of polygonal, tangentially elongated cells, most of the cells containing both simple and compound starch grains consisting of 2-3 components, rounded to oval in shape, 3-11  $\mu$  in dia., some cells containing yellowish-brown contents and prismatic crystals of calcium oxalate; stone cells found in single as well as in groups of varying shapes and size; secondary phloem a very wide zone, consisting of tangentially arranged fibres, alternating with sieve elements and phloem parenchyma traversed by phloem rays mostly straight, 1-2 seriate, consisting of radially elongated, thin-walled cells towards inner region, tangentially elongated towards outer region; starch grains, and crystals similar to those of cortical cells, also present in phloem parenchyma and phloem rays; secondary xylem consisting of vessels, tracheids, fibres and parenchyma; vessels found scattered throughout secondary xylem region in singles or groups of 2-4 or rarely, more; fibres thick-walled arranged in tangential bands traversed by xylem rays; xylem parenchyma cells thin-walled, rounded to oval in shape; xylem rays uni to triseriate consisting of radially elongated cells; starch grains and calcium oxalate crystals are similar to those present in cortical cells and also found scattered in xylem parenchyma and xylem ray cells.

**Powder** -Light yellow; shows fibres in singles or groups; xylem vessels entire or in pieces with reticulate thickenings; starch grains in abundance both simple and compound, consisting of 2-3 components, measuring 3-11  $\mu$  in dia., stone cells and a few prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Karanjin, Kanugin, Demethoxy-kanugin, Pongachromene & Tetra-O- Methylfisetin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Vātahara, Pittahara, Kaṇḍūghna, Viṣaghna, Vraṇaśodhana

## IMPORTANT FORMULATIONS - Dhānvantara Ghṛta

**THERAPEUTIC USES** - Kuṣṭha, Kaṇḍū, Duṣṭavrāṇa, Prameha, Yoniroga, Kṛmiroga, Āntrarvidradhi, Vidradhī

**DOSE** - 1-2 g of the drug in powder form.

## KARAÑJA (Stem Bark)

Karañja consists of dried stem bark of *Pongamia pinnata* (Linn.) Merr., Syn. *P. glabra* Vent. (Fam. Fabaceae); a glabrous tree, upto 18 m or sometimes more in height, found almost throughout the country upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Ghṛtakarañja, Karañjaka, Naktāhvā, Naktamāla
Assamese	:	Korach
Bengali	:	Dahara karanja, Karanja, Natakaranja
English	:	--
Gujrati	:	Kanaji
Hindi	:	Karanj
Kannada	:	Honge Beru
Kashmiri	:	--
Malayalam	:	Pungu, Ungu
Marathi	:	Karanja
Oriya	:	Karanja
Punjabi	:	Karanj
Tamil	:	Pungai
Telugu	:	Ganuga, Kanuga
Urdu	:	Karanj

### DESCRIPTION

#### a) Macroscopic

Bark available in channelled, recurved, slightly quilled, usually 0.2-1 cm thick, lenticellate pieces, more or less smooth; outer surface ash-grey to greyish-brown and internal surface yellowish-white to cream coloured; fracture, short and fibrous, odour, unpleasant; taste, bitter.

## b) Microscopic

**Bark** - Shows 5-20 or more layers of cork, composed of rectangular, thick-walled cells, filled with reddish-brown content, at some places lenticels also appear; secondary cortex 10-15 layered having oval to polygonal, tangentially elongated, thin-walled, parenchymatous cells; beneath secondary cortex a large group of oval to elongated stone cells, arranged in a tangential manner, forming a continuous or discontinuous band; secondary phloem composed of sieve elements, phloem parenchyma, phloem fibre and stone cells, traversed by medullary rays; sieve elements and parenchyma composed of rectangular to polygonal thin-walled cells, alternating with stone cells; fibre small, polygonal, thin-walled and aseptate, a few associated with stone cells and arranged radially; medullary rays wavy, usually 2-4 cells wide, radially elongated and rounded to oval in shape, a few stone cells scattered in secondary cortex as in secondary phloem; rhomboidal crystals of calcium oxalate found in secondary cortex; starch grains simple, rounded to oval and compound having 2-4 components, present in secondary cortex, phloem parenchyma and rays cells; oil globules found in secondary phloem only.

**Powder** - Yellowish-cream; shows groups of rectangular to polygonal, elongated, thin walled parenchymatous sieve tube; aseptate fibre and stone cells; rhomboidal crystals of calcium oxalate; rounded to oval, simple and compound starch grains, measuring 3-14  $\mu$  in dia, and rarely, oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	18	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Flavones and Furanoflavones like Karanjin, Pongapin, Demethoxykanugin, Kanugin, Pinnatin, Tetra-o-Methylfisetin, Gamatin, 5-Methoxyfuran (2", 3" 7 : 8), flavone and 5-Methoxy-3'4' Methylene dioxyfuran (2", 3", 7 : 8) flavone & two new Furano compounds Glabra-I and Glabra-II. It also contains alkaloids and Triterpenoid saponin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Vātahara, Pittahara, Kaṇḍūghna, Viṣaghna, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Bṛhanmañjiṣṭhādi Kvātha Cūrṇa, Mustākarañjādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Kuṣṭha, Kaṇḍū, Duṣṭavrāṇa, Prameha, Yoniroga, Kṛmiroga, Āntrarvidradhi, Vidradhī

**DOSE** - 1-2 g of the drug in powder form.

## KARAÑJA (Leaf)

Karañja consists of dried leaf of *Pongamia pinnata* (Linn.) Merr., Syn. *P. glabra* Vent. (Fam. Fabaceae); a glabrous tree, upto 18 m or sometimes more in height, found almost throughout the country upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Ghṛtakarañja, Karañjaka, Naktāhvā, Naktamāla
Assamese	:	Korach
Bengali	:	Dahara karanja, Karanja, Natakaranja
English	:	Smooth leaved pongamia
Gujrati	:	Kanaji, Kanajo
Hindi	:	Karuaini, Dithouri
Kannada	:	Honge Beru, Hulagilu
Kashmiri	:	--
Malayalam	:	Pungu, Ungu, Unu, Avittal
Marathi	:	Karanja
Oriya	:	Karanja
Punjabi	:	Karanj
Tamil	:	Pungai, Pongana
Telugu	:	Ganuga, Kanugu
Urdu	:	Karanj

### DESCRIPTION

#### a) Macroscopic

Leaves imparipinnate, leaflets 2-3 pairs, ovate or elliptic with smooth margins, 6.2 - 11.5 cm long and 3.9-8.3 cm wide, dark green, petiolule short, 0.5-0.8 cm.

## b) Microscopic

### Leaf-

*Petiolule* - circular in outline, covered with cuticle, epidermis single layered, consistig of tabular cells; cortex consisting of angular, isodiametric, parenchymatous cells without intercellular spaces, a few cells containing prismatic crystals of calcium oxalate; pericycle present in the form of sclerenchymatous sheath; vascular bundle single, arc-shaped, consisting of xylem and phloem; xylem vessels arranged radially, traversed by xylem rays; a few schizogenous cavities found scattered in cortex.

*Mid rib* - shows single layered epidermis, consisting of tabular cells, covered with thick cuticle, followed by 3-4 layered collenchymatous hypodermis; cortex consists of round to oval, thin-walled parenchymatous cells; pericycle present in the form of sclerenchymatous sheath; vascular bundle, collateral, conjoint and arranged in discontinuous ring; central portion occupied by oval to polygonal thin-walled parenchymatous pith; prismatic crystals of calcium oxalate present in cortex, phloem and pith.

*Lamina* -shows single layered epidermis covered with thick cuticle; palisade two layered; spongy parenchyma 3-5 layered, a few containing prismatic crystals similar to midrib, occasionally a few spongy parenchyma cells get elongated and look like palisade cells, palisade ratio 3.5-50; vein islet number 18-25 per mm square; stomata anisocytic, present in lower surface; stomatal index 12.5-20.

**Powder** -Green; shows spiral xylem vessels, mesophyll cells, epidermal cells and a few prismatic crystals of calcium oxalate

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.

**CONSTITUENTS** - A new Furanoflavone -3' - methoxy pongapin in addition to Karanjin, Kanjone and its two isomers 7-Methoxyfurano-(4",5",6,5) - flavone and 8-Methoxyfurano-(4", 5", - 6, 5)-flavone and 8 methoxyfurano-(4", 5" - 6, 7) -flavone.

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Kaṣāya  
**Guṇa** : Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Pittavardhaka, Bhedana, Kaṇḍūghna, Kṛmihara, Śothahara

**IMPORTANT FORMULATIONS** - Jātyādi Taila

**THERAPEUTIC USES** - Kuṣṭha, Kṛmiroga, Vraṇa, Kaṇḍū

**DOSE** - For external use only.

## KĀRAVALLAKA (Fresh Fruit)

Kāravallaka consists of fresh fruit of *Momordica charantia* Linn. (Fam. Cucurbitaceae); a monoecious climber found throughout the country often under cultivation, upto an altitude of 1500 m.

### SYNONYMS

Sanskrit	:	Kāravella, Kathilla, Varivallī, Kāravallī.
Assamese	:	Kakiral, Kakral
Bengali	:	Karolla
English	:	Bitter gourd
Gujrati	:	Karela
Hindi	:	Karela
Kannada	:	Hagalakai
Kashmiri	:	--
Malayalam	:	Kaippa, Pavackkai
Marathi	:	Karla
Oriya	:	Kalara, Salara
Punjabi	:	Karela
Tamil	:	Paharkai
Telugu	:	Kaakara Kaaya
Urdu	:	Karela

### DESCRIPTION

#### a) Macroscopic

Fruit 2.5 - 25 cm long, oblong, pendulous, fusiform, usually pointed or beaked, ribbed and bearing numerous triangular tubercles, 3 valved at the apex when mature, surface rough; light green to green in colour containing numerous seeds; taste, extremely bitter.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter		Nil	Appendix	2.2.2.
Total Ash	Not more than	8.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	28	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform: Methanol (90 : 10) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.23 (red), 0.61 (light sky blue), 0.96 (sky blue), 0.98 (red & sky blue). On exposure to Iodine vapour four spots appear at Rf. 0.17, 0.46, 0.67 and 0.98 (all yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent nine spots appear at Rf. 0.03, 0.16, 0.34, 0.43, 0.50, 0.60, 0.75, 0.81 and 0.98 (all blue).

**CONSTITUENTS** - Alkaloid (Momoridine) and Glycosides.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Raktadoṣahara, Dīpana, Hṛdya, Bhedi

**IMPORTANT FORMULATIONS** - Mahāviṣagarbha Taila

**THERAPEUTIC USES** - Kuṣṭha, Prameha, Kāmalā, Pāṇḍu, Kṛmiroga, Raktavikāra, Jvara, Śvāsa, Kāsa, Aruci

**DOSE** - 10 - 15 ml juice of fresh drug.

## KATUKĀ (Rhizome)

Kaukā consists of the dried rhizome with root of *Picrorhiza kurroa* Royle ex Benth. (Fam. Scrophulariaceae); a perennial, more or less hairy herb common on the north-western Himalayas from Kashmir to Sikkim. Rhizome is cut into small pieces.

### SYNONYMS

Sanskrit	:	Tiktā, Tiktaroḥiṇī, Kaṭuroḥiṇī, Kavī, Sutiktaka, Kaṭuka, Roḥiṇī.
Assamese	:	Katki, Kutki
Bengali	:	--
English	:	Hellebore
Gujrati	:	Kadu, Katu
Hindi	:	Kutki
Kannada	:	Katuka rohini, katuka rohini
Kashmiri	:	--
Malayalam	:	Kaduk rohini, Katuka rohini
Marathi	:	Kutki, Kalikutki
Oriya	:	Katuki
Punjabi	:	Karru, kaur
Tamil	:	Katuka rohini, Katuku rohini, Kadugurohini
Telugu	:	Karukarohini
Urdu	:	Kutki

### DESCRIPTION

#### a) Macroscopic

**Rhizome** - 2.5-8 cm long and 4-8 mm thick, subcylindrical, straight or slightly curved, externally greyish-brown, surface rough due to longitudinal wrinkles, circular scars of roots and bud scales and sometimes roots attached, tip ends in a growing bud surrounded by tufted crown of leaves, at places cork exfoliates exposing dark cortex; fracture, short;

odour, pleasant; taste, bitter.

**Root** - Thin, cylindrical, 5-10 cm long, 0.05-0.1 cm in diameter, straight or slightly curved with a few longitudinal wrinkles and dotted scars, mostly attached with rhizomes, dusty grey, fracture, short, inner surface black with whitish xylem; odour, pleasant; taste, bitter.

#### **b) Microscopic**

**Rhizome** - Shows 20-25 layers of cork consisting of tangentially elongated, suberised cells; cork cambium 1-2 layered; cortex single layered or absent, primary cortex persists in some cases, one or two small vascular bundles present in cortex; vascular bundles surrounded by single layered endodermis of thick-walled cells; secondary phloem composed of phloem parenchyma and a few scattered fibres; cambium 2-4 layered; secondary xylem consists of vessels, tracheids, xylem fibres and xylem parenchyma, vessels vary in shape and size having transverse oblique articulation; tracheids long, thick-walled, lignified, more or less cylindrical with blunt tapering ends; xylem parenchyma thin-walled and polygonal in shape; centre occupied by a small pith consisting of thin-walled cells; simple round to oval, starch grains, measuring 25-104  $\mu$  in dia., abundantly found in all cells.

**Root** - Young root shows single layered epidermis, some epidermal cells elongate forming unicellular hairs; hypodermis single layered; cortex 8-14 layered; consisting of oval to polygonal, thick-walled, parenchymatous cells; primary stele tetrach to heptarch, enclosed by single layered pericycle and single layered, thick-walled cells of endodermis; mature root shows 4-15 layers of cork, 1-2 layers of cork cambium; secondary phloem poorly developed; secondary xylem consisting of vessels, tracheids, parenchyma and fibres; vessels have varying shape and size, some cylindrical with tail-like, tapering ends, some drum shaped with perforation on end walls or lateral walls; tracheids cylindrical with tapering pointed ends; fibres aseptate, thick-walled, lignified with tapering blunt chisel-like pointed ends.

**Powder** - Dusty grey; shows groups of fragments of cork cells, thick-walled, parenchyma, pitted vessels and aseptate fibres, simple round to oval, starch grains, measuring 25 - 104  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 7	per cent, Appendix	2.2.3.

Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 20 per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform: Methanol (95 : 5) shows under U.V. light (366 nm) three fluorescent zones at Rf. 0.05 (blue), 0.30 (blue) and 0.35 (green). On exposure to Iodine vapour nine spots appear at Rf. 0.10, 0.17, 0.21, 0.30, 0.37, 0.41, 0.62, 0.72 and 0.84 (all yellow). On spraying with 5% methanolic sulphuric acid reagent and heating the plate for about ten minutes at 105°C seven spots appear at Rf. 0.05, 0.10, 0.17, 0.21, 0.30, 0.41 and 0.84 (all brownish grey).

**CONSTITUENTS** - Glucoside (Picrorhizin).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Dīpanī, Bhedinī, Hṛdya, Jvarahara

**IMPORTANT FORMULATIONS** - Ārogyavardhinī Guṭikā, Tiktaka Ghṛta, Sarvajvarahara Lauha, Mahātiktaka Ghṛta

**THERAPEUTIC USES** - Kāmalā, Śvāsa, Dāha, Jvara, Kuṣṭha, Viṣamajvara, Arocaka

**DOSE** - 1 - 3 g of the drug in powder form.

## KOKILĀKṢĀ (Whole Plant)

Kokilākṣā consists of dried whole plant of *Asteracantha longifolla* Nees. Syn. *Hygrophila spinosa* T.Anders (Fam.Acanthaceae); a spiny, stout, annual herb, common in water logged places throughout the country.

### SYNONYMS

Sanskrit	:	Ikṣura, Ikṣuraka, Kokilākṣī
Assamese	:	Kulekhara
Bengali	:	Kuliyakhara, Kulekhade
English	:	--
Gujrati	:	Ekharo
Hindi	:	Talmakhana
Kannada	:	Kolavali, Kolarind, Kolavankal
Kashmiri	:	--
Malayalam	:	--, Culli, Nirchulli, Vayalculli
Marathi	:	Talikhana, Kalsunda
Oriya	:	--
Punjabi	:	--
Tamil	:	Golmidi, Kettu, Nirguvireru, Nerugobbi
Telugu	:	--
Urdu	:	Talmakhana

### DESCRIPTION

#### a) Macroscopic

**Root** - Mostly adventitious, whitish to brown; no characteristic odour and taste.

**Stem** - Usually unbranched, fasciculate, sub-quadrangular, swollen at nodes, covered with long hairs which are numerous at the nodes, externally greyish-brown, creamishbrown in

cut surfaces; no characteristic odour and taste.

**Leaf** - Greenish-brown, 1-7 cm long , 0.5-1 cm wide, subsessile, lanceolate, acute, entire and hairy.

**Flower** - Yellowish-brown, usually occurring in apparent whorls of eight (in 4 pairs) at each node; bracts about 2.5 cm long, with long white hairs; calyx 4-partite, upper sepal 1.6-2 cm long, broader than the other three, which are 1.3 cm long, all linear-lanceolate, coarsely hairy on the back and with hyaline ciliate margins; corolla 3.2 cm long, widely 2 lipped, tube 1.6 cm long, abruptly swollen at top; stamens 4, didynamous, second pair larger; filament quite glabrous; anthers two celled, subequal, glabrous; ovary two celled with 4 ovules in each cell; style filiform, pubescent; stigma simple, involute with a fissure on upper side.

**Fruit** - Two celled, linear-oblong, compressed, capsule about 0.8 cm long, pointed, 4-seeded.

**Seed** - Ovate, flat or compressed, truncate at the base, 0.2-0.25 cm long and 0.1 - 0.15 cm wide, hairy but appearing smooth; when soaked in water immediately get coated with mucilage, light brown; taste slightly bitter and odour not distinct.

#### **b) Microscopic**

**Root** - Root shows a single layered epidermis of thin-walled, rectangular to cubical, parenchymatous cells having unicellular hairs; secondary cortex composed of round to oval or oblong, thin-walled cells having large intercellular spaces; most of these cells divided longitudinally and transversely with walls forming 4-6 or more chambers; size of these cells and intercellular spaces gradually reduce towards the inner region, where these cells are mostly radially elongated, arranged in radial rows, a few thick-walled cells found scattered singly throughout secondary cortex; secondary phloem narrow consisting of small, thin-walled, polygonal cells; phloem fibres thick-walled, occur in groups of 2-6 or singles, scattered throughout the phloem region; secondary xylem forms continuous ring; vessels angular, broader towards centre, arranged radially having spiral thickenings, surrounded by thick-walled parenchyma and xylem fibres; fibre walls uniformly thickened; multi and uniseriate medullary rays occur from primary xylem region upto secondary cortex; ray cells thin walled, radially elongated in xylem region, circular to transversely elongated in phloem region.

**Stem** - Shows somewhat sub-quadrangular outline; cork consists of 5-10 rows of rectangular, radially arranged, moderately thick-walled, brownish cells; collenchyma 4-8

layered consisting of isodiametric cells; a few thick-walled, isolated cells found scattered in this zone; cortical cells thin-walled, round, oblong, variable in size, with a number of large air cavities; a special feature of these cells is the formation of tangential and radial walls within the cell dividing it into 4-5 or more parts; most of cells contain numerous acicular crystals of calcium oxalate; endodermis single layered, composed of transversely elongate, thin-walled cells; phloem narrow, consisting of round to polygonal cells, peripheral ones larger, inner cells smaller; fibres thick-walled, single or in groups of 2-3, some cells contain calcium oxalate crystals similar to those found in cortical cells; xylem present in a ring; vessels with spiral thickenings, arranged radially; fibres elongated with wide lumen and pointed tips, medullary rays uni to multi seriate extend upto secondary cortex; ray cells thin-walled, radially elongated in secondary xylem, transversely elongated in secondary phloem; pith large, composed of polygonal, thin-walled parenchymatous cells, having small intercellular spaces; a few cells contain calcium oxalate crystals similar to those found in secondary cortex.

### **Leaf-**

*Midrib* - Shows concavo-convex outline; epidermis on either surface covered with thick cuticle; collenchyma 2-5 layered; stele composed of small strands of xylem and phloem having some groups of fibre; rest of tissues composed of thin-walled, parenchymatous cells, a few of them containing acicular crystals of calcium oxalate ; cystolith present beneath upper and above the lower epidermal cells.

*Lamina* - Shows epidermis single layered on either surface, composed of thin-walled, parenchymatous, tangentially elongated cells, covered with thick cuticle; stomata diacytic, 1-5 celled hairs present on both surfaces; palisade 1-2 layered; spongy parenchyma composed of 3-5 layered, loosely arranged cells traversed by a number of veins; palisade ratio 6.25-15.75; stomatal index 17.24-30.78; vein islet number 17-42.

**Fruit** - Shows single layered epidermis covered with striated cuticle followed by 5-10 layered, thick-walled, oval to hexagonal, lignified, sclerenchymatous cells.

**Seed** - Shows hairy testa composed of thin-walled, tangentially elongated cells covered with pigmented cuticle; embryo composed of oval to polygonal, thin-walled, parenchymatous cells containing oil globules.

**Powder** - Light brown; shows aseptate, elongated fibres; vessels with simple pits and spiral thickening; palisade, acicular crystals of calcium oxalate, unicellular hairs and globules.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter

Not more than 2 per cent, Appendix 2.2.2.

Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Amla, Tikta
<b>Guna</b>	:	Picchila, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Balya, Vṛṣya, Mūtrala, Vājikara, Santarpana, Rucya

**IMPORTANT FORMULATIONS** - Pānaviralādi Bhasma (Kṣāra)

**THERAPEUTIC USES** - Āmavāta, Śoṭha, Tṛṣṇā, Vātarakta

**DOSE** - 3 -6 g of the drug in powder form.

## KOKILĀKṢĀ (Root)

Kokilākṣā consists of dried root of *Asteracantha longifolia* Nees. Syn. *Hygrophila spinosa* T. Anders (Fam.Acanthaceae); a spiny, stout, annual herb, common in water logged places throughout the country.

### SYNONYMS

Sanskrit	:	Ikṣura, Ikṣuraka, Kokilākṣī, Culli
Assamese	:	--, Kulekhara
Bengali	:	--
English	:	--
Gujrati	:	Ekharo
Hindi	:	Talmakhana
Kannada	:	Nirmulli, Kolavulike, Kolavankae
Kashmiri	:	--
Malayalam	:	Vayalculli, Nirchulli
Marathi	:	Talimakhana
Oriya	:	Koillekha, Koilrekha
Punjabi	:	---
Tamil	:	Nirmulle
Telugu	:	Talmakhana, Nerugobbi, Golmidi
Urdu	:	Talmakhana

### DESCRIPTION

#### a) Macroscopic

Roots mostly adventitious, branches on nodes, whitish to brownish; no characteristic odour and taste.

## b) Microscopic

Root-Appears circular in outline, epidermis consists of rectangular to cubical, thin-walled cells; a few epidermal cells elongated to form unicellular hairs, below epidermis 3-4 compactly arranged rows of thin-walled polygonal cells of secondary cortex; secondary cortex composed of rounded to oval or oblong, thin-walled cells having conspicuously large intercellular spaces, most of these cells divided longitudinally and transversely with walls forming 4-6 or more chambers, the size of these cells, and the intercellular spaces gradually reduce towards inner region of secondary cortex; a few thick-walled cells found scattered singly throughout secondary cortex, inner most row of thin-walled cells of secondary cortex comparatively smaller in size, slightly transversely elongated; secondary phloem narrow, consisting of small, thin-walled, polygonal cells, phloem fibres thick-walled occur in groups or as single cells, scattered throughout the phloem region, each group composed of 2-6 cells; secondary xylem forms continuous ring; xylem vessels usually arranged in radial rows, angular, broader towards centre, having spiral thickening, surrounded by thick-walled xylem parenchyma and xylem fibres; fibre walls uniformly thickened; multiseriate medullary rays occur from primary xylem region upto secondary cortex; uniseriate rays also present in xylem and extend upto the secondary cortex; ray cells thin-walled, radially elongated in the xylem region, rounded to transversely elongated in phloem region.

Powder - Light brown to ash coloured; shows fragments of pitted, lignified fibres; vessels with spiral thickening, unicellular hairs and a few groups of parenchymatous cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil

## PROPERTIES AND ACTION

**Rasa** : Madhura, Amla, Tikta

**Guṇa** : Picchila, Snigdha

**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Vātahara, Kaphahara, Mūtrala, Vṛṣya

**IMPORTANT FORMULATIONS** - Rāsnairaṇḍādi Kvātha Cūrṇa, Vastyāmayāntaka Ghṛta

**THERAPEUTIC USES** - Āmavāta, Śoṭha, Aśmaṛī, Vātarakta, Pittatisāra

**DOSE** - 3 -6 g of the drug for decoction.

## KOKILĀKṢĀ (Seed)

Kokilākṣā consists of dried seed of *Asteracantha longifolia* Nees. Syn. *Hygrophila spinosa* T. Anders. (Fam. Acanthaceae); a spiny, stout, annual herb, common in water logged places throughout the country.

### SYNONYMS

Sanskrit	:	Ikṣura, Ikṣuraka, Kokilākṣī, Culli
Assamese	:	Kulekhara
Bengali	:	---
English	:	---
Gujrati	:	Talimkhana
Hindi	:	Talmakhana
Kannada	:	Kolavankae, Nirmulli, Kolavalike
Kashmiri	:	--
Malayalam	:	Vayalchulli, Nirchulli
Marathi	:	Talimakhana
Oriya	:	Koillekha, Koilrekha
Punjabi	:	---
Tamil	:	Nirmulle
Telugu	:	Nite Gobbi, Nirugobbi
Urdu	:	Talmakhana

### DESCRIPTION

#### a) Macroscopic

Ovate, flat or compressed, truncate at the base, 2-3 mm long and 1-2 mm wide, white, hairy but appearing smooth, when soaked in water immediately get coated with mucilage, light yellowish-brown; taste, slightly bitter and odour not distinct.

## b) Microscopic

Seed - Shows hairy testa composed of thin-walled, tangentially elongated cells covered externally with pigmented cuticle layer; embryo composed of oval to polygonal, thin-walled, parenchymatous cells; oil globules present in this region.

Powder - Greyish-brown; shows hairs and oil globules.

Swelling Index - 8 -10.

Introduce the accurately weighed seeds into a 25 ml glass-stoppered measuring cylinder. The length of the graduated portion of the cylinder should be 125 mm; the internal diameter 16 mm subdivided in 0.2 ml and marked from 0 to 25 ml in upwards direction. Add 25 ml of water, and shake the mixture thoroughly at intervals of every 10 minutes for 1 hour. Allow to stand for 3 hours at room temperature. Measure the volume in ml occupied by the seeds, including any sticky mucilage. Carry out simultaneously not less than 3 determination and calculate the mean value of the individual determinations, related to 1 g of seeds.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	8	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (95 : 5) shows under U.V. (366 nm) five fluorescent zones at Rf. 0.24 (red), 0.41 (light blue), 0.55 (light blue), 0.76 (sky blue) and 0.93 (sky blue). On exposure to Iodine vapour seven spots appear at Rf. 0.03, 0.17, 0.24, 0.31, 0.38, 0.52 and 0.72 (all yellow). On spraying with 5% Ethanolic-Sulphuric acid reagent and on heating the plate for fifteen minutes at 105° C eight spots appear at Rf. 0.03 (light brown), 0.10 (light brown),

0.17 (light brown), 0.24 (dark brown), 0.31 (dark brown), 0.38 (light brown), 0.52 (dark brown) and 0.72 (dark brown).

**CONSTITUENTS** - An yellow semi-drying oil, enzymes like Diastase, Lipase, Protease and an Alkaloid.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Picchila
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphahara, Vṛṣya, Balya, Ruchya, Santarpana

**IMPORTANT FORMULATIONS** - Vastyāmayāntaka Ghṛta, Yakṛt Śulavināśinī Vaṭikā

**THERAPEUTIC USES** - Vātarakta, Śoṭha, Pittāśmarī

**DOSE** - 3 -6 g of the drug in powder form.

## KOZUPPĀ (Whole Plant)

Kozuppā consists of dried whole plant of *Portulaca oleracea* Linn. (Fam. Portulacaceae); an annual succulent, prostrate herb, 50 cm long, found throughout the country, ascending upto an altitude of 1500 m in the Himalayas.

### SYNONYMS

Sanskrit	:	Lonikā, Loni, Ghoṭikā.
Assamese	:	--
Bengali	:	Baraloniya, Badanuni, Baranunia
English	:	Garden Purslane, Common Indian Purslane
Gujrati	:	Luni, Loni, Moti Luni
Hindi	:	Khursa, Kulfa, Badi Lona
Kannada	:	Dudagorai, Doddagoni Soppu, Lonika, Loni
Kashmiri	:	--
Malayalam	:	Koricchira, Kozhuppa, Kozuppa, Kozuppaccira
Marathi	:	Kurfah, Ghola
Oriya	:	--
Punjabi	:	Lonak, Chhotalunia, Khurfa, Kwfa
Tamil	:	Pasalai, Pulikkirai, Paruppukkeerai, Kozhuppu
Telugu	:	Pappukura, Peddapavila Kura, Payilikura, Pavilikura
Urdu	:	Khurfa

### DESCRIPTION

#### a) Macroscopic

Root - Cylindrical, small, oblique, surface smooth, brownish-grey; secondary roots, less in number, root hairs abundant in upper region, fracture, short.

Stem - Almost cylindrical, swollen at the nodes, ribbed, branched, 0.1 to 0.2 cm in diameter, fracture, short; odour, characteristic.

Leaf - Simple, sub-sessile, cuneiform, rounded and truncate at the apex; 0.3 to 2.5 cm long and 0.1 to 0.6 cm wide, oblong, spatulate, smooth and greenish-brown.

Flower - A few, bright yellow, at terminal heads, sometimes in axillary clusters of 2-6, subtended by an involucre, 3-4 leaves; sepal 0.25-0.4 cm long; petals obovate, 0.5 cm long, very delicate and soon falling off; stamens 8-12; style 5-6 cm long, 0.35-0.4 cm long.

Fruit - An ovoid capsule, 0.3 cm long, dehiscent above the base.

Seed - Numerous, reniform, black, minute, 0.06-0.07 cm across, dark brown.

### **b) Microscopic**

**Root** - Shows 5-15 layers of cork, inner half filled with reddish-brown contents; secondary cortex composed of thin-walled, oval cells, having intercellular spaces; pericycle fibre present in patches; secondary phloem consists of sieve tubes and parenchymatous cells; secondary xylem composed of vessels, tracheids and parenchyma; vessels, solitary or in groups of 2-5, arranged in radial rows, having simple pits and spiral thickening; tracheids, thick-walled with wide lumen; parenchyma abundant; simple as well as compound starch grains measuring 6-14  $\mu$  in dia., having 2-3 components present in secondary cortex, phloem, xylem parenchyma and ray cells.

**Stem** - Wavy in outline, shows 5-10 layers of thin walled cork, with reddish-brown content in a few cells; secondary cortex consists of 2-3 layers of collenchymatous and 3-4 layers of parenchymatous cells with intercellular spaces; pericycle present as patches of pericyclic fibres; secondary phloem mostly composed of sieve tubes and parenchyma cells; secondary xylem consists of vessels, tracheids and parenchyma; vessels having simple pits and spiral thickening; tracheids thick-walled with wide lumen; parenchyma abundant and thick-walled; rosette crystals of calcium oxalate and starch grains present in secondary cortex, phloem and xylem parenchyma, ray cells and pith.

**Leaf-**

**Midrib** - shows a collateral vascular bundle surrounded by a sheath of palisade cells; rest of the tissues between vascular bundle and epidermal cells composed of thin walled, oval, parenchymatous cells; stomata paracytic type; rosette crystals of calcium oxalate and starch grains simple, as well as compound, measuring 6-14  $\mu$ , present in mesophyll cells.

**Lamina** - shows a single layered upper and lower epidermis, covered externally with a thick cuticle; paracytic stomata present on both surfaces; palisade single layered; spongy parenchyma cells more or less isodiametric and loosely arranged.

**Powder** - Greyish-brown; shows groups of oval to polygonal, thin-walled, parenchymatous cells, pitted and spiral vessels, fragments of cork cells, rosette crystals of calcium oxalate and starch grains, simple as well as compound, measuring 6-14  $\mu$  in dia. having 2-3 components.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 5 per cent, Appendix	2.2.2.
Total Ash	Not more than 30 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 19 per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' plate using Toluene : Ethylacetate (9:1) shows six spots at Rf. 0.08, 0.10, (both green), 0.41, 0.52 (both faint green), 0.68 (yellow) and 0.76 (green) in visible light. Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.08, 0.10, 0.41, 0.52, 0.68 and 0.76 (all pinkish red). On exposure to Iodine vapour six spots appear at Rf. 0.10, 0.50, 0.61, 0.68, 0.76 and 0.98 (all yellow)

**CONSTITUENTS** - Protein, Carbohydrates, Vitamin C and Mucilage

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Amla
<b>Guṇa</b>	:	Sara, Guru, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Amla

**Karma** : Vātahara, Pittakara, Kaphahara, Cakṣuṣya, Vāṇīdoṣahara

**IMPORTANT FORMULATIONS** - Marma Gutikā

**THERAPEUTIC USES** - Vraṇa, Gulma, Prameha, Śoṭha, Arśa, Agnimāndya

**DOSE** - 3 - 6 g of the drug in powder form.

## LAJJĀLU (Whole Plant)

Lajjālu consists of dried whole plant of *Mimosa pudica* Linn. (Fam. Fabaceae); a diffused undershrub, sensitive to touch, 25-50 cm high, found nearly through hotter and moist regions of the country.

### SYNONYMS

Sanskrit	:	Samangā, Varākrāntā, Namaskārī
Assamese	:	Lajubilata, Adamalati
Bengali	:	Lajaka, Lajjavanti
English	:	Touch-me-not
Gujrati	:	Risamani, Lajavanti, Lajamani
Hindi	:	Chhuimui, Lajauni
Kannada	:	Muttidasenui, Machikegida, Lajjavati
Kashmiri	:	--
Malayalam	:	Thotta Vati
Marathi	:	Lajalu
Oriya	:	Lajakuri
Punjabi	:	Lajan
Tamil	:	Thottavadi, Tottalchurungi
Telugu	:	Mudugudamara
Urdu	:	Chhuimui

### DESCRIPTION

#### a) Macroscopic

Root - Cylindrical, tapering, rependant, with secondary and tertiary branches, varying in length, upto 2 cm thick, surface more or less rough or longitudinally wrinkled; greyish brown to brown, cut surface of pieces pale yellow; fracture hard, woody, bark fibrous; odour, distinct; taste, slightly astringent.

**Stem** - Cylindrical, upto 2.5 cm in dia; sparsely prickly, covered with long, weak bristles longitudinally grooved, external surface light brown, internal cut surface grey, bark fibrous; easily separable from wood.

**Leaf** - Digitately compound with one or two pairs of sessile, hairy pinnae, alternate, petiolate, stipulate, linear lanceolate; leaflets 10-20 pairs, 0.6-1.2 cm long, 0.3-0.4 cm broad, sessile, obliquely narrow or linear oblong; obliquely rounded at base, acute, nearly glabrous; yellowish-green.

**Flower** - Pink, in globose head, peduncles prickly; calyx very small; corolla pink, lobes 4, ovate oblong; stamens 4, much exserted; ovary sessile; ovules numerous.

**Fruit** - Lomentum, simple, dry, 1-1.6 cm long, 0.4-0.5 cm broad with indehiscent segments and persistent sutures having 2-5 seeds with yellowish, spreading bristle at sutures, 0.3 cm long, glabrous, straw coloured.

**Seed** - Compressed, oval-elliptic, brown to grey, 0.3 long, 2.5 mm broad having a central ring on each face.

#### **b) Microscopic**

**Root** - Mature root shows cork 5-12 layered, tangentially elongated cells, a few outer layers crushed or exfoliated; secondary cortex consisting of 6-10 layered, tangentially elongated thin-walled cells; secondary phloem composed of sieves elements, fibres, crystal fibres and phloem parenchyma traversed by phloem rays, phloem fibres single or in groups, arranged in tangential bands; crystal fibres thick-walled, 3-25 chambered, each with single or 2-4 prismatic crystals of calcium oxalate; phloem rays uni to multiseriate, 2-3 seriate more common; secondary xylem consists of usual elements traversed by xylem rays; vessels scattered throughout secondary xylem having bordered pits and reticulate thickenings; crystal fibres containing one or rarely 2-4 prismatic crystals of calcium oxalate in each chamber; parenchyma, thick-walled, scattered throughout secondary xylem; xylem rays uni to bi-seriate, rarely multiseriate, wider towards secondary phloem and narrower towards centre; starch grains, prismatic crystals of calcium oxalate and tannin present in secondary cortex, phloem and xylem rays and parenchyma; starch grains both simple and compound having 2-3 components, rounded to oval measuring 6-20  $\mu$  and 16-28  $\mu$  in dia. respectively.

**Stem** - Mature stem shows 4-8 layered, exfoliated cork of tangentially elongated cells filled with reddish-brown contents; secondary cortex wide, consisting of large, moderately thick-walled, tangentially elongated to oval, parenchymatous cells, filled with reddish-brown contents, a few cells containing prismatic crystals of calcium oxalate, a number of lignified,

fibres single or in groups, scattered throughout; secondary phloem consisting of usual elements, 2-5 transversely arranged strips of fibres occur alternating with narrow strips of sieve elements and parenchyma, crystal fibres elongated, thick-walled, containing single crystal of calcium oxalate in each chamber; phloem rays thick-walled, radially elongated; secondary xylem composed of usual elements traversed by xylem rays; vessels drum-shaped with spiral thickenings, tracheids pitted with pointed ends, fibres of two types, shorter with wide lumen and longer with narrow lumen; xylem rays radially elongated, thick-walled, 1-6 cells wide and 3-30 cells high; pith consisting of polygonal, parenchymatous cells with intercellular spaces.

#### Leaf-

*Petiole* - shows single layered epidermis with thick cuticle; cortex 4-7 layered of thin walled, parenchymatous cells; pericycle arranged in a ring; 4 central vascular bundles present with two smaller vascular bundles arranged laterally, one in each wing.

*Midrib* - shows single layered epidermis, covered with thin-cuticle; upper epidermis followed by a single layered palisade, spongy parenchyma single layered, pericycle same as in petiole; vascular bundle single.

*Lamina* - shows epidermis on both surfaces, palisade single layered; spongy parenchyma, 3-5 layers consisting of circular cells; rosette crystals and a few veins present in spongy parenchyma.

**Fruit** - Shows single layered epidermis with a few non-glandular, branched, shaggy hairs; mesocarp of 5-6 layers of thin-walled, parenchymatous cells; some amphicribal vascular bundles found scattered in this region; endocarp of thick-walled, lignified cells followed by single layered, thin-walled, parenchymatous cells

**Seed** - Shows single layered radially elongated cells; followed by 5-6 layered angular cells filled with dark brown contents; endosperm consists of angular or elongated cells, a few containing prismatic crystals of calcium oxalate; cotyledons consists of thin-walled cells, a few cells containing rosette crystals of calcium oxalate; embryo straight with short and thick radicle.

**Powder** - Reddish-brown; shows, reticulate, pitted vessels, prismatic and rosette crystals of calcium oxalate, fibres, crystal fibres, yellow or brown parenchymatous cells, palisade cells non glandular, branched, shaggy hairs, single and compound starch grains, measuring 6-25  $\mu$  in dia. with 2 - 3 components

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' plate using n-Butanol : Acetic acid: Water: (4:1:5) Under U.V. (366 nm) four fluorescent zones appear at Rf. 0.35, 0.62, 0.69 (all blue) and 0.81 (bluish-pink). On exposure to Iodine vapour two spots appear at Rf. 0.35 and 0.94 (both yellow) On spraying with Dragendorff reagent followed by 5% Methanolic Sulphuric acid reagent one spot appears at Rf. 0.35 (orange).

## CONSTITUENTS - Alkaloid

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Pittahara, Grāhī

**IMPORTANT FORMULATIONS** - Samaṅgādi Cūrṇa, Kuṭajāvāleha, Puṣyānuga Cūrṇa, Bṛhat Gangādhara Cūrṇa.

**THERAPEUTIC USES** - Raktapitta, Atīśāra, Yoniroga, Śōpha, Dāha, Śvāsa, Vraṇa, Kuṣṭha

**DOSE** - 10-20 g of the drug for decoction.

## MADHŪKA (Flower)

Madhūka consists of flower usually without stalk or calyx of *Madhuca indica* J.F.Gmel. Syn. *M. latifolia* (Roxb.) Macbride, *Bassia latifolia* Roxb. (Fam. Sapotaceae) ; a medium sized deciduous tree occurs in mixed deciduous forests throughout India, and also cultivated.

### SYNONYMS

Sanskrit	:	Guḍapūṣpā
Assamese	:	Mahua, Mahuwa
Bengali	:	Mahuwa
English	:	The Indian Butter tree, Mahawash tree
Gujrati	:	Mahudo, Mahuwa
Hindi	:	Mahuwa
Kannada	:	Hippegida, Halippe, Hippe, Hippenara, Madhuka, Ippa, Eppimara
Kashmiri	:	--
Malayalam	:	Irippa, Ilippa, Iluppa, Eluppa
Marathi	:	Mohda
Oriya	:	Mahula
Punjabi	:	Maua, Mahua
Tamil	:	Katiluppai, Kattu Iluppai, Iluppi
Telugu	:	lppa Puvvu
Urdu	:	Mahuva

### DESCRIPTION

#### a) Macroscopic

Drug consists of mostly corolla and androecium; corolla fleshy, reddish-brown, tabular, lobes 7-14 (usually 8-9), ovate lanceolate, short, erect 0.5-2 cm long; stamen 20-30 (usually 24-26), epipetalous and arranged in two series; anther sub-sessile,

epipetalous, basifixed, lanceolate, pointed at tip and hairy at the back with prominent dark brown connective strand; taste, sweet.

#### **b) Microscopic**

Corolla - Petal shows a single layered epidermis, followed by thin-walled, irregularly shaped parenchymatous cells; vascular bundles found scattered in parenchymatous tissues.

Androecium - Anther shows 4 pollen chambers and prominent cells of connective tissue in the centre of the chambers; epidermis single layered covered with thin cuticle; a few unicellular hairs present on one side; endothecium composed of radially elongated, oval shaped, lignified cells; tapetum not distinct; pollen grains single or in groups, spherical, with clear exine and intine walls scattered in the pollen sac, a few cells of the vascular bundles are seen embedded in the connective tissues.

**Powder** - Dark brown; shows fragments of epidermal cells, unicellular hairs; round, brown pollen grains with clear exine and intine walls.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	25	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	70	per cent, Appendix	2.2.7.
Moisture content	Not more than	10	per cent, Appendix	2.2.9

#### **CONSTITUENTS** - Sugars

#### **PROPERTIES AND ACTION**

**Rasa** : Madhura

**Guṇa** : Guru

**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Vātahara, Pittakara, Śukrala, Śramahara, Balya, Ahṛdya

**IMPORTANT FORMULATIONS** - Madhūkāsava, Drākaṣādi Kvātha Cūrṇa, Elādi Modaka

**THERAPEUTIC USES** - Tṛṣṇā, Dāha, Śrama, Śvāsa, Kṣata, Kṣaya

**DOSE** - 10 - 15 g of the drug.

## MATSYĀKṢĪ (Whole Plant)

Matsyākṣī consists of dried whole plant of *Alternanthera sessilis* (Linn.) R. Br., Syn, *A. triandra* Lam., *A. denticulata* R. Br., *A. nodiflora* R. Br., *A. repens* Gmel., non Link. (Fam. Amaranthaceae); a small prostrate or ascending herb with several spreading branches growing throughout the warmer parts of the country and frequently found in wet places especially around tanks and ponds.

### SYNONYMS

Sanskrit	:	Matsyagandhā, Bahli, Matsyāduni, Gandālī, Gartkalambukā
Assamese	:	--
Bengali	:	Sanchesak, Salincha Sak
English	:	--
Gujrati	:	Jalajambo
Hindi	:	Gudari Sag
Kannada	:	Honagonne soppu
Kashmiri	:	--
Malayalam	:	Kozuppa, Ponnankanni
Marathi	:	Kanchari
Oriya	:	Matsagandha, Salincha Saaga
Punjabi	:	---
Tamil	:	Ponnangkanni
Telugu	:	Ponnaganti Koora
Urdu	:	-----

### DESCRIPTION

#### a) Macroscopic

**Root** - Cylindrical, 0.1-0.6 cm diameter, cream to grey, numerous roots arising from the main tap root as lateral rootlets; fracture, short; no characteristic odour and taste.

**Stem** - Herbaceous, weak, mostly cylindrical occasionally sub-quadrangular at the apical region, with spreading branches from the base; yellowish-brown to light-brown; nodes and internodes distinct, internodes 0.5-5 cm long, often rooting at lower nodes; fracture, short; no characteristic odour and taste.

**Leaf** - 1.3-7.5 cm long, 0.3-2 cm wide, sometimes reaching 10 cm long, 2.5 cm wide, sessile, linear-oblong, or elliptic, obtuse or subacute; no characteristic odour and taste.

**Flower** - Flower in small axillary sessile heads, white often tinged with pink, bracteoles 1.2 cm long, ovate, scarious; perianth 2.5-3 mm long, sepals ovate, acute, thin, ovary obcordate, compressed, style very short, capitate; no characteristic odour and taste.

**Fruit** - Utricle, 1.5 mm long, orbicular, compressed with thickened margins; no characteristic odour and taste.

#### **b) Microscopic**

**Root** - Shows circular outline consisting of 5-7 layered, thin-walled tangentially elongated and squarish, radially arranged cork cells; secondary cortex narrow, consistig of thin-walled, round or oval, parenchymatous cells; vascular bundles radially arranged, numerous, consisting of thin-walled cells; xylem tissues lignified; conjunctive tissue between bundles consisting of oval, thin-walled, parenchymatous cells; anomalous secondary growth occurs in the form of succession of rings of vascular bundles which are bicollateral, open and exarch; in the pith there are two larger vascular bundles composed of xylem and phloem; pith consisting of thin-walled, round to oval, isodiametric, parenchymatous cells.

**Stem** - Shows single layered epidermis consisting of round or oval, thin-walled cells covered with striated cuticle; cortex 6-10 layered consisting of thin-walled oval to round, parenchymatous cells and rosette crystals of calcium oxalate measuring 55-77  $\mu$  in diameter; vascular bundles arranged in a ring, with anomalous secondary growth; with are conjoint, bicollateral, open and endarch phloem narrow consisting of thin-walled cells traversed by phloem rays; xylem consisting of usual elements traversed by xylem rays; there are two vascular bundles situated in the peripheral region of pith, each bundle consisting of xylem and phloem; pith distinct, composed of thin-walled, round to oval parenchymatous cells with intercellular spaces, a few parenchymatous cells contain rosette crystals of calcium oxalate.

Leaf-

*Midrib* - shows single layered epidermis on both surfaces, covered with striated cuticle;

collenchymatous cells, 2-4 layered towards ventral side forming 1-2 small patches, 1-2 layered towards dorsal side; parenchymatous cells, thin-walled round or oval, isodiametric cells, a few of them containing rosette crystals of calcium oxalate; vascular bundles three, each consisting of xylem and phloem, present in the centre.

*Lamina* - dorsiventral; shows wavy or undulate, irregular, single layered, tabular epidermis cells present on both surfaces; stomata paracytic, more on ventral side and less on dorsal side; palisade 2-3 layers; spongy parenchyma 3-4 layered of oval or irregular loosely arranged cells; a few of them containing rosette crystals of calcium oxalate; stomatal index 22-26 in lower surface and 12-20 upper surface; palisade ratio 3-5; vein-islet number 6-12 and veinlet termination number 8-10.

Powder - Olive green; shows fragments of parenchymatous cells, wavy or undulate irregular epidermal cells in surface view, paracytic stomata, palisade cells and xylem vessels with pitted and reticulate thickening and rosette crystals of calcium oxalate.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 10 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 4.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 19 per cent, Appendix	2.2.7.

#### **ASSAY**

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' plate using Toluene : Ethylacetate (9:1) shows in visible light three spots at Rf. 0.16, 0.33 and 0.44 (all green). Under U.V. (366 nm) five fluorescent zones visible at Rf. 0.16, 0.33, 0.44, 0.54 and 0.68 (all red). On exposure to Iodine vapour eight spots appear at Rf. 0.18, 0.25, 0.35, 0.44, 0.59, 0.81, 0.94 and 0.96 (all yellow).

**CONSTITUENTS** - Sugar, Saponins & Sterols

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Grāhī

**IMPORTANT FORMULATIONS** - Traikaṇṭaka Ghṛta

**THERAPEUTIC USES** - Kuṣṭha, Raktavikāra, Pittavikāra

**DOSE** - 2 -3 g of the drug in powder form.

## METHĪ (Seed)

MethĪ consists of seeds of *Trigonella foenum-graecum* Linn. (Fam. Fabaceae); an aromatic, 30-60 cm tall, annual herb, cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Methini
Assamese	:	--
Bengali	:	--
English	:	Fenugreek
Gujrati	:	Methi
Hindi	:	Methi
Kannada	:	Menthe, Mente
Kashmiri	:	--
Malayalam	:	Uluva
Marathi	:	Methi
Oriya	:	--
Punjabi	:	Methi
Tamil	:	Mendium, Ventaiyam
Telugu	:	Mentulu
Urdu	:	Methi

### DESCRIPTION

#### a) Macroscopic

Seed oblong, rhomboidal with deep furrow running obliquely from one side, dividing seed into a larger and smaller part, 0.2-0.5 cm long, 0.15-0.35 cm broad, smooth, very hard; dull yellow; seed becomes mucilaginous when soaked in water; odour, pleasant; taste, bitter.

**b) Microscopic**

Seed - Seed shows a layer of thick-walled, columnar palisade, covered externally with thick cuticle; cells flat at base, mostly pointed but a few flattened at apex, supported internally by a tangentially wide bearer cells having radial rib-like thickenings; followed by 4-5 layers of tangentially elongated, thin-walled, parenchymatous cells; endosperm consists of a layer of thick-walled cells containing aleurone grains, several layers of thin walled, mucilaginous cells, varying in size, long axis radially elongated in outer region and tangentially elongated in inner region; cotyledons consists of 3-4 layers of palisade cells varying in size with long axis and a few layers of rudimentary spongy tissue; rudimentary vascular tissue situated in spongy mesophyll; cells of cotyledon contain aleurone grains and oil globules.

**Powder** - Yellow; shows groups of palisade parenchymatous cells, aleurone grains, oil globules, endosperm and epidermal cells of testa.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5 per cent, Appendix	2.2.6.

**CONSTITUENTS** - Alkaloid, Sapogenins and Mucilage.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Rucya

**IMPORTANT FORMULATIONS** - Mustakāriṣṭa, Mṛtasañjīvanī Surā

**THERAPEUTIC USES** - Aruci, Jvara, Grahaṇī, Prameha

**DOSE** - 3-6 g of the drug in powder form.

## MŪLAKA (Whole Plant)

Mŭlaka consists of fresh whole plant of *Raphanus sativus* Linn. (Fam. Brassicaceae); an annual or biennial bristly herb, cultivated throughout the country upto an altitude of 3,000 m in the Himalayas and other hilly regions.

### SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Mula
English	:	Radish
Gujrati	:	Mulo
Hindi	:	Muli
Kannada	:	Moolangi
Kashmiri	:	--
Malayalam	:	Mullanki
Marathi	:	Mula
Oriya	:	Mula, Rakhyasmula
Punjabi	:	Mulaka, Muli, Mula
Tamil	:	Mullangi
Telugu	:	Mullangi
Urdu	:	Muli

### DESCRIPTION

#### a) Macroscopic

Root - Root cylindrical, variable size and thickness, having a few longitudinal striations; light greyish-brown externally and faint yellowish internally; odour, not distinct; taste, slightly pungent.

Stem - Slender, hollow, cylindrical, compressed, smooth with branches arising at node and show longitudinal striations on drying; 0.1-1.0 cm in dia., yellowish-green.

Leaf - Lower leaves hairy, petiole 5-5.3 cm long, lyrate, coarsely toothed; upper most leaves simple, sub-linear but narrowed at the base; bright green.

Flower - Flower in long terminal raceme, bisexual, regular, complete 1-2 cm long, pedicel with scattered hairs; sepal 6.5-10 cm long, oblong, sometimes brown red; petals 1.7-2.2 cm long, blade obovate, sub-marginate at the apex, white or lilac with yellow or purple vein; stamen 6 in two whorls, two outer smaller and four inner longer; ovary superior, green or brown-purple, 10-12 ovuled; style about 4 mm long, 1-2 chambered.

Fruit - Siliqua, erect, cylindrical, 3-9 cm long and 0.8- 1.4 cm thick, continuous or more or less constricted, longitudinally sulcatus, greenish-yellow, occasionally pale purple.

Seed - Reddish-brown; irregularly globose, sometimes flattened, 2-4 mm long, 2 mm wide; surface generally smooth and sometimes wrinkled and grooved at micropylar end; taste, oily.

#### **b) Microscopic**

Root - shows 3-10 layered tangentially elongated, radially arranged, cork cells; secondary cortex composed of wide zone of oval to polygonal, elliptical, thin-walled, parenchymatous cells; secondary phloem mostly composed of sieve elements and parenchyma, traversed by phloem rays; secondary xylem mostly consisting of vessels and parenchyma, traversed by xylem rays; vessels mostly solitary or 2-3 in group; medullary rays four to many cells wide; starch grains simple and compound having 2-4 components, solitary or ingroups, round to oval, measuring 6-14  $\mu$  in dia. present in cortex, phloem, xylem parenchyma and ray cells.

Stem - Shows single layered epidermis with thick cuticle; cortex consists of 5-12 layers with intercellular spaces; endodermis at some places, single layered; pericycle occurs as crescent shaped groups of pericycle fibres; vessels solitary or 2-4 in groups, in macerated preparation show bordered pits and spiral thickening; tracheids and fibres aseptate with pointed ends; medullary rays 1-3 cells wide; pith a wide zone of polygonal, parenchymatous cells; starch grains simple, round to oval, measuring 3-6  $\mu$  in dia. present in cortex and phloem.

Leaf-

*Petiole* - appears nearly circular in outline with two lateral wings; epidermis single layered, covered with thick cuticle; hairs unicellular, present only on upper side; cortex 6-12 layers of oval to polygonal, thin-walled, parenchymatous cells; collateral vascular bundles arranged in a ring.

*Midrib* - appears biconvex in outline; epidermis on both side covered with thin cuticle; epidermis followed by 6- 12 layers of parenchymatous cortex on both sides; vascular bundle three in number, one central and two lateral.

*Lamina* - dorsiventral; epidermis on either surface with thin-cuticle; palisade 2-3 layers; spongy parenchyma 4-5 layers; anisocytic stomata present on both surfaces.

Fruit - Shows a single layered epidermis, covered with a thin-cuticle; epidermis followed by a wide zone of oval to polygonal, tangentially elongated, parenchymatous cells in which a few vascular bundles are embedded.

Seed - Seed coat consists of single layered epidermis of nearly rectangular cells, covered with thin, straight cuticle; epidermis followed by integument of radially elongated, reddish-brown, of columnar cells; beneath integument 2-3 layers of compressed, thinwalled, parenchymatous cells present; endosperm and embryo consists of oval to polygonal, thin-walled, parenchymatous cells, containing aleurone grains and oil globules.

**Powder** - Yellowish-green; shows aseptate fibres, spiral vessels, oil globules and round to oval starch grains, measuring 3-14  $\mu$  diameter.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	30	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Glucoside, Volatile oil (containing butyl crotonyl isothiocyanate sulphide) with a typical radish odour

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Dīpana, Pācana, Rucya, Svarya, Hṛdya

**IMPORTANT FORMULATIONS** - Mūlakakṣāra, Gandhaka Vaṭī, Hajarul yahūda Bhasma

**THERAPEUTIC USES** - Gulma, Arśa, Agnimāndya, Pīnasa, Udāvarta

**DOSE** - 20 - 40 ml of the drug in juice form.

## MŪLAKA (Root)

Mūlaka consists of fresh root of *Raphanus sativus* Linn. (Fam. Brassicaceae); an annual or biennial bristly herb, cultivated throughout the country upto an altitude of 3,000 m in the Himalayas and other hilly regions.

### SYNONYMS

Sanskrit	:	Salamarkataka, Visra, Saleya, Marusambhava
Assamese	:	Mula
Bengali	:	Mula
English	:	Radish
Gujrati	:	Mulo, Mula
Hindi	:	Muli
Kannada	:	Moolangi, Moclengi gadde, Mullangi, Mugunigadde
Kashmiri	:	--
Malayalam	:	Mullanki
Marathi	:	Mula
Oriya	:	Mula, Rakhyasmula
Punjabi	:	Mula, Mulaka, Muli
Tamil	:	Mullangi
Telugu	:	Mullangi
Urdu	:	Muli

### DESCRIPTION

#### a) Macroscopic

Root fleshy, fusiform, cylindrical, having a few lateral fibrous roots, variable in size, usually 25-40 cm in length, sometime cultivated species 75-90 cm in length and 50-60 cm in girth; white in colour; taste, slightly or strongly pungent, rarely sweet.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	24	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	36	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	33	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract of drug on Silica gel 'G' plate using Benzene: Ethylacetate (9: 1) Under U.V. (366 nm) two fluorescent zones appear at Rf. 0.04 & 0.09 (both blue). On exposure to Iodine vapour five spots appear at Rf 0.04, 0.09, 0.34, 0.49 & 0.69 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110° C three spots appear at Rf. 0.04, 0.09 & 0.47 (all violet)

**CONSTITUENTS** - Glucoside, Methylmercaptan and Volatile Oil.

### PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta  
**Guṇa** : Laghu, Tīkṣṇa

**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Pittahara, Kaphahara, Dīpana, Pācana, Rucya, Svarya, Hṛdya

**IMPORTANT FORMULATIONS** - Candanabalālākṣādi Taila, Mūlakakṣāra

**THERAPEUTIC USES** - Jvara, Śvāsa, Kāsa, Pīnasa, Galaroga, Vraṇa, Dadru, Netraroga, Gulma, Arśa, Agnimāndya, Udāvarta

**DOSE** - 15-30 ml of the drug in the juice form

## MURĀ (Root)

Murā consists of dried root of *Selinum candollei* DC. Syn. *S. tenuifolium* Wall. ex DC. (Fam. Apiaceae ); a perennial herb, 0.6 - 2.4 m tall, found commonly in the Himalayas from Kashmir to Nepal at an altitude of 1800 - 42000 m.

### SYNONYMS

Sanskrit	:	Surabhi, Daitya, Gandhakuti, Gandhavati
Assamese	:	--
Bengali	:	Musamansi
English	:	--
Gujrati	:	--
Hindi	:	Mura
Kannada	:	Halukoratige, Haggoratige
Kashmiri	:	--
Malayalam	:	Muramanchi
Marathi	:	Mura
Oriya	:	Muramansi
Punjabi	:	--
Tamil	:	Mural
Telugu	:	Mura
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Roots occur in broken and cylindrical pieces, 6-12 cm long and 0.3 - 1.5 cm thick with stem portions attached and covered with leaf sheaths, roots rough due to longitudinal striations and root scars; colour, dull brown; odour, aromatic; taste, slightly bitter.

## b) Microscopic

Root - Shows 10 - 25 layers of cork cells consisting of radially elongated, rectangular cells, outer cork cells filled with dark brown contents, inner cells thin-walled, tangentially elongated; cork cambium consisting of 1-2 layered tangentially elongated, thin-walled cells; secondary cortex composed of rounded, parenchymatous cells with intercellular spaces; secondary phloem shows wide zone, consisting of sieve elements and parenchyma, traversed by phloem rays; cambium 2-4 layered, consisting of tangentially elongated, thin-walled cells; secondary xylem consisting of vessels, fibres and parenchyma, traversed by xylem rays; vessels solitary or in groups of 2-6 or more having spiral thickenings; fibres aseptate, short with blunt ends; xylem rays 2-5 cells wide, composed of radially arranged, somewhat oval cells; starch grains simple, round to oval, measuring 7-55  $\mu$  in dia., present in secondary cortex, secondary phloem, xylem parenchyma, xylem and phloem rays; secretory canals numerous, distributed throughout secondary cortex, secondary phloem, secondary xylem and medullary rays; secretory canals lined by varying number of epithelial cells and filled with yellowish contents.

**Powder** - Brown; shows groups of cork cells, parenchymatous cells, secretory canals, oil globules and simple starch grains, round to oval measuring 7-55  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 9 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 3.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 9 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 17 per cent, Appendix	2.2.7.

**CONSTITUENTS** - Dihydropyrano-coumarines (identified as Isopteryxin and Anomalin), Sucrose and Mannitol.

## PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta, Kaṣāya, Madhura  
**Guṇa** : Laghu

**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Pittahara, Vātahara

**IMPORTANT FORMULATIONS** - Aravindāsava, Karpūrādyariṣṭa

**THERAPEUTIC USES** - Jvara, Dāha, Bhrama, Mūrchā, Śvāsa, Tṛṣṇā

**DOSE** - 1-3 g of the drug in powder form.

## MŪRVĀ (Root)

Murvā consists of dried root of *Marsdenia tenacissima* Wight. & Am. (Fam. Asclepiadaceae); a large stout, twining shrub, growing throughout the country

### SYNONYMS

Sanskrit	:	Madhusrava, Madhurasā
Assamese	:	Murha
Bengali	:	--
English	:	--
Gujrati	:	Moravel
Hindi	:	Murva, Jartor
Kannada	:	Koratige Hambu, Kallu Shambu, Koratige, Halukaratige, Kadaluhaleballi
Kashmiri	:	--
Malayalam	:	Perumkurumba
Marathi	:	Morvel
Oriya	:	Murva, Murga
Punjabi	:	--
Tamil	:	Perunkurinjan
Telugu	:	Chagaveru
Urdu	:	Turbud Safed

### DESCRIPTION

#### a) Macroscopic

Root cylindrical, available in cut pieces of varying length and 0.5-3 cm thick, externally yellow to buff coloured with dark brown patches on the cork; prominent longitudinal ridges and furrows and transverse cracks present; bark easily separable from

wood; fracture, short and granular in bark region and fibrous in wood; taste, slightly bitter; odour, indistinct.

#### **b) Microscopic**

**Root** - Shows a cork, composed of 15-25 layers of thin-walled, tangentially elongated, rectangular cells, some filled with reddish-brown contents; secondary cortex composed of an outer region of broken ring of stone cells of varying thickness, followed by wide zone of oval to polygonal parenchymatous cells; stone cells yellow in colour of variable shapes and size; secondary phloem composed of mostly parenchyma with small patches of sieve elements and small strands of stone cells, similar to those present in secondary cortex; resin cells present irregularly in this region; phloem fibres absent; phloem rays 1 - 3 cells wide; secondary xylem segmented and shows a wedge-shaped structure, consisting of small tangential, concentric bands of unlignified masses of parenchymatous tissue, separated by similar concentric band of lignified tissue, composed of vessels, tracheids, fibres, fibre tracheids and xylem parenchyma; in isolated preparation xylem vessels cylindrical with transverse articulations, vary in shape and size with bordered pits; fibres much elongated with mostly tapering ends and pitted walls; thick-walled and lignified parenchyma possess simple and bordered pits and scalariform thickening; xylem rays not distinctly marked where adjoining parenchyma is delignified; rosette and a few prismatic crystals of calcium oxalate and abundant starch grains, present in parenchymatous tissues; starch grains simple, elliptical to spherical with central hilum, 5.5-22  $\mu$  dia., compound starch grains having 2-3 or rarely upto 6 components.

**Powder** - Light brown; shows a number of stone cells, fibres, tracheids, fibre tracheids, vessels with pitted walls, fragments of cork, rosette and prismatic crystals of calcium oxalate, simple and compound starch grains, measuring 5.5 - 22  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Resin

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Guru, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Viṣaghna

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa, Paṭolādī Kvātha Cūrṇa, Prameha Mihira Taila, Sudarśana Cūrṇa

**THERAPEUTIC USES** - Jvara, Medoroga, Meha, Mukha Śoṣa, Kṛmiroga, Hṛdroga, Kaṇḍū, Arśa, Raktapitta, Tṛṣṇā

**DOSE** - 2-6 g of the drug in powder form. 10-20 g of the drug for decoction.

## NĀGAKEŚARA (Stamen)

Nāgakeśara consists of dried stamens of *Mesua ferrea* Linn. (Fam. Guttiferae); an evergreen tree, about 15-18 m high with short trunk, often buttressed at the base, occurring in the Himalayas from Nepal eastwards, Bengal, Assam, evergreen rain forests of North Kanara, Konkan, forests of Western Ghats and Andhra Pradesh.

### SYNONYMS

Sanskrit	:	Keśara, Nāgapuṣpa, Nāga, Hemā, Gajakeśara
Assamese	:	Negeshvar, Nahar
Bengali	:	Nageshvara, Nagesar
English	:	Cobras Saffron
Gujrati	:	Nagkesara, Sachunagkeshara, Nagchampa, Pilunagkesar, Tamranagkesar
Hindi	:	Nagkesara, Pila Nagkesara
Kannada	:	Nagsampige, Nagakesari
Kashmiri	:	--
Malayalam	:	Nangaa, Nauga, Peri, Veluthapala, Nagppu, Nagappovu
Marathi	:	Nagkesara
Oriya	:	Nageswar
Punjabi	:	Nageswar
Tamil	:	Naugu, Naugaliral, Nagachampakam, Sirunagappu
Telugu	:	Nagachampakamu
Urdu	:	Narmushk, Nagkesar

### DESCRIPTION

#### a) Macroscopic

Stamen consists of anther, connective and filament; coppery or golden brown; filament united at base forming a fleshy ring; each stamen 0.9-1.9 cm long; anther about 0.5 cm long, linear, basifixed, containing pollen grains; filament 0.8 - 1.0 cm long;

slender, filiform, more or less twisted, soft to touch, quite brittle; connective not visible with naked eye; odour, fragrant; taste, astringent.

#### b) Microscopic

**Androecium** - Anther shows golden-brown, longitudinally dehiscent anther wall, consisting of thin-walled, parenchymatous cells, pollen grains numerous in groups or in single, yellowish and thin-walled, many pollen grains having 1-3 minute, distinct protuberances on walls, thick-walled, exine and intine distinct.

**Powder** - Brown; shows elongated cells of filament, connective and numerous golden yellow pollen grains having 1-3 protuberances.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Essential oil and Oleo-resin.

#### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Varṇya, Vastivātāmayaghna, Ūrdhvajatrugatarogahara

**IMPORTANT FORMULATIONS** - Candanabalālākṣādi Taila, Kumāryāsava, Nāgakesarādi Cūrṇa

**THERAPEUTIC USES** - Vātarakta, Śopharoga, Vastiroga, Raktapitta

**DOSE** - 1-3 g of the drug in powder form.

## NĪLĪ (Leaf)

NĪlĪ (leaf) consists of dried leaf of *Indigofera tinctoria* Linn. (Fam. Fabaceae); a shrub, 1.2- 1.8 m high, found throughout and widely cultivated in many parts of the country.

### SYNONYMS

Sanskrit	:	NĪlikā, NĪlinī, Rangapatrī
Assamese	:	Nilbam
Bengali	:	Nil
English	:	Indigo
Gujrati	:	Gali, Galiparna
Hindi	:	Nili
Kannada	:	Karunili
Kashmiri	:	--
Malayalam	:	Neelamar
Marathi	:	Neel
Oriya	:	Nili, Nila
Punjabi	:	Neel
Tamil	:	Avuri
Telugu	:	Nili Chettu, Nili
Urdu	:	Neel

### DESCRIPTION

#### a) Macroscopic

Drug occurs mostly in the form of leaflets and broken pieces of rachis; leaflet 1-2.5 cm long and 0.3-1.2 cm wide, oblong or oblanceolate with very short mucronate tip; pale green to greenish-black; no characteristic odour and taste.

## b) Microscopic

### Leaf-

*Petiole* - appears nearly circular in outline having two lateral wings; epidermis single layered covered externally with thin cuticle and followed internally by single layered collenchymatous cells; pericycle present in the form of continuous or discontinuous ring, vascular bundles collateral and three in number, large one present in central and two smaller in lateral wings; pith composed of round to oval, thin-walled parenchymatous cells, a few prismatic crystals of calcium oxalate present in phloem and pith region.

*Midrib* - shows epidermis, cuticle and hair, similar as in petiole; beneath epidermis on lower side single or 2-3 layers of collenchyma on upper side present, both followed by 2- 3 layers of thin-walled parenchyma; vascular bundle single, collateral and crescent shaped.

*Lamina* - shows dorsiventral structure; epidermis, cuticle and hair, similar as in petiole and midrib; palisade 2-3 layers; spongy parenchyma 2-4 layered, a few patches of veins scattered between palisade and spongy parenchyma, prismatic crystals of calcium oxalate rarely present in mesophyll cells; paracytic stomata and hair present on both surfaces but abundant in lower surface

Powder - Greenish-grey; shows groups of mesophyll cells, aseptate fibres, pitted vessels, unicellular hairs and rarely prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Glycoside (Indican).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Recanī, Keśya

**IMPORTANT FORMULATIONS** - Nīlī Bhṛṅgādi Taila (For external use only),  
Mahāpañcagavya Ghṛta

**THERAPEUTIC USES** - Āmavāta, Vātarakta, Udararoga, Udāvarta, Plīhāroga, Gulma, Jvara,  
Kāsa, Viṣavikāra, Kṛmiroga

**DOSE** - 50-100 g of decoction.

## NĪLĪ (Root)

NĪlĪ (Root) consists of dried root of *Indigofera tinctoria* Linn. (Fam. Fabaceae); a shrub, 1.2-1.8 m high, found throughout and widely cultivated in many parts of the country.

### SYNONYMS

Sanskrit	:	NĪlĪkā, RangapatrĪ, NĪlinĪ
Assamese	:	Nilbam
Bengali	:	Nil
English	:	Indigo, Indian Indigo
Gujrati	:	Gali, Nil, Gari
Hindi	:	Nili
Kannada	:	Kadunili, Karunili, Nili, Neeligida, Olleneeli
Kashmiri	:	--
Malayalam	:	Amari, Nila
Marathi	:	Nili, Nila
Oriya	:	--
Punjabi	:	Neel
Tamil	:	Avuri, Neeli
Telugu	:	Nili, Nili Chettu, Aviri
Urdu	:	Neel

### DESCRIPTION

#### a) Macroscopic

Root mostly available in pieces, hard, woody, cylindrical, 0.1 -1.5 cm thick, surface nearly smooth except for a few scattered lenticels; pale-yellow to light yellowish-brown; odour not distinct; taste, slightly bitter.

**b) Microscopic**

Root -Shows a narrow zone of cork consisting of 4- 10 layers of tangentially elongated, rectangular, thin-walled cells, with lenticels; secondary cortex a narrow zone, consisting of rectangular to polygonal, thin-walled cells, group of fibres, measuring 11-17  $\mu$  in dia., thick-walled and lignified with wide lumen; secondary phloem composed of usual elements; wood occupies bulk parts of the root, consisting of usual elements; vessels solitary or 2-4 in groups having simple pits; fibres present in the form of alternating bands of parenchyma; parenchyma cells rectangular to polygonal in shape and attached on both the opposite sides of vessels; medullary rays 1 -4 cells wide; prismatic crystals of calcium oxalate present in secondary cortex, phloem and xylem parenchyma and rays; oil globules present in cortex and phloem parenchyma; starch grains simple, round to oval, measuring 3-11  $\mu$  in dia., present in cortex, phloem, xylem parenchyma and rays.

Powder - Creamish-brown; shows aseptate fibres, pitted vessels, simple and compound starch grains, measuring 3-11  $\mu$  in dia., rarely oil globules and prismatic crystals of calcium oxalate.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'GF 254 + Silica gel 'G' (1:3 w/w) plate using Chloroform : Ethylacetate (6:4) show under U.V. (366 nm) ten fluorescent zones at Rf. 0.14 (blue), 0.30 (bluish green), 0.40 (blue), 0.47 (blue), 0.58 (blue), 0.63 (bluish green), 0.75 (blue), 0.81 (blue), 0.86 (green) and 0.91 (blue). On exposure to Iodine vapour thirteen spots appear at Rf. 0.06, 0.10, 0.14, 0.27, 0.33, 0.40, 0.50, 0.58, 0.63, 0.75,

0.80, 0.86 and 0.91 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 110°C for ten minutes fourteen spots appear at Rf. 0.06, 0.10, 0.14, 0.21, 0.27, 0.33, 0.40, 0.50, 0.58, 0.63, 0.75, 0.81, 0.86, and 0.91 (all grey).

**CONSTITUENTS** - Glycoside (Indican)

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Recanī, Keśya, Bhrama Mohahara

**IMPORTANT FORMULATIONS** - Aravindāsava, Triphalādi Taila

**THERAPEUTIC USES** - Vātarakta, Āmavāta, Udāvarta, Udararoga, Plīhāroga, Viṣavikāra, Kāsa, Gulma, Kṛmiroga

**DOSE** - 48 g of drug for decoction.

## **NIMBA (Leaf)**

Nimba (Leaf) consists of dried leaf of *Azadirachta indica* A. Juss Syn. *Melia azadirachta* Linn. (Fam. Meliaceae); a moderate sized to fairly large evergreen tree, attaining a height of 12-15 m with stout trunk and spreading branches, occurring throughout the country up to an elevation of 900 m.

### **SYNONYMS**

Sanskrit	:	Ariṣṭa, Picumarda
Assamese	:	Mahanim
Bengali	:	Nim, Nimgach
English	:	Margosa Tree
Gujrati	:	Limba, Limbado, Limado, Kohumba
Hindi	:	Nim, Nimba
Kannada	:	Nimba, Bevu, Oilevevu, Kahibevu, Bevinama
Kashmiri	:	--
Malayalam	:	Veppu, Aryaveppu, Nimbam, Veppa
Marathi	:	Balantanimba, Limba, Bakayan, Nim, Kadunimb
Oriya	:	Nimba
Punjabi	:	Nimba, Bakan, Nim
Tamil	:	Vemmu, Veppu, Arulundi, Veppan
Telugu	:	Vemu, Vepa
Urdu	:	Neem

### **DESCRIPTION**

#### **a) Macroscopic**

**Leaves** - Compound, alternate, rachis 15-25 cm long, 0.1 cm thick; leaflets with oblique base, opposite, exstipulate, lanceolate, acute, serrate, 7-8.5 cm long and 1.0-1.7 cm wide, slightly yellowish-green; odour, indistinct; taste, bitter

## b) Microscopic

### Leaf-

*Midrib* -leaflet through midrib shows a biconvex outline; epidermis on either side covered externally with thick cuticle; below epidermis 4-5 layered collenchyma present; stele composed of one crescent-shaped vascular bundle towards lower and two to three smaller bundle towards upper surface; rest of tissues composed of thin-walled, parenchymatous cells having secretory cells and rosette crystals of calcium oxalate; phloem surrounded by non-lignified fibre strand; crystals also present in phloem region.

*Lamina* - shows dorsiventral structure; epidermis on either surface, composed of thin walled, tangentially elongated cells, covered externally with thick cuticle; anomocytic stomata present on lower surface only; palisade single layered; spongy parenchyma composed of 5-6 layered, thin-walled cells, traversed by a number of veins; rosette crystals of calcium oxalate present in a few cells; palisade ratio 3.0-4.5; stomatal index 13.0-14.5 on lower surface and 8.0-11.5 on upper surface.

Powder - Green; shows vessels, fibres, rosette crystals of calcium oxalate, fragments of spongy and palisade parenchyma.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	13	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	19	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Triterpenoids and Sterols.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātalā, Pittanāśaka, Grāhī

**IMPORTANT FORMULATIONS** - Kāsīsādi Ghṛta, Jātyādi Ghṛta, Ārogyavardhinī Guṭikā, Nimbapatrādi upanāha, Pañcagūṇa Taila

**THERAPEUTIC USES** - Jvara, Āmaśoṭha, Vraṇa, Kuṣṭha, Prameha, Netraroga, Kṛmiroga, Viṣaroga

**DOSE** - 1-3 g of the drug in powder form. 10-20 ml of the drug for decoction.

## **NIMBA (Stem Bark)**

Nimba (stem bark) consists of stem bark of *Azadirachta indica* A. Juss. Syn. *Melia azadirachta* Linn. (Fam. Meliaceae); a moderate sized to fairly large, evergreen tree, attaining a height of 12-15 m with stout trunk and spreading branches, occurring throughout the country upto an elevation of 900 m.

### **SYNONYMS**

Sanskrit	:	Ariṣṭa, Picumarda
Assamese	:	Mahanim
Bengali	:	Nim, Nimgacha
English	:	Margosa Trees
Gujrati	:	Kadvo Limbdo
Hindi	:	Nim, Nimb
Kannada	:	Bevu, Kahibevu, Nimba, Oilevevu
Kashmiri	:	--
Malayalam	:	Veppu, Aruveppu
Marathi	:	Balantanimba, Kadunimb, Limba
Oriya	:	Nimba
Punjabi	:	Nim, Nimba, Bakam
Tamil	:	Veppai, Vembu
Telugu	:	Vemu, Vepa
Urdu	:	Neem

### **DESCRIPTION**

#### **a) Macroscopic**

Bark varies much in thickness according to age and parts of tree from where it is taken; external surface rough, fissured and rusty-grey; laminated inner surface yellowish and foliaceous, fracture, fibrous; odour, characteristic; taste, bitter

**b) Microscopic**

Stem Bark -Shows outer exfoliating pieces hard, woody, considerably thick in older barks; almost entirely dead elements of secondary phloem, alternating with discontinuous tangential bands of compressed cork tissue, former composed of several layers of stone cells occurring in regularly arranged groups together with collapsed phloem elements filled with brown contents; in between the successive zones of cork tissue 3-5 layers of fibre groups with intervening thin-walled and often collapsed phloem elements present; each zone of cork tissue consists of several layers of regular, thin-walled cells occasionally with a few compressed rows of thick-walled cells towards outer surface; within exfoliating portion a number of layers of newly formed cork composed of thin walled, rectangular cells and one or two layers of cork cambium, below which a wide zone of secondary phloem present; secondary cortex absent in most cases; secondary phloem commonly composed of well-developed fibre bundles traversed by 2-4 seriate phloem rays and transversely separated by bands of parenchymatous tissue of phloem; phloem elements of outer bark mostly collapsed; a few fairly large secretory cavities also occur in phloem; most of phloem parenchyma contain starch grains and prismatic crystals of calcium oxalate; starch grains, simple, round with central hilum, measuring 2.75-5  $\mu$  structure of bark varies considerably according to gradual formation of secondary cork bands.

Powder - Reddish-brown; shows numerous prismatic crystals of calcium oxalate, phloem fibres with narrow lumen and pointed ends; cork cells, stone cells mostly in groups, lignified rectangular to polygonal, having wide lumen and distinct striations, simple starch grains, measuring 2.75-5  $\mu$  in diameter.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.

Water-soluble extractive

Not less than 5 per cent, Appendix 2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform : Ethylacetate; Formic acid (5:4: 1) shows under U.V. (366nm) three fluorescent zones at Rf. 0.72 (blue), 0.86 (blue), and 0.90 (green). On spraying with 5% Methanolic Phosphomolybdic acid reagent and heating the plate for about ten minutes at 105°C four spots appear at Rf. 0.20, 0.45, 0.63 and 0.90 (all blue).

**CONSTITUENTS** - Bitter principles Nimbin and Nimbiol

### **PROPERTIES AND ACTION**

**Rasa** : Tikta  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Kaphahara, Pittahara, Viṣaghna, Kaṇḍūghna, Vraṇaśodhanakara, Hṛdayavidāhaśāntikara

**IMPORTANT FORMULATIONS** - Nimbādi Kvātha Cūrṇa, Nimbādi Cūrṇa, Pañcanimba Cūrṇa, Pañcatikta Guggulu Ghṛta, Pathyādi Kvātha (Ṣaḍaṅga) Cūrṇa, Sudarśana Cūrṇa

**THERAPEUTIC USES** - Vraṇa, Kuṣṭha, Prameha, Kaṇḍū, Kṛmiroga, Jvara, Dāha, Rakta Pitta

**DOSE** - 2-4 g of the drug in powder form, Decoction should be used externally.

## PALĀŚĀ (Stem Bark)

Palāśa consists of dried stem bark of *Butea monosperma* (Lam.) Kuntze (Fam. Fabaceae); a medium sized tree with somewhat crooked trunk, 12 - 15 m high with irregular branches, commonly found throughout the greater part of the country upto about 915 m, except in very arid parts.

### SYNONYMS

Sanskrit	:	Kimśuka, Raktapuṣpaka
Assamese	:	Kulekhara
Bengali	:	Palash Gachha, Palash, Palas
English	:	Bastard peak
Gujrati	:	Kesudo, Khakharo, Khakhapado
Hindi	:	Dhak, Tesu
Kannada	:	Muttug, Muttuga, Muttala
Kashmiri	:	--
Malayalam	:	Plasu, Camata, Plas, Chama Tha
Marathi	:	Palas
Oriya	:	--
Punjabi	:	Palash, Dhak, Tesu
Tamil	:	Purasu, Paras
Telugu	:	Moduga, Modugu, Chettu
Urdu	:	Dhak, Palaspapda

### DESCRIPTION

#### a) Macroscopic

Mature stem bark, 0.5 - 1 cm thick, greyish to pale brown, curved, rough due to presence of rhytidoma, and scattered dark brown spots of exudate; rhytidoma 0.2 cm thick

usually peels off, exposing light brown surface, exfoliation of cork and presence of shallow longitudinal and transverse fissures; fracture, laminated in outer part and fibrous in inner part; internal surface rough, pale brown; taste, slightly astringent.

#### **b) Microscopic**

Stem **Bark** -Mature bark shows rhytidoma consisting of alternating layers of cork, secondary cortex and phloem tissue; cork cells, thin-walled, 5-10 or more layered, rectangular, dark-brown; secondary cortical cells round and irregular in outline, dark brown, moderately thick-walled; tanniferous cells, often in groups, having brown colour, sometimes containing mucilage and other materials found scattered in this zone; beneath this zone regular cork consisting of 4-12 rows of radially arranged, rectangular cells followed by a zone of 2 - 4 layers of sclereids; secondary phloem consisting of sieve tubes, companion cells, phloem parenchyma, phloem fibres, crystal fibres, traversed by phloem rays; in outer and middle phloem regions phloem tissues get crushed and form tangential bands of ceratenchyma; phloem fibres arranged in tangential bands alternating with sieve tubes and phloem parenchyma; most of fibre groups contain prismatic crystals of calcium oxalate forming crystal sheath; in macerated preparation phloem fibres appear thick-walled lignified elongated with tapering or bifurcated ends; crystal fibres divided into a number of chambers containing a prismatic crystal of calcium oxalate in each chamber; phloem rays multiseriate 4 - 12 cells wide, 7 - 50 cells in height, straight; prismatic crystals of calcium oxalate found scattered in the secondary phloem tissues and phloem rays; starch grains simple or compound having 2 - 3 components, measuring 2.75 - 13.75  $\mu$  in dia., found scattered in phloem parenchyma and phloem ray cells abundantly; tanniferous cells and secretory cavities also occur in secondary phloem.

Powder - Reddish-brown; shows numerous prismatic crystals of calcium oxalate, starch grains simple and compound with 2 - 3 components measuring 3-14  $\mu$  in dia., dark brown coloured cells, sclereids mostly in groups, thin-walled cork cells, numerous crystal fibres in group or singles

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.5	per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14 per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene : Ethylacetate (90: 10) under U.V. (366 nm) shows four fluorescent zones at Rf. 0.10, 0.18, 0.48, 0.65 (all blue). On exposure to Iodine vapour three spots appear at Rf. 0.10, 0.48 and 0.67 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C three spots appear at Rf. 0.10, 0.48 and 0.67 (all violet).

**CONSTITUENTS** - Kinotannic acid and Gallic acid.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Kaṭu, Tikta
<b>Guṇa</b>	:	Sara, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphavātaśāma, Agnidīpaka, Sāraka, Vṛṣya

**IMPORTANT FORMULATIONS** - Palāśa Kṣāra, Nyagrodhādi Kvātha Cūrṇa, Mahānārāyaṇa Taila

**THERAPEUTIC USES** - Grahaṇī, Gulma, Arśa, Vraṇa, Kṛmiroga

**DOSE** - 5-10 g of the drug in powder form for decoction.

## PĀRIBHADRA (Stem Bark)

Pāribhadra consists of the dried stem bark of *Erythrina indica* Lam. (Fam. Fabaceae); medium sized, quick growing tree, distributed widely in deciduous forests throughout India, also grown in gardens as an ornamental plant and as a support for black pepper vine.

### SYNONYMS

Sanskrit	:	Pāribhadra, Kaṇṭakimśuka
Assamese	:	--
Bengali	:	Pattemadar
English	:	Coral tree
Gujrati	:	Panderavo
Hindi	:	Pharahada, Pangara
Kannada	:	Hongar, Halivanadamar
Kashmiri	:	--
Malayalam	:	Murrikku
Marathi	:	Pangara
Oriya	:	--
Punjabi	:	--
Tamil	:	Kalyanamurongai, Mulmurumgai
Telugu	:	Badisa, Varifamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Mature dried stem bark about 0.5-2.0 cm thick, smooth, exfoliating in narrow strips; outer surface yellowish to yellowish-grey, lenticels found at short intervals longitudinal lines on the outer surface, yellowish to cream coloured; whole bark differentiated into outer

non-fibrous and inner fibrous zones, outer bark breaks readily with a short fracture, inner bark fibrous.

**b) Microscopic**

**Stem Bark** - Mature bark shows stratified and lignified cork of about 2-9 or more alternating bands of narrow tangentially elongated compressed, yellowish coloured cells and of wider cells in 3-25 or more layers, tangentially elongated to squarish, radially arranged and thin-walled; a few cells contain prismatic crystals of calcium oxalate; secondary cortex consists of large, somewhat tangentially elongated to polygonal, parenchymatous cells, a few cells contain prismatic crystals of calcium oxalate, stone cells occur in singles or in groups which are circular, elongated or rectangular in shape, parenchymatous cells surrounding stone cells groups, contain large crystals of calcium oxalate; secondary phloem consisting of sieve tubes with their companion cells, phloem fibres and phloem parenchyma traversed by phloem rays; phloem fibres, mostly arranged in tangential strips alternating with the regular thin-walled phloem elements, sieve elements in outer and middle regions of phloem mostly get collapsed and crushed and form many tangential strips of ceratenchyma between the tangential groups of phloem fibres; fibres large, thick-walled with narrow lumen; crystal fibres numerous, septate and each chamber contains a single prismatic crystals of calcium oxalate; phloem parenchyma thin-walled, a few of them contains crystals of calcium oxalate similar to those found in the secondary cortex and crystal fibres; phloem rays numerous and mostly multiseriate running almost straight in the inner phloem region but bent towards left or right in the outer phloem region; ray cells thin-walled, radially elongated in the inner region and slightly tangentially elongated towards outer region in transverse section.

Powder - Creamish-yellow; shows stratified cork, pieces of phloem fibres, stone cells and prismatic crystals of calcium oxalate.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids and Resins

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Medohara, Kṛmighna

**IMPORTANT FORMULATIONS** - Nyagrodhādi Cūrṇa, Abhayā Lavaṇa, Nārāyaṇa Taila

**THERAPEUTIC USES** - Kṛmiroga, Śoṭha, Karṇaroga

**DOSE** - 6-12 g of the drug in powder form.

12-24 g of the drug for decoction.

## PIPPALĪMŪLA (Stem)

PippalĪmūla consists of dried, cut, stem pieces of *Piper longum* Linn. (Fam. Piperaceae); a slender, aromatic, creeping and perennial herb; native of the hotter parts of the country and found wild as well as cultivated extensively in Bengal and southern states.

### SYNONYMS

Sanskrit	:	Māgadhī, Granthikā, Pippalikā
Assamese	:	Kulekhara
Bengali	:	Pipulmul
English	:	Piper root
Gujrati	:	Gantoda, Ganthoda
Hindi	:	Piparamula
Kannada	:	Modikaddi, Hippali, Tippali, Modi
Kashmiri	:	--
Malayalam	:	Kattuthippaliver, Tippaliveru
Marathi	:	Pimplimula
Oriya	:	Pippalimula, Bana Pippalimula
Punjabi	:	Pippalimula, Magha
Tamil	:	Kanda Tippili, Ambinadi Desavaram
Telugu	:	Modi, Madikatta
Urdu	:	Filfil Daraz

### DESCRIPTION

#### a) Macroscopic

Drug available in cut pieces, having distinct internodes and swollen nodes with a number of small rootlets and root scars; stout, cylindrical, 0.2-0.6 cm thick, reddish brown to grey; odour, aromatic; taste, pungent.

## **b) Microscopic**

Stem - Shows a single layered epidermis followed by a continuous ring of collenchymatous and round to oval thin-walled, parenchymatous cells; vascular bundles show peripheral and medullary arrangement, separated from each other by a wavy strip of sclerenchyma forming a ring, enclosing pith; bundles collateral and arranged in rings, having sclerenchymatous sheath of pericyclic cap over phloem; xylem wedge-shaped; starch grains simple and compound having 2-7 components, round to oval, measuring 3-14  $\mu$  in dia., present abundantly throughout the section.

Powder - Reddish-brown to crearnish-grey; under microscope shows scalariform vessels, aseptate fibres, simple and compound starch grains measuring 3-14  $\mu$  in diameter.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 5.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 4.0 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 12 per cent, Appendix	2.2.7.

## **ASSAY**

### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. light eight spots at Rf. 0.04 (yellow), 0.12 (light green), 0.25 (green), 0.31 (light green), 0.36 (light green), 0.53 (light green), 0.65 (green) and 0.97 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.13, 0.25, 0.40, 0.89, 0.93 (all yellow). On spraying with Dragendorff reagent two orange coloured spots appear at Rf. 0.13 & 0.25.

**CONSTITUENTS** - Alkaloids (Piperine, Piperlongumine, Piperlonguminine etc), Essential Oils.

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Dīpana, Pācana, Vātānulomana, Śūlapraśamana, Rucya

**IMPORTANT FORMULATIONS** - Pañcakola Cūrṇa, Daśamūla Taila, Daśamūlapañcakolādi Kvātha Cūrṇa, Daśamūlaṣṭapalaka Ghṛta

**THERAPEUTIC USES** - Udararoga, Ānāha, Gulma, Kṛmiroga, Vātaroga

**DOSE** - 0.5 - 1g of the drug in powder form.

## PLAKṢA (Stem Bark)

Plakṣa consists of dried stem bark of *Ficus lacor Buch.* - Ham. = *F. lucescens Blume.*, Syn. *F. infectoria* Roxb. (Fam. Moraceae); a large spreading tree, with occasional aerial roots, found nearly throughout the country and commonly planted as an avenue and ornamental tree.

### SYNONYMS

Sanskrit	:	Parkarī, Parkatī, Jatī
Assamese	:	--
Bengali	:	Pakur
English	:	--
Gujrati	:	Paras pipalo, Pepli
Hindi	:	Pakad
Kannada	:	Karibasari, Kadubasari, Jeevibasari, Basari, Juvvebasari
Kashmiri	:	--
Malayalam	:	Itti, Ittiyadi, Itthy
Marathi	:	--
Oriya	:	Pakali, Pakal
Punjabi	:	--
Tamil	:	Icchi, Itthi, Kallalnaram
Telugu	:	---
Urdu	:	Pakhad

### DESCRIPTION

#### a) Macroscopic

Bark rough, occurring in flat to curved, quilled pieces, measuring 0.4-0.7 cm in thickness; external surface ash or whitish-grey; numerous transversely arranged lenticels;

ranging from 0.1 cm - 1.3 cm in length, lip-shaped and exfoliating; internal surface rough, fibrous, longitudinally striated, reddish-brown; fracture, fibrous.

#### **b) Microscopic**

Shows 5-8 layered cork consisting of thin-walled, rectangular cells, a few external layers exfoliating; secondary cortex very wide consisting of compactly arranged, rectangular, thick-walled, pitted cells, patches of circular to elongated, lignified, elliptical stone cells with radiating canals, a few with concentric striations; a few prismatic crystals of calcium oxalate and reddish-brown contents found scattered throughout the secondary cortex; secondary phloem very wide consisting of mostly stratified layers of collapsed cells forming ceratenchyma, groups of fibres, phloem parenchyma, laticiferous cells, traversed by 2-5 seriate phloem rays; phloem fibres lignified with wide lumen and pointed tips; thin-walled, rectangular, a few phloem parenchyma containing prismatic crystals of calcium oxalate.

Powder - Reddish-brown; shows thick-walled parenchyma with simple pits; stone cells in groups and singles, prismatic crystals of calcium oxalate, elongated phloem fibres with wide lumen and pointed tips.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Sterols, Sugar, Tannin, Alkaloid and Saponin

#### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Kaṣāya

**Guṇa** : Rūkṣa

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Pittahara, Kaphahara, Medohara, Stambhana, Dāhahara, Śramahara, Saṅgrāhī, Bhagnasandhānaka, Yonidoṣahara

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa, Nālpāmarādi Taila, Marma Guṭikā

**THERAPEUTIC USES** - Raktapitta, Mūrccā, Vraṇa, Yoniroga, Śoṭha, Visarpa, Atīśāra

**DOSE** - 50 g of the drug in powder form for decoction.

## PRASĀRIṆĪ (Whole Plant)

Prasāriṇī consists of dried whole plant of *Paederia foetida* Linn. (Fam. Rubiaceae); an extensive foetid smelling perennial climber, found in most of the parts of country.

### SYNONYMS

Sanskrit	:	Sāraṇī, Prasāraṇī, Gandhapatra
Assamese	:	Bhedilata
Bengali	:	--
English	:	--
Gujrati	:	Prasarini
Hindi	:	Gandha Prasarini
Kannada	:	Hesarani, Prasarini bail
Kashmiri	:	--
Malayalam	:	Tala nili
Marathi	:	Hiranvel, Haranvel
Oriya	:	--
Punjabi	:	Prasarini
Tamil	:	Mudiyar Kundal
Telugu	:	Gontima goru-Teega
Urdu	:	---

### DESCRIPTION

#### a) Macroscopic

Root - Tap root 2-4 cm long, 0.5-2 cm thick, cylindrical or sub cylindrical, tortuous, having a number of branches and rootlets; dark brown; surface rough due to longitudinal wrinkles, ridges and fissures; remnants of rootlet, thin scars and numerous horizontal lenticels also present; fracture, short in bark region and somewhat fibrous in wood; odour, disagreeable and foetid more marked in fresh samples; taste, indistinct.

Stem - Slender, sub-erect with diffuse branching, upto 4 cm thick; subcylindrical showing a dumb-bell shaped appearance in transverse view due to presence of two prominent furrows running opposite each other on both surfaces, externally dark brown, longitudinal anastomosing wrinkles, ridges and a few transverse cracks and circular lenticels, fracture, fibrous; odour, foetid more marked in fresh samples; taste, indistinct.

Leaf - Simple, petiolate, stipulate; 10-15 cm long, 5-6 cm broad; somewhat glabrous; ovate, entire, base narrow or broad, apex acute or cuspidate; stipule ovate, lanceolate, bifid, entire, acute, base broad with hairy surface, texture, thin; odour, foetid more distinct in fresh samples; taste, indistinct.

Flower - Violet to pink; bracteate, pedicellate, bisexual, calyx campanulate, acutely, toothed; corolla funnel-shaped, usually pubescent, somewhat gibbous and wooly inside, limb narrow, divided into five cordate crenulate segments, lobes short; filament short, inserted irregularly about the middle of the tube, anther erect within the tube; ovary turbinate, two celled containing one ovule, each attached to the bottom of the cell; style, simple; stigma two cleft with lobes bent amongst the anther.

Fruit - Berry, orbicular, ellipsoid, compressed, smooth with five lines on each side, one celled, two seeded, 1.1 cm across, red or black.

Seed - Compressed, smooth, enlarged with somewhat membranous ring all round.

#### **b) Microscopic**

Root - Mature root shows 6-13 layers of cork, composed of tangentially elongated cells, in outer few layers somewhat collapsed, lignified and filled with brown content; cork cambium 1-2 layers; secondary cortex 5-16 layers of thin-walled; somewhat radially arranged parenchymatous cells; secondary phloem appears as wedge-shaped conical masses consisting of sieve elements and parenchyma traversed by phloem rays; major portion of phloem element thick-walled, sieve elements form collapsed masses of ceratenchyma in outer region and intact in inner most region; uni to biseriate phloem rays composed of usually thick-walled cells in outer and middle phloem region; multiseriate phloem rays composed of thin-walled parenchymatous cells showing funnel-shaped dilatation in outer phloem region; in tangential section through inner phloem region sieve cells shows beaded thickening; cambium 1-3 layered; secondary xylem consists of wide zone of lignified and non-lignified tissue traversed by xylem rays; lignified tissue consists of vessels, tracheids and fibres; non-lignified tissue consists of thin-walled parenchymatous cells; xylem vessels distributed singly or in groups of two to three having variable shape and bordered pits; tracheids long and narrow having bordered pits; fibres long, narrow having simple pits; xylem parenchyma have simple pits or reticulate thickening; xylem ray cells thin-walled, circular to somewhat radially elongated in non-lignified zone and thick-walled, lignified and radially elongated in lignified zone having simple pits; starch grains as granular masses, oil globules as small circular bodies and raphides of calcium oxalate present in a few cells of secondary cortex, phloem, xylem and medullary rays.

**Stem** - Mature stem shows 7-11 layers of cork composed of rectangular cells, a few outer layers lignified; secondary cortex 6-9 layers consisting of thin-walled parenchymatous cells; pericyclic fibres present in singles or in groups of two to three, much elongated and septate with very narrow lumen; secondary phloem much similar to that of root having thick-walled phloem elements, arranged in wedged-shaped conical masses, with ceratenchyma, two types of phloem rays, sieve cells with beaded thickening; cambium 1-2 layers; secondary xylem represented by lignified and non-lignified tissues; inner most xylem composed of thin compact band of 8-9 layers of lignified tissue with primary xylem attached towards pith, xylem vessels associated with tracheids, fibres and lignified or non-lignified parenchyma; a few xylem vessels show tyloses; all elements have similar pittings as described in case of root; uni and biseriate rays thin-walled but lignified; in lignified region, multiseriate rays usually thin-walled; centre of stem occupied by small pith and a few sclereids; a few cells of secondary cortex, phloem, xylem, medullary rays and pith contain starch grains, oil globules and raphides of calcium oxalate.

**Leaf-**

*Petiole* - shows similar structure as midrib but differs in possessing trichomes comparatively smaller, as well as two more somewhat spherical accessory bundles, one flanking on each side of median vascular bundle close to lateral extensions where they further split after reaching distal end of petiole; starch grains, oil globules and raphides of calcium oxalate similar to those of root and stem also present in parenchymatous cells of petiole, midrib and in mesophyll cells of leaf.

*Midrib* - composed of single layered epidermis covered with cuticle; ground tissue consisting of 2-5 layered of collenchyma towards upper and lower side and rest parenchyma; a larger median crescent-shaped vascular bundle consisting usual elements with xylem towards upper side and phloem towards lower side.

*Lamina* - shows a dorsiventral structure; epidermis single layered covered externally with striated cuticle; uniseriate covering trichomes and paracytic stomata present on both surfaces; mesophyll composed of single layered palisade cells and 3-4 layered spongy tissue; in margin of leaf mesophyll replaced by thick-walled cells; veins usually surrounded by bundle sheath, larger veins transcurrent and smaller ones embedded; vein islet number 5-10 per sq. mm., palisade ratio 6.75-14.2 .

**Powder** - Dark green; shows fragments of cork cells, palisade cells, raphides of calcium oxalate, oil globules and starch grains

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 21	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 9	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Alkaloids, Volatile Oil.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Guru, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Vṛṣya, Balakṛt, Sandhānakṛt

**IMPORTANT FORMULATIONS** - Prasāriṇī Taila, Daśamūlāriṣṭa

**THERAPEUTIC USES** - Vātaroga, Vātarakta

**DOSE** - 2-4 g of drug in powder form.

## PRIYĀLA (Seed)

Priyāla consists of seed of *Buchanania lanzan Spreng.* Syn. *B. latifolia* Roxb. (Farn, Anacardiaceae); an evergreen tree upto 15 m high, found throughout the country in dry deciduous forests.

### SYNONYMS

Sanskrit	:	Piyālaka, Bhaulavalkala
Assamese	:	--
Bengali	:	Chirangi, Chowl, Satdhan
English	:	--
Gujrati	:	Charal, Shalichokha
Hindi	:	Piyal, Piyar, Chiraungi
Kannada	:	Nurlaal
Kashmiri	:	--
Malayalam	:	Mural, Priyalam, Mural maram
Marathi	:	Charoli
Oriya	:	--
Punjabi	:	--
Tamil	:	Muolaima, Korka, Saraparuppu
Telugu	:	Sara, Sarapappu
Urdu	:	Chironji

### DESCRIPTION

#### a) Macroscopic

Seed laterally much compressed, creamish-brown, mottled with darker brown lines, 0.4-0.6 cm long, 0.3-0.5 cm wide, occasionally separate cotyledons also occur, funicle stout, micropyle superior, linear, hilum present at the apex of round edge; slight pressure separates oily cotyledons; odour, pleasant; taste, sweetish-oily.

## b) Microscopic

**Seed** - Longitudinal section of seed-coat shows epidermis consisting of polygonal cells with scattered, large, pitted, thick-walled, sclerenchymatous cells, occurring mostly in groups, followed by remnants of disorganised, collapsed cells of integument, which are of various size, thin-walled and parenchymatous cells filled with brownish content and form a pigment layer, below which a band of parenchymatous cells present, consisting of elongated or tubular cells; cotyledons consisting of epidermis and thin-walled parenchymatous cells, epidermal cells of cotyledons barrel-shaped and the parenchymatous cells polyhedral and filled with aleurone grains of globoid type, measuring 2.5-5.0  $\mu$  in dia. and oil globules; procambium bundles, running longitudinally also occur among these parenchyma cells.

Powder - A creamish-brown paste; shows numerous mesophyll cells, filled with oil globules and aleurone grains of globoid type measuring 2.5-5.0  $\mu$  in dia. and sclerenchymatous cells, in surface view seed coat polyhedral in shape, thick-walled and filled with brownish contents.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica Gel 'G' plate using Benzene : Ethylacetate (3:1) shows under U.V. (254 nm) two fluorescent zones at Rf. 0.72 and 0.94 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.08, 0.27, 0.54, 0.72, 0.91, 0.94 and 0.98 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and on heating

the plate for ten minutes at 105°C eight spots appear at Rf. 0.08, 0.27, 0.54, 0.72, 0.84, 0.91, 0.94 and 0.98 (all violet).

**CONSTITUENTS** - Albuminoids, Oil and Starch.

**PROPERTIES AND ACTION**

**Rasa** : Madhura

**Gūṇa** : Guru, Snigdha, Sara

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātahara, Pittahara, Kaphakara, Śukrakara, Bhagnasandhānaka, Śramahara, Bṛṃhaṇa, Vṛṣya, Balya, Hṛdya, Āmavardhaka

**IMPORTANT FORMULATIONS** - Pūgakhaṇḍa, Priyāla Taila

**THERAPEUTIC USES** - Raktapitta, Dāha, Kṣata, Kṣaya

**DOSE** - 10 - 20 g of the drug in powder form.

## PRIYAᅅGU (Inflorescence)

Priyaᅅgu consists of dried inflorescence of *Callicarpa macrophylla* Yahl. (Fam. Verbenaceae); an erect, 1.2- 2.4 m high shrub, found throughout North and East India ascending to 1800 m in the West Himalayas from Kashmir to Assam, and abundant in Bengal plains.

### SYNONYMS

Sanskrit	:	Phalinī, Vanitā
Assamese	:	Priyangu
Bengali	:	Priyangu
English	:	--
Gujrati	:	Lata Priyangu
Hindi	:	Priyangu
Kannada	:	Priyangu, Gandhapriyangu
Kashmiri	:	--
Malayalam	:	Njazhal
Marathi	:	Priyangu, Gavhala
Oriya	:	Priyangu
Punjabi	:	Priyangu
Tamil	:	Gnazhal, Gnazalpoo
Telugu	:	Prakhanam, Prenkanamu
Urdu	:	---

### DESCRIPTION

#### a) Macroscopic

Inflorescence - Cymose, densely clothed with wooly hairs; 2.5-7.5 cm across, peduncle cylindrical, 1.5 - 3 mm in dia; densely hairy.

Flower - 0.5 cm long; brown, calyx, bell-shaped, 4 toothed covered with wooly hairs; corolla, brown, tubular, 4 lobbed spreading; stamens 4, equal in size, epipetalous, anther ovate, basifixed; filament very long, hairy; ovary 2-4 celled; style, long; stigma minutely capitate.

### **b) Microscopic**

Peduncle - Shows more or less wavy outline, epidermis single layered with stellate hairs; cortex composed of 10-18 layers of elliptical, thin-walled, parenchymatous cells, a few upper layers filled with reddish-brown contents; pericycle appears in the form of interrupted ring of pericyclic fibres; phloem composed of usual elements except phloem fibres; xylem consists of usual elements; vessels mostly solitary with spiral thickening; fibres aseptate.

Powder - Brown; shows abundant numbers of stellate hairs, spiral vessels, aseptate fibres, groups of thin-walled, elliptical, oval and round pollen grains with clear exine and yellowish in colour.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Glycosides, Terpenes, Phenolic compound, Resin and Saponin.

### **PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṣāya  
**Guṇa** : Rūkṣa

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Vātahara, Pittahara, Rakta Prasādana, Daurgandhyahara, Purīṣasaṅgrahaṇīya, Mūtravirajānīya, Sandhānīya, Vraṇaropana, -

**IMPORTANT FORMULATIONS** - Khadirādi Guṭīkā(Mukharoga), Elādi Cūrṇa, Kanaka Taila, Kuṅkumādi Taila, Nīlikādyā Taila

**THERAPEUTIC USES** - Dāha, Jvara, Rakta-Pitta, Pakvātisāra, Svedādhikya

**DOSE** - 1-3 g of the drug in powder form.

## ŚĀLĪ (Root)

Śālī consists of dried root of *Oryza sativa* Linn. (Fam. Poaceae); an annual herb, cultivated throughout India.

### SYNONYMS

Sanskrit	:	Dhānya, Vrīhi, Nivara
Assamese	:	--
Bengali	:	Chaval, Dhana, Cala, Chawl, Sali, Dhan
English	:	Rice, Paddy
Gujrati	:	Shalichokha, Bhata, Corava, Damgara, Coke
Hindi	:	Chaval, Dhana
Kannada	:	Bhatto, Nellu, Bhatta, Akki
Kashmiri	:	--
Malayalam	:	Ari, Nellu
Marathi	:	Tandulamul, Dhanarmul, Bhata Chamul
Oriya	:	--
Punjabi	:	Dhan, Jhona
Tamil	:	Arishi, Nelver
Telugu	:	Dhanyamu, Odalu, Biyyamu
Urdu	:	Chaval, Biranj

### DESCRIPTION

#### a) Macroscopic

Root fibrous, thin, cylindrical, 5-15 cm in length and 0.05-0.1 cm thick with a few rootlets, soft, smooth; creamish-brown to greyish-brown.

## b) Microscopic

**Root** - Shows single layered epidermis consisting of thin-walled, rectangular cells with a few unicellular root hairs; exodermis 1-2 layered, composed of thick-walled, sclerenchymatous cells; cortex differentiated into three zones; outer 5-8 and inner 2-3 layered, both consisting of round to oval, parenchymatous cells with intercellular spaces; middle zone consisting of radially elongated, parenchymatous cells having very large air-spaces; endodermis and pericycle both single layered; xylem and phloem form equal number of bundles arranged alternately with each other; centre occupied by a small pith composed of polygonal, thick-walled, sclerenchymatous cells.

**Powder** - Greyish-cream; shows groups of sclerenchymatous cells, pitted vessels and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	5	per cent, Appendix	2.2.2.
Total Ash	Not more than	21	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	16	per cent, Appendix	2.2.4.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## CONSTITUENTS - Sugars

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Snigdha, Guru, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Śukrala, Baddhālpavarcasa, Bṛmhaṇa, Mūtrala, Balya, Varṇakṛt, Svarya, Rucya, Cakṣuṣya, Hṛdya, Stanyajanana

**IMPORTANT FORMULATIONS** - Brāhma Rasāyana, Stanyajanana Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Stanyakṣaya, Mūtrakṛchra

**DOSE** - 50 g of the drug for decoction.

## ŚĀṆKHAPUṢPĪ (Whole Plant)

Śāṅkhaṣṣpī consists of whole plant of *Convolvulus pluricaulis* Choisy (Fam. Convolvulaceae); a prostrate, sub-erect, spreading, hairy, perennial herb with a woody root stock, found throughout the country.

### SYNONYMS

Sanskrit	:	Śāṅkhaṣṣpā, Śāṅkhāhvā
Assamese	:	--
Bengali	:	Sankhapuspi
English	:	--
Gujrati	:	Shankhawali
Hindi	:	Shankhapushpi
Kannada	:	Bilikantisoppu, Shankhapushpi, Shankhali
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Sankhahuli, Shankhavela, Sankhapuspi
Oriya	:	Sankhapuspi
Punjabi	:	Ksirapuspi, Sankhapuspi, Sankhahuli
Tamil	:	Kakattam, Kakkanangudi, Karakhuratt, Sanghupushpam
Telugu	:	Shankhapushpi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Usually branched, cylindrical, ribbed having some rough stem nodules and small secondary roots, 1-5 cm long, 0.1-0.4 cm thick, yellowish-brown to light brown.

**Stem** - Slender, cylindrical, about 0.1 cm or less in thickness with clear hairy nodes and

internodes; light green.

**Leaf** - Shortly petiolate, linear-lanceolate, acute, hairy on both surfaces; 0.5-2 cm long and 0.1-0.5 cm broad; light green.

**Flower** - White or pinkish; solitary or in pairs sessile or sub-sessile in the leaf axis; sepals narrowly, linear-lanceolate, sparsely hairy; corolla shortly discoid; stamen 5, free, epipetalous, alternate with the petals, inserted deep in the corolla tube; ovary superior and bicarpellary.

**Fruit** - Capsule, oblong globose with coriaceous, pale brown pericarp.

**Seed** - Brown; minutely puberulous.

#### **b) Microscopic**

**Root** - Appears nearly circular in outline; cork composed of 10-15 layers of tangentially elongated, thick-walled cells; cortex composed of 6-10 layers of oval to elongated, elliptical, parenchymatous cells and yellowish-brown, tanniferous, secretory cells present in this region; phloem composed of sieve elements, phloem parenchyma and phloem rays; xylem consisting of usual elements; vessels solitary or in groups of two with simple pits; fibres and tracheids aseptate and pitted; medullary rays 1-3 cells wide and multicellular in length; starch grains solitary or in groups, simple and composed of 2-3 components, round to oval in shape, measuring 3-8  $\mu$  in dia., present in cortex, phloem, xylem rays and parenchyma.

**Stem** - Shows single layered epidermis, covered with thick cuticle; at places unicellular hairs present; cortex differentiated in two zones, 2-3 upper collenchymatous and 1-2 lower parenchymatous layers, both having round to oval, elongated, thin-walled cells; endodermis single layered; pericycle present in the form of single strand of fibres; phloem a narrow zone, mostly composed of sieve elements and parenchyma; xylem consists of vessels, fibres and parenchyma; medullary rays and tracheids not distinct, vessels mostly solitary with spiral thickening; fibres aseptate having pointed ends and narrow lumen; strand of internal phloem present around the slightly lignified pith.

**Leaf-**

*Midrib* - appears convex in lower and concave in upper side; epidermis single layered, covered with thick cuticle; lower epidermis followed by 2-3 layers of chlorenchymatous cells; vascular bundle bicollateral, composed of usual elements of phloem and xylem; rest of tissue between chlorenchyrna and vascular bundles composed of 4-5 layers of parenchymatous cells.

*Lamina* - shows epidermis on both surfaces covered with thick cuticle; hairs unicellular, present on both surfaces, palisade two layered, spongy parenchyma 4-5 layered; a few bicollateral vascular bundles present in spongy parenchyma; palisade ratio 6-9; vein islet number 21-25 per sq. mm. , stomatal index in lower surface 17-20 and in upper surface, 13.8-17.0; stomatal number in lower surface 184-248, and in upper surface 202-238 per sq. mm.

**Powder** - Light yellowish-green; shows groups of vessels with spiral thickening and simple pits, fibres and tracheids, simple and compound starch grains, measuring 3 - 8  $\mu$  in dia., unicellular hairs, mesophyll cells and gives positive test for tannin.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	8	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

#### CONSTITUENTS - Alkaloid

#### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Rasāyana, Medhya, Balya, Mohanāśaka, Āyusya

**IMPORTANT FORMULATIONS** - Agastyaharītakī Rasāyana, Brāhma Rasāyana, Brāhmī Ghṛta, Mānasamitra Vaṭaka, Gorocanādi Vaṭī, Brāhmī Vaṭī

**THERAPEUTIC USES** - Mānasaroga, Apasmāra

**DOSE** - 3-8 g of the drug in powder form

Note: In certain parts of India, Clitoria ternatea Linn. and Evolvulus alsinoides Linn. are used as Śāṅkhaṣṭī

## SAPTALĀ (Whole Plant)

Saptalā consists of dried whole plant of *Euphorbia dracunculoides* Lam. (Fam. Euphorbiaceae); a much branched, 20-40 cm high, annual herb, found throughout India in the plains and low hills.

### SYNONYMS

Sanskrit	:	Sātalā, Carmasāhvā, Caramakaṣā
Assamese	:	Kulekhara
Bengali	:	Chagalpupti
English	:	--
Gujrati	:	Satale
Hindi	:	Titali, Joyachi, Chagulputputi
Kannada	:	Satala, Bilikalli, Kalli
Kashmiri	:	--
Malayalam	:	Chasma Lantha, Pathiri
Marathi	:	Nivadung
Oriya	:	Naagapheni, Siju, Saptala
Punjabi	:	Kangi
Tamil	:	Tillakada, Thusimullai
Telugu	:	Tillakada
Urdu	:	Thuhar

### DESCRIPTION

#### a) Macroscopic

Root - Small, 4-5 cm long, 0.5-2 mm thick, cylindrical, ribbed, gradually tapering, having a few secondary roots, pale brown, fracture, short, odour and taste indistinct.

Leaf - 1.7-7 cm long, 0.2-0.8 cm wide, sessile, linear, lanceolate or linear oblong, subacute, base rarely rounded or sub-cordate; greenish-yellow; odour and taste not distinct.

Flower - Involucre broadly campanulate, sub-sessile, solitary, 2.5 mm across at the mouth, glabrous outside and pubescent inside, lobes short, ovate, ciliolate; gland semilunate, horned; filament pubescent; style, 1 mm long, free to the base, shortly 2-fid at the apex.

Fruit - Capsule, smooth; 3-4 mm in dia; trilocular, 3- celled with or without attached pedicel.

Seed - 3 mm long, ellipsoidal to oblong with a white, leprous tuberculate testa, rounded at the base, grooved at one side, with an arillode at the oblique depressed apex.

### **b) Microscopic**

Root - Young root shows exfoliated, single layered epidermis; mature root shows thin walled cork, composed of 10-12 layers of rectangular cells; secondary cortex consists of 4- 6 layers of oval, elliptical, parenchymatous cells; oval to elongated elliptical thick walled, lignified cells with wide lumen; groups of stone cells and a few fibres present in this region; endoderm is and pericycle not distinct; secondary phloem composed of sieve elements and parenchyma; secondary xylem consists of vessels, fibres, tracheids and medullary rays; all elements thick-walled and lignified; fibres and vessels having simple pits; starch grains simple, rounded to oval, 2.75  $\mu$  in dia; found scattered in phloem region; rarely a few oil globules also present.

Stem - Shows a single layered epidermis composed of thick-walled, flattended, tangentially elongated cells; older stem shows 4-5 layers of cork composed of thin-walled, rectangular, tangentially elongated and radially arranged cells; cortex composed of 4-5 layers of oval to rectangular, tangentially elongated elliptical, thin-walled parenchymatous cells; stone cells oval to elongated, elliptical, thick-walled lignified, with wide lumen present in this region; endodermis not distinct; pericycle represented by groups of lignified fibres; secondary phloem narrow, composed of sieve elements, phloem parenchyma and a few elongated laticiferous sacs; secondary xylem composed of vessels, fibres and tracheids, traversed by numerous xylem rays; all elements, thick-walled and lignified, vessels having simple pits; fibres elongated and aseptate; centre occupied by a pith, consisting of thick-walled, circular to oval, parenchymatous cells; some rounded, small laticiferous sacs present in peripheral pith cells, filled with yellowish-brown content; starch grains more abundant in phloem and pith region, simple, solitary or in groups, rounded to oval, measuring 5.5-19.25  $\mu$  in diameter.

Leaf-

*Midrib* - shows slightly convex outline; epidermis single layered, covered externally with thick, striated cuticle; hypodermis consists of single layered collenchymatous cells towards lower side; vascular bundle collateral and surrounded by 4-6 layers of thin-walled,

parenchymatous cells.

*Lamina* -shows slightly wavy outline; epidermis on either covered with thick cuticle; paracytic stomata present on both surfaces; mesophyll differentiated into palisade and spongy parenchyma; palisade single layered present on both sides; spongy parenchyma 4-5 layered consisting of irregularly arranged cells present between upper and lower palisade; a few small collateral vascular bundles embedded in spongy parenchyma.

Powder - Light yellow; shows vessels with simple pits, aseptate fibres; oval to elongated, elliptical, stone cells thick-walled, lignified with wide lumen; simple, rounded to oval starch grains, measuring 3-19  $\mu$  in diameter.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform : Methanol (95:5) shows under U.V. (366 nm) two blue fluorescent zones at Rf. 0.04 and 0.67. On exposure to Iodine vapour three spots appear at Rf.0.04, 0.46, and 0.57 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C two spots appear at Rf. 0.46 (brown) and 0.87 (violet).

**CONSTITUENTS** - Glyco-alkaloid (Euphorbine).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa, Vikāśī
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātalā, Pittahara, Kaphahara, Raktadoṣahara, Viḍbhedinī

**IMPORTANT FORMULATIONS** - Brāhmī Ghṛta, Miśraka Sneha, Nārāyaṇa Cūrṇa

**THERAPEUTIC USES** - Gulma, Udāvarta, Ānāha, Udararoga, Vibandha, Visarpa

**DOSE** - 50 g of the drug for decoction.

## ŚATĀHVĀ (Fruit)

Śatāhvā consists of the dried ripe fruits of *Anethum sowa* Roxb. ex Flem. Syn. *A. graveolens* Linn. var. *sowa* Roxb.; *A. graveolens* DC.; *Peucedanum sowa* Roxb.; *P. graveolens* Benth. (Fam. Apiaceae); a tall, glabrous, aromatic herb found throughout tropical and sub-tropical regions of the country and cultivated.

### SYNONYMS

Sanskrit	:	Śatapuspā
Assamese	:	--
Bengali	:	Suva, Sulpha, Shulupa, Sowa
English	:	Indian Dil Fruit
Gujrati	:	Suva
Hindi	:	Soya, Sova
Kannada	:	Sabasige
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Badishep, Shepa, Shepu
Oriya	:	--
Punjabi	:	Soya
Tamil	:	Satakuppa
Telugu	:	Sadapa
Urdu	:	Shibt, Soya

### DESCRIPTION

#### a) Macroscopic

Fruits, dark brown, often stalk attached, broadly oval and compressed dorsally; mericarps usually separate and free, 4 mm long, 2-3 mm broad and 1 mm thick, glabrous, traversed from the base to apex by 5 lighter coloured primary ridges of which 3

dorsal, slightly raised, brown, filiform and inconspicuous, 2 lateral prolonged into thin, yellowish membranous wings; odour, faintly aromatic resembling that of caraway, and a warm, slightly sharp taste, akin to caraway.

#### **b) Microscopic**

**Fruit** - Pericarp shows epidermis of polygonal tabular cells having thick outer wall and striated cuticle; mesocarp, parenchymatous, some cells lignified and show reticulate thickening; endocarp consists of tabular cells sometimes with sinuous anticlinal walls; vittae, 4 on the dorsal valliculae and 2 on the commissural surface, extending the length of each mericarp with an endothelium of brown cells and containing volatile oil; dorsal costae three, one larger and the two lateral broadly winged, each costae with vascular strands; endosperm much flattened and consists of thick-walled, cellulosic, parenchyma containing fixed oil and numerous aleurone grains upto 5  $\mu$  in diameter containing micro-rosette crystals of calcium oxalate; carpophore split, passing at the apex into the raphe of each mericarp containing a vascular strand of sclerenchymatous fibres and spiral vessels.

Powder - Brown; shows spiral vessels, micro-rosette crystals of calcium oxalate and oil globules, aleurone grains upto 5  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	5 per cent, Appendix	2.2.2.
Total Ash	Not more than	14 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15 per cent, Appendix	2.2.7.
Volatile oil	Not less than	3 per cent, Appendix	2.2.10

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene shows on exposure to Iodine vapour two spots at Rf. 0.59 and 0.68 (all yellow). On spraying with

Anisaldehyde-Sulphuric acid reagent and heating the plate for about ten minutes at 110° C three spots appear at Rf. 0.37 (pink) 0.59 (blue) and 0.68 (violet).

**CONSTITUENTS** - Essential Oil.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guna</b>	:	Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Śūlapraśamana

**IMPORTANT FORMULATIONS** - Bṛhat Phala Ghṛta, Gorocanādi Vaṭī, Nārāyaṇa Cūrṇa, Ṣaḍbindu Taila

**THERAPEUTIC USES** - Jvara, Netra Roga, Vraṇa, Śūla, Atīśāra

**DOSE** - 3-6 g of the drug in powder form.

## ŚIGRU (Leaf)

Śigru consists of dried leaf of *Moringa oleifera* Lam. Syn. *Moringa pterygosperma* Gaertn. (Fam. Moringaceae); a small or medium sized tree, found wild in sub Himalayan tract, commonly cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Śobhāñjana, Bahala, Tīkṣṇagandhā, Akṣīva, Mocaka
Assamese	:	--
Bengali	:	Sajina, Sajna, Sajne
English	:	Horse Radish Tree, Drum Stick Tree
Gujrati	:	Sargavo, Sekato, Saragavo Parna
Hindi	:	Shajoma, Mungna
Kannada	:	Neege, Nugge ele
Kashmiri	:	--
Malayalam	:	Murinna, Tishnagandha, Muringa, Muringa Elai
Marathi	:	Sevaga, Segata, Segata pana, Shewgachi pane
Oriya	:	Sajana, Munga, Munika
Punjabi	:	Sohanjana
Tamil	:	Murungai, Murungai Ilai
Telugu	:	Munaga Aku
Urdu	:	Sehjan

### DESCRIPTION

#### a) Macroscopic

Leaves tripinnate compound, available in the form of leaflets and some broken pieces of rachis, slender, thickened, and articulated at the base; leaflet 1.2-2 cm long and 0.5-1 cm wide, entire, elliptic, ovate or obovate, rounded or narrowed at base and obtuse at apex; smooth and greenish-grey to pale green; odour and taste not distinct.

## b) Microscopic

Rachis - Rachis shows single layered epidermis, followed by single layer of pigmented collenchymatous hypodermis; cortex consisting of 5-10 layered, oval to elliptical, thin walled, parenchymatous cells; pericycle forming a broken ring, consisting of pericyclic fibres; vascular bundle collateral; pith composed of wide zone of thin-walled, parenchymatous cells; rosette crystals of calcium oxalate present in cortex, pith and phloem parenchyma.

Leaflet - Leaflet shows dorsiventral structure; epidermis and unicellular hairs present on both the surfaces; palisade single layered; spongy parenchyma 2-3 layers; central region occupied by a crescent-shaped, collateral vascular bundle surrounded by 2-4 layers of collenchymatous cells; rosette crystals of calcium oxalate present in mesophyll and collenchymatous cells; stomata anornocytic, present on both surface but more on lower surface; palisade ratio 6-11; stomatal index 10-13-15 stomatal number 100-137 upper surface and 290-350 lower surface per mm square; vein islets number 50-65.

Powder -Greyish-green; shows groups of spongy parenchyma, palisade cells; spiral vessels, unicellular hairs with blunt tip; pieces of polyhedral epidermal cells in surface view, stomata and rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene : Ethylacetate (9: 1) shows six spots at Rf. 0.05, 0.18, 0.26 (all green), 0.36 (yellowish green), 0.46 (dark green) & 0.94 (yellow) in visible light. Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.05, 0.18, 0.26, 0.36, 0.46 (all red) & 0.94 (blue). On spraying with 5% Methanolic Phosphomolybdic acid reagent six spots

appear on heating the plate for ten minutes at 105° C at Rf. 0.38, 0.46 (both blue), 0.52 (green), 0.59 (blue), 0.69 (blue) and 0.87 (blue). On spraying with Anisaldehyde-Sulphuric acid reagent ten spots appear on heating the plate for ten minutes at 105°C at Rf. 0.05, 0.20, 0.26, (all green), 0.30 (pink), 0.36 (green), 0.46 (green), 0.53 (yellow), 0.69 (yellow), 0.82 (yellow) and 0.94 (violet).

**CONSTITUENTS** - Carbohydrate, Protein, Carotene and Ascorbic acid.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Medohara, Śukranāśaka, Kṛmihara, Bṛmhaṇa, Cakṣuṣya, Sirovirecaka

**IMPORTANT FORMULATIONS** - Viṣatinduka Taila, Ekāṅgavīra Rasa, Ratnagiri Rasa

**THERAPEUTIC USES** - Śopha, Kṛmiroga, Medoroga, Plīhāroga, Vidradhi, Gulma, Galagaṇḍa

**DOSE** - 10 - 20 ml of the fresh drug in juice form.

## STHŪLAILĀ (Seed)

Sthūlailā consists of dried seed of *Amomum subulatum* Roxb. (Fam. Zingiberaceae); a herb with leafy stem and perennial root stock; cultivated in swampy places along the sides of mountain streams in Bengal and Assam.

### SYNONYMS

Sanskrit	:	Bhadrā, Bhadrailā
Assamese	:	--
Bengali	:	Baara aliach
English	:	Greater or Nepal cardamom
Gujrati	:	Elaicho, Mothi Elichi
Hindi	:	Bari elachi
Kannada	:	Dodda Yalakki, Nepdi Elakki
Kashmiri	:	--
Malayalam	:	Valiya Elam, Perelam
Marathi	:	Mothi Elayachi
Oriya	:	Bada aleicha, Aleicha
Punjabi	:	Budi Eleichi
Tamil	:	Periya Elam, Beraelam, Kattu Elam
Telugu	:	Pedda Elakulu
Urdu	:	Badi Elaichi, Heel Kalan

### DESCRIPTION

#### a) Macroscopic

Seed 0.4 cm long, 0.3 cm wide, irregularly ovoid with 3 flattened face covered externally with a colourless, membraneous aril; brown to dark brown; odour, aromatic; taste, spicy pungent.

### b) Microscopic

Seed -Shows a very thin membraneous aril composed of several layers of collapsed cells containing oil globules and prismatic crystals of calcium oxalate; testa consists of single layered epidermis of rectangular cells followed by 1-2 layers of collapsed, thin-walled parenchymatous cells, beneath this a single layered large rectangular cells containing oil globules present, which is internally surrounded by several layers of flattened, thin walled, parenchymatous cells; perisperm consists of polygonal, thin-walled, parenchymatous cells containing round to oval starch grains measuring 2-5  $\mu$  in dia., and cluster crystals of calcium oxalate; perisperm surrounded externally by thick-walled, sclerenchymatous, radially elongated dark brown beaker cells; perispenn encloses the endosperm and embryo, both composed of polygonal, thin-walled, parenchymatous cells, rich in protein.

Powder - Light brown; shows fragments of testa, polygonal, thin-walled, perisperm cells, oil globules, rarely cluster crystals of calcium oxalate, rounded to oval, simple, starch grains measuring 2-5  $\mu$  in diameter.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	v/wper cent, Appendix	2.2.10

**CONSTITUENTS** - Volatile Oil (rich in Cineole).

### PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta

**Guṇa** : Laghu, Rūkṣa, Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Rocaka, Dīpanī, Mukhaśodhaka, Aṅgamardapraśamana

**IMPORTANT FORMULATIONS** - Sārivadyāsava, Karpūrādyārka, Kalyāṇaka Ghṛta, Vastyāmayāntaka Ghṛta, Mānasamitra Vaṭaka

**THERAPEUTIC USES** - Śvāsa, Kāsa, Trṣṇā, Chardi, Mukharoga, Hṛllāsa, Kaṇḍū

**DOSE** - 0.5 -1 g. of the drug in powder form.

Note - Cluster crystals of calcium oxalate are present in Sthulaela (Amomum subulatum Roxb.(Seed), while absent in Suksamaila (Elettaria cardamomum Maton. (Seed).

## TEJOVATĪ (Stem Bark)

Tejovatī consists of dried stem bark of *Zanthoxylum armatum* DC. Syn. *Z. alatum* Roxb. (Fam. Rutaceae); an evergreen or sub-deciduous shrub or occasionally a small tree upto 6 m high, stem and branches, armed with long, sharp prickles, found in the hot valleys of the Himalayas from Jammu to Khasia hills at 600-1800 m and eastern ghats in Orissa and Andhra Pradesh at 1200 m, also sometimes planted for hedges in Assam.

### SYNONYMS

Sanskrit	:	Tejohva
Assamese	:	Kulekhara
Bengali	:	Tejovati
English	:	--
Gujrati	:	Tejabala, Tejbal
Hindi	:	Tejbal
Kannada	:	Tejapatri, Jimmi, Tumbura, Tumburudra, Tejovanti
Kashmiri	:	--
Malayalam	:	Thumboonal, Thumbooni, Valiyavaluzhavam
Marathi	:	Tejabal
Oriya	:	Tejabala
Punjabi	:	Tejovati, Tejabal
Tamil	:	Thejyovathi
Telugu	:	Tejovathi
Urdu	:	Kabab-e-Khandan

### DESCRIPTION

#### a) Macroscopic

Bark corky, channelled and single quilled with large marks of tubercular

prickles; 0.1-0.2 cm thick, external surface pale brown, rough with numerous scattered patches of lenticels, rather deeply furrowed; internal surface smooth, light yellow to pale brown; fracture, short; odour, aromatic; taste, aromatic pungent.

#### **b) Microscopic**

**Stem Bark** - Shows exfoliated cork interrupted by lenticels at some places; cork 15-20 layers of tabular, brownish, thick-walled cells; secondary cortex 10-20 layers of tangentially elongated or oval, thin-walled, parenchymatous cells; small groups of stone cells and some fibres found scattered in this region; secondary phloem consisting of sieve elements, parenchyma and fibres traversed by phloem rays; phloem fibres thick-walled, lignified, aseptate and arranged in tangential rows; stone cells found in tangential bands alternating with phloem fibres; a number of secretory cells found scattered throughout secondary phloem; phloem rays 1-2 cells wide and 10-15 cells high; secretory cells containing oily or resinous substances; prismatic crystals of calcium oxalate and simple starch grains found scattered in secondary cortex, phloem parenchyma and phloem rays; starch grains round and oval, measuring 2.75 - 13.75  $\mu$  in diameter.

**Powder** - Yellowish-brown; shows fragments of cork cells; aseptate fibres, stone cells, prismatic crystals of calcium oxalate, oil globules and starch grains, round and oval measuring 2.75 - 13.75  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

**CONSTITUENTS** - A bitter crystalline principle identical with Berberine, a Volatile Oil and Resin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Pācana, Rucya, Medhya

**IMPORTANT FORMULATIONS** - Pañcatikta Guggulu Ghr̥ta, Kālaka Cūr̥ṇa (Lepa)

**THERAPEUTIC USES** - Śvāsa, Kāsa, Mukharoga, Āmavāta, Arucī, Hikkā

**DOSE** - 10-20 g of the drug for decoction.

## TULASĪ (Whole Plant)

TulasĪ consists of dried whole plant of *Ocimum sanctum* Linn. (Fam. Lamiaceae); an erect, 30 - 60 cm high, much branched, annual herb, found throughout the country.

### SYNONYMS

Sanskrit	:	Surasā, KṛṣṇatulasĪ, Bana TulasĪ
Assamese	:	Tulasi
Bengali	:	Tulasi
English	:	Holy Basil
Gujrati	:	Tulasi, Tulsi
Hindi	:	Tulasi
Kannada	:	Tulasi, Shree Tulasi, Vishnu Tulasi
Kashmiri	:	--
Malayalam	:	Tulasi, Tulasā
Marathi	:	Tulas
Oriya	:	--
Punjabi	:	Tulasi
Tamil	:	Tulasi, Thulasi, Thiru Theezai
Telugu	:	Tulasi
Urdu	:	Raihan, Tulsi

### DESCRIPTION

#### a) Macroscopic

Root - Thin, wiry, branched, hairy, soft, blackish-brown externally and pale. violet internally.

Stem - Erect, herbaceous, woody, branched; hairy, sub quadrangular, externally purplish-brown to black, internally cream, coloured; fracture, fibrous in bark and short in xylem; odour faintly aromatic.

Leaf - 2.5-5 cm long 1.6 - 3.2 cm wide, elliptic oblong, obtuse or acute, entire or serrate, pubescent on both sides; petiole thin, about 1.5-3 cm long hairy; odour, aromatic; taste, characteristic.

Flower - Purplish or crimson coloured, small in close whorls; bracts about 3 mm long and broad, pedicels longer than calyx, slender, pubescent; calyx ovoid or campanulate 3-4 mm bilipped, upper lip broadly obovate or suborbicular, shortly apiculate, lower lip longer than upper having four mucronate teeth, lateral two short and central two largest; corolla about 4 mm long, pubescent; odour, aromatic; taste, pungent.

Fruit - A group of 4 nutlets, each with one seed, enclosed in an enlarged, membranous, veined calyx, nutlets sub-globose or broadly elliptic, slightly compressed, nearly smooth; pale brown or reddish with small black marking at the place of attachment to the thalamus; odour, aromatic; taste, pungent.

**Seed** - Rounded to oval; brown, mucilaginous when soaked in water, 0.1 cm long, slightly notched at the base; no odour; taste, pungent, slightly mucilaginous.

#### **b) Microscopic**

**Root** - Shows a single layered epidermis followed by cortex, consisting of seven or more layers of rectangular, round to oval polygonal, thin-walled, parenchymatous cells, filled with brown content, inner layers of cortex devoid of contents; phloem consisting of sieve elements, thin-walled, rectangular parenchyma cells and scattered groups of fibres, found scattered in phloem; xylem consists of vessels, tracheids, fibres and parenchyma; vessels pitted; fibre tracheides, long, pitted with pointed ends; fibres thick walled and with pointed ends.

**Stem** - Shows a single layered epidermis with uniseriate, multicellular covering trichomes having 5-6 cells, occasionally a few cells collapsed; cortex consists of 10 or more layers of thin-walled, rectangular, parenchymatous cells; phloem consists of sieve elements, thin-walled, rectangular parenchyma cells and fibres; fibres found scattered mostly throughout phloem, in groups and rarely in singles; xylem occupies major portion of stem consisting of vessels, tracheids fibres and parenchyma; vessels pitted; fibres with pointed ends; centre occupied by narrow pith consisting of round to oval, thin-walled, parenchymatous cells.

Leaf-

**Petiole** - shows somewhat cordate outline, consisting of single layered epidermis composed of thin-walled, oval cells having a number of covering and glandular trichomes; covering trichomes multicellular 1-8 celled long, rarely slightly reflexed at tip; glandular trichomes

short, sessile with 1-2 celled stalk and 2-8 celled balloon-shaped head, measuring 22-27 in dia; epidermis followed by 1 or 2 layers and 2 or 3 layers of thin-walled, elongated, parenchyma cells towards upper and lower surfaces respectively; three vascular bundles situated centrally, middle one larger than other two; xylem surrounded by phloem.

*Midrib* - epidermis, trichomes and vascular bundles similar to those of petiole except cortical layers reduced towards apical region.

*Lamina* - epidermis and trichomes similar to those of petiole; both anomocytic and diacytic type of stomata present on both surfaces, slightly raised above the level of epidermis; palisade single layered followed by 4-6 layers of closely packed spongy parenchyma with chloroplast and oleo-resin; stomatal index 10-12-15 on upper surface and 14 - 15 - 16 on lower surface; palisade ratio 3.8; vein islet number 31 - 35.

**Powder** - Greenish: shows thin-walled, parenchymatous cells, a few containing reddish brown contents, unicellular and multicellular-trichomes either entire or in pieces; thin walled fibres, xylem vessels with pitted thickenings, fragments of epidermal cells in surface view having irregular shape, oil globules, rounded to oval, simple as well as compound starch grains having 2-5 components, measuring 3-17  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of Tulasi oil obtained by stem distillation is carried out on Silica gel 'G' plate using Toluene : Ethylacetate (93:7) Tulasi oil is diluted in chloroform-toluene (1: 10).

Eugenol to be applied as standard also diluted in 130 ratio and 10  $\mu$ l of each to be applied in

band form. After running distance of 10 cm the plate is air drying for 15 minutes and than kept in the over for 2 to 5 minutes. On cooling spray, in thoroughly vanillin - Sulphuric acid reagent and heat the plate at 110° C for 5 - 1- minutes Under observation. Record Rf. values of eugenol and caryophyllence. Eugenol (orange brown) approx. Rf. value 0.7, caryophyllence (reddish violet) runs to solvent front.

**CONSTITUENTS** - Essential Oil.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Kaṣāya  
**Guṇa** : Tīkṣṇa, Rūkṣa, Laghu  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Pittavardhinī, Vātahara, Kaphahara, Hṛdya, Dīpana, Rucya, Durgandhahara

**IMPORTANT FORMULATIONS** - Tribhuvanakīrti Rasa, Muktaṭpañcāmṛta Rasa, Muktaḍi Mahāñjana, Mānasamitra Vaṭaka

**THERAPEUTIC USES** - Śvāsa, Kāsa, Hikkā, Chardi, Kṛmiroga, Pārśva Śūla, Kuṣṭha, Aśmarī, Netraroga

**DOSE** - 1-3 ml of the drug in juice form.

1-2 g of the drug in powder form (seed).

## TULASĪ (Leaf)

TulasĪ consists of dried leaf of *Ocimum sanctum* Linn. (Fam. Lamiaceae), an erect, 30-60 cm high, much branched annual herb, found throughout the country.

### SYNONYMS

Sanskrit	:	Bana TulasĪ, KṛṣṇatulasĪ, Surasā
Assamese	:	Tulasi
Bengali	:	Tulasi
English	:	Sacred Basil, Holy Basil
Gujrati	:	Tulasi, Tulsi
Hindi	:	Tulasi
Kannada	:	Tulasi
Kashmiri	:	--
Malayalam	:	Tulasi
Marathi	:	Tulas
Oriya	:	--
Punjabi	:	Tulasi
Tamil	:	Thulasi, Tulasi
Telugu	:	Tulasi
Urdu	:	Raihan, Tulsi

### DESCRIPTION

#### a) Macroscopic

Leaves 2.5-5 cm long, 1.6-3.2 cm wide, elliptic-oblong, obtuse or acute, entire or serrate, pubescent on both surfaces, petiolate, thin, petiole 1.5-3 cm long, hairy; odour, aromatic; taste, characteristic.

## b) Microscopic

### Leaf-

*Petiole* - shows cordate outline, consisting of single layered epidermis composed of thin walled, oval cells having a number of covering and glandular trichomes; covering trichomes multicellular, uniseriate 1-8 celled long, rarely slightly reflexed at tip; glandular trichomes short, sessile or with 1-2 celled stalk, and 2-8 celled, balloon-shaped head, enclosed in a cuticular bladder, measuring 22-27  $\mu$  dia., upper epidermis, followed by 3-4 layers of collenchymatous and 1-2 layers of parenchymatous cells; lower epidermis followed by 1-3 layers of collenchymatous and 2-3 layers of parenchymatous cells; three vascular bundles situated centrally, middle one larger than the other two, consisting of xylem and phloem.

*Midrib* - epidermis, trichomes and vascular bundles similar to those of petiole, except reduced in cortical layers towards apical region of midrib.

*Lamina* - epidermis and trichomes similar to those of petiole on both surfaces; stomata anomocytic and diacytic present on both surfaces and slightly raised above the level of epidermis; palisade single layered followed by 4-6 layers of closely packed spongy parenchyma with chloroplasts and oleo-resin; stomatal index 10-13-15 on upper surface and 14-15-16 on lower surface; palisade ratio 3.8; vein islet number 31-33.

Powder - Light-green; shows fragments of polygonal, less wavy walled epidermal cells in surface view, covering and glandular trichomes as a whole or in pieces, palisade and spongy parenchyma, anomocytic and diacytic stomata.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	19	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (9: 1) shows in visible light nine spots at Rf. 0.03 (dark green), 0.04, 0.08 (both green), 0.12 (light green), 0.21, 0.33 (both green) 0.45 (yellowish green), 0.85 & 0.93 (both light green). Under U.V. (366 nm) eight fluorescent zones appear at Rf. 0.04, 0.30, 0.33, 0.45, 0.83 (all pink) 0.85 (blue), 0.93 (pink) & 0.98 (blue). On exposure to Iodine vapour eleven spots appear at Rf. 0.04, 0.08, 0.12, 0.21, 0.33, 0.45, 0.54, 0.75, 0.83, 0.88 and 0.93 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 110<sup>o</sup> C for ten minutes ten spots appear at Rf. 0.08 (violet), 0.12 (light violet), 0.21 (brown), 0.33 (violet), 0.45 (violet), 0.54 (blue), 0.75 (violet), 0.83 (blue), 0.93 (violet) and 0.98 (blue).

**CONSTITUENTS** - Essential Oil (Carvacrol, Caryophyllene, Nerol and Camphene etc.,).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Pittahara, Dīpanī, Hṛdya, Kṛmighna

**IMPORTANT FORMULATIONS** - Mānasamitra Vaṭaka, Tribhuvana Kīrti Rasa, Mukṭā Pañcāmṛt Rasa, Mahājvarāṅkuśa Rasa

**THERAPEUTIC USES** - Śvāsa, Kāsa, Pratiśyāya, Pārśvaśūla, Aruci, Hikkā, Kṛmiroga, Kuṣṭha

**DOSE** - 2-3 g of the drug in powder form.

## VACĀ (Rhizome)

Vacā consists of dried rhizome of *Acarus calamus* Linn. (Fam. Araceae); a semiaquatic herb, wild or cultivated throughout the country ascending upto 1800 m in the Himalayas.

### SYNONYMS

Sanskrit	:	Uragandhā, Ugrā, Ṣaḍgranthā
Assamese	:	--
Bengali	:	--
English	:	The Sweet Flag
Gujrati	:	Ghoduvaj, Ghodvach
Hindi	:	Bach, Gora-bach
Kannada	:	Baje, Narru Berua
Kashmiri	:	--
Malayalam	:	Vayambu
Marathi	:	Vaca, Vekhandas
Oriya	:	--
Punjabi	:	Varch, Ghodavaca
Tamil	:	Vasambu, Pillai maruntho
Telugu	:	Vasa
Urdu	:	Waja-e-Turki

### DESCRIPTION

#### a) Macroscopic

Drug occurs in simple or rarely with thumb-like branches at nodes; sub cylindrical to slightly flattened, somewhat tortuous or rarely straight, cut pieces of 1-5 cm long, and 0.5-1.5 cm thick; upper side marked with alternately arranged, large, broadly, triangular, transverse leaf scars which almost encircle the rhizome; at nodes leaf sheath mostly having an appearance present; lower side shows elevated tubercular spots of root scars; light-brown with reddish-tinge to pinkish externally, buff coloured intemally; fracture, short; odour, aromatic; taste, pungent and bitter.

## b) Microscopic

Rhizome - Shows single layered epidermis; cortex composed of spherical to oblong, thin-walled cells of various sizes, cells towards periphery, smaller, somewhat collenchymatous, more or less closely arranged cells towards inner side, rounded and form a network of chains of single row of cells, enclosing large air spaces, fibro-vascular bundles and secretory cells having light yellowish-brown contents, present in this region; endodermis distinct; stele composed of round, parenchymatous cells enclosing large air spaces similar to those of cortex and several concentric vascular bundles arranged in a ring towards endodermis, a few vascular bundles scattered in ground tissues; starch grains simple, spherical, measuring 3-6  $\mu$  in dia., present in cortex and ground tissue.

Powder - Buff coloured; shows fibres, reticulate, annular vessels and simple spherical starch grains, measuring 3-6  $\mu$  in diameter.

Observation of powder and its extracts on exposure under UV light :-

a. Powder as such: - Yellowish-cream

b. Extracts in

i. Petroleum ether-No change

ii. Chloroform-Light green

iii. Methanol-Yellowish green

iv. Benzene-No change

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.
Volatile oil	Not less than	2	per cent, Appendix	2.2.10

## ASSAY

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows two spots at Rf. 0.14 (violet) and 0.73 (violet) on spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C.

**CONSTITUENTS** - Volatile Oil (principal constituents of the Volatile oil are Asamyl alcohol, Eugenol and Asarone), also contains a bitter principle Acorin (Glucoside), Starch and Tannin.

## PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta

**Guṇa** : Laghu, Tīkṣṇa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Mala Mūtraviśodhanī, Dīpanī, Kaṇṭhya, Kṛmihara, Vāmaka, Medhya

**IMPORTANT FORMULATIONS** - Vacādi Taila, Vacā Laśunādi Taila, Sārasvata Cūrṇa, Sārasvatāriṣṭa, Mānasamitra Vaṭaka, Candraprabhā Vaṭī, Khadirādi Vaṭī, Hiṅguvacādi Cūrṇa

**THERAPEUTIC USES** - Apasmāra, Unmāda, Vibandha, Ādhmāna, Śūla, Karṇa Srāva, Kāsa, Śvāsa, Smṛti daurbalya

**DOSE** - 60 -120 mg of the drug in powder form.

1- 2 g. of the drug in powder form for inducing vomiting.

Note: Sodhana of Vaca is to be done before internal use.

## VATSANĀBHA (Root)

Vatsanābha consists of dried roots of *Aconitum chasmanthum* Stapf. ex Holmes (Fam. Ranunculaceae); plant is an erect, perennial herb, occurs in subalpine and alpine zones of the western Himalayas, in high plateaus between 2000-4000 m, roots are generally collected late in September.

### SYNONYMS

Sanskrit	:	Amra, Viṣa Vajranāga, Sthāvaraviṣa, Vatsanāgaka
Assamese	:	Mithavish, Bish
Bengali	:	Kathavish
English	:	Aconite
Gujrati	:	Vachhanaag, Basanaag
Hindi	:	Bisa, Meethabisha, Bachhnaag, Teliya Bish
Kannada	:	Basanalli, Vatsanabha, Vatsanabhi, Vachanaga
Kashmiri	:	--
Malayalam	:	Vatsanabhi
Marathi	:	Bachnaga
Oriya	:	Tahara, Mahura, Mithvisa
Punjabi	:	Mitha Visha, Mithatelia
Tamil	:	Vasanaavi, Vatsanabhi, Nabhi, Vasanabhi
Telugu	:	Vatsanaabhi, Naabhi
Urdu	:	Bachnak, Mithalelia, Beesh, Atees

### DESCRIPTION

#### a) Macroscopic

Roots paired, occasionally separated due to breakage, ovoid, conical, small portions of stem sometimes attached, tapering downwards to a point, 2-4.5 cm, rarely 5 cm long, 0.4 - 1.8 cm thick, gradually decrease in thickness towards tapering end; wrinkled longitudinally and transversely, rough due to root scars; dark brown to blackish-brown;

fracture, cartilaginous, hard and white within the cambium ring and brownish outside cambium; odour indistinct, taste, slightly bitter followed by a strong tingling sensation, poisonous.

#### **b) Microscopic**

**Root** -Shows epidermis 1-3 layered, suberised, papillose on outside, primary cortex consisting of 8-10 layers of oval to tangentially elongated, thin-walled, parenchymatous cells, without or with a few intercellular spaces, a few rectangular or triangular stone cells in singles found scattered in this zone; primary cortex separated by distinct endodermis; inner bark parenchymatous, consisting of round to oval cells, containing a few groups of phloem strands, occupying more than half the radius; cambium having 6 - 10 angles; xylem vessels arranged almost in a ring, some scattered, often forming 'V' shaped ring, enclosing xylem parenchyma in older portions; bundles compact often wedge-shaped having acute apex; xylem exarch, metaxylem vessels met in centre; starch grains simple measuring 6-18  $\mu$  in dia. and compound grains consisting of 2-5 components with hilum in centre, present in cortical cells, phloem parenchyma and xylem parenchyma.

Powder - Light grey; shows vessels, a few aseptate fibres, and numerous simple and compound starch grains having hilum in the centre, single grain measuring 6-18  $\mu$  in dia.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	5.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24 per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform: Methanol (90:10) shows six spots at Rf. 0.10, 0.20, 0.39, 0.56, 0.74 and 0.96 (all yellow) on exposure to Iodine vapour. On spraying with Dragendorff reagent two spots appear at Rf. 0.39 and 0.96 (both orange).

**CONSTITUENTS** - Alkaloids

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Uṣṇa, Rūkṣa, Tīkṣṇa, Laghu, Vikāśī, Viyavāyī, Yogavāhi
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Tridoṣahara, Rasāyana, Svēdala, Pittaśantāpakāraka

**IMPORTANT FORMULATIONS** - Tribhuvanakīrti Rasa, Sūtaśekhara Rasa, Anandabhairava Rasa, Vātavidhvamsana Rasa, Mahāviṣaḡarbha Taila

**THERAPEUTIC USES** - Sannipāta, Vātakaphajvara, Vātaroga, Jvarātisāra, Kaṇṡharoga

**DOSE** - 15 - 30 mgs of the drug in powder form.

Note: It is dangerous to exceed the normal dose.

## VIDĀRĪ (Tuberous Root)

Vidārī consists of sliced and dried pieces of tuberous root of *Pueraria tuberosa* DC. (Fam. Fabaceae); a perennial climber with very large tuberous root, distributed nearly throughout the country except in very humid or very arid regions and ascending upto 1200 m.

### SYNONYMS

Sanskrit	:	Vidārī, Vidārikā, Bhumikuṣmāṇḍa
Assamese	:	Bhedeleton, Bhuikumra
Bengali	:	Vidari, Bhumikusmanda, Bhuinkumra
English	:	--
Gujrati	:	Vidarikanta, Bhonykoru, Eagio, Bhoikolu, Sakharvel
Hindi	:	Vidarikanda
Kannada	:	Nelagumbala Gudde, Nelagumbala, Gumadi belli, Nelagumbula, Gumadigida
Kashmiri	:	--
Malayalam	:	Mudakku
Marathi	:	Bhuikohala, Ghodvel
Oriya	:	Bhuiankakharu
Punjabi	:	--
Tamil	:	Nilapoosani
Telugu	:	Nelagummuda, Darigummadi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug available in the form of longitudinally sliced pieces of variable size; outer surface reddish-brown, smooth except for protuberances at some places; cut surface creamish-brown, starchy and somewhat porous; usually does not break, but pliable; taste,

sweetish.

#### **b) Microscopic**

**Tuberous Root** - Mature tuber shows 20-30 layers of cork consisting of rectangular, thin-walled, tangentially elongated and radially arranged cells filled with dark reddish-brown content except in a few inner layers; secondary cortex consists of 6-15 layers of circular, oval to rectangular and tangentially elongated, thin-walled cells, yellow band of 2-6 layers of compactly arranged stone cells present towards inner side of cortex; stone cells moderately thick-walled, varying in shape and size and having well marked striations and pits; a number of prismatic crystals of calcium oxalate found in parenchymatous cells, and also rarely in stone cells; secondary phloem consists of sieve elements and phloem parenchyma having a number of strands of phloem fibres and a few stone cells; sieve elements somewhat collapsed in outer region forming tangential bands; phloem fibres much elongated, highly thickened, lignified with narrow lumen; a number of tanniferous ducts filled with brown content, distributed throughout this region; xylem forms whole of inner white spongy zone, consisting of several concentric rings of one or a few xylem vessels associated with a few xylem elements; vessels mostly drum-shaped having reticulate thickening; xylem rays multi seriate and well marked consisting of thin walled, radially elongated cells, a few latex duct also present; plenty of starch grains mostly simple, somewhat round, angular to oval, having central hilum and striations, measuring 5.5 - 13.75  $\mu$  in dia. present in all parenchymatous cells.

Powder - Buff coloured; shows plenty of starch grains with central hilum and striations measuring 5.5 - 13.75  $\mu$  in dia., fragments of cork, prismatic crystals of calcium oxalate, a few xylem vessels with reticulate thickening and phloem fibres.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24	per cent, Appendix	2.2.7.

**CONSTITUENTS** - Gluconic and Malic acids.

## PROPERTIES AND ACTION

**Rasa** : Madhura

**Guṇa** : Snigdha, Guru

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātahara, Pittahara, Stanyada, Śukrala, Mūtrala, Jīvanīya, Rasāyana, Bṛmhaṇīya, Svarya, Varnya, Balya

**IMPORTANT FORMULATIONS** - Vidāryādikvātha Cūrṇa, Vidāryādi Ghṛta, Marma Guṭikā, Manmathābhra Rasa, Pūgakhaṇḍa (Aparaḥ)

**THERAPEUTIC USES** - Dāha, Raktapitta, Aṅgamarda, Daurbalya, Śoṣa

**DOSE** - 3-6 g of the drug in powder form.

## YAVA (Fruit)

Yava consists of dried fruit of *Hordeum vulgare* Linn. Syn. *H. sativum* Pers. (Fam. Poaceae); an annual, erect herb, 50-100 cm high, cultivated chiefly in North India.

### SYNONYMS

Sanskrit	:	Dhānyarāja, Tīkṣṇāśuka, Hayeṣṭā
Assamese	:	Kulekhara
Bengali	:	Jau, Jav
English	:	Barley
Gujrati	:	Cheno, Jau
Hindi	:	Jav
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Javegambu
Marathi	:	Yava, Java
Oriya	:	--
Punjabi	:	Javo
Tamil	:	Barley
Telugu	:	Barlibiyam, Yava Dhanya
Urdu	:	Jau

### DESCRIPTION

#### a) Macroscopic

Fruit a caryopsis, elliptic, oblong, ovoid-and tapering at both ends, smooth, about 1 cm long and 0.2-0.3 cm wide, dorsally compressed and flattened on the sides with a shallow longitudinal furrow, 3-5 ridges having shallow depression between them, grains tightly enclosed and adhering the lemma and palea; pale-greenish-yellow; odour, not distinct; taste, sweetish-acrid.

## b) Microscopic

Fruit -Shows single layered epidermis consisting of crescent-shaped, round to oval wavy walled cells, followed by 2-3 layers, thick-walled, sclerenchymatous fibres; below the sclerenchyma are present irregular, square or quadrilateral, spongy parenchymatous cells, a few cell walls having silica bodies through which run the fibro-vascular bundles of the ribs, followed by more or less, polygortal inner epidermal cells, a few inner epidermal cells having unicellular claw-shaped hair and stomata; pericarp composed of cells with more or less compressed parenchymatous cells; seed coat appears as a colourless line; perisperm composed of cells with more or less wavy walls having narrow lumens; endosperm divided into two zones, 2-4 cells deep aleurone layers, and the rest starch layers; starch grains simple, round to oval, measuring 3-30  $\mu$  in diameter.

Powder - Creamish-white; shows groups of fragments of polygonal, thin-walled flowering glume cells in surface view, sclerenchymatous fibres, scalariform vessels and abundant round to oval, simple starch grains, measuring 3-30  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Water-soluble ash	Not less than	4 per cent, Appendix	2.2.5
Alcohol-soluble extractive	Not less than	2.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5.5 per cent, Appendix	2.2.7

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. light (366 nm) seven fluorescent zones at Rf.

0.10, 0.22, 0.31, 0.45, 0.68, 0.83 (all violet) and 0.92 (yellow). On spraying with Phosphomolybdic acid reagent and on heating the plate for ten minutes at 105°C six spots appear at Rf. 0.10, 0.22, 0.31, 0.68, 0.83 and 0.92 (all grey). On spraying with Ninhydrin reagent eleven spots appear at Rf. 0.06, 0.14, 0.16, 0.24, 0.31, 0.36, 0.44, 0.53, 0.56, 0.65 & 0.72 (all pink.)

**CONSTITUENTS** - Starch, Sugars, Fats, Proteins (Albumin, Globulin, Prolamin and Glutinin) also contains Flavone Glycosides viz, Orientoside, Orientin, Vitexin etc.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Madhura  
**Guṇa** : Rūkṣa, Guru, Picchila, Mṛdu  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Vātakṛt, Pittahara, Kaphahara, Medohara, Balya, Vṛṣya, Svarya, Varṇya, Sthairyakara, Purīṣakṛt, Mūtrahara, Lekhana

**IMPORTANT FORMULATIONS** - Agastyaharītakī Rasāyana, Elādyā Modaka, Dād̄hika Ghṛta, Dhānvantara Ghṛta, Gandharvahasta Taila, Dhānvantara Taila, Bṛhatmāṣa Taila, Sarṣapādi Pralepa, Kāyasthādyā Varti

**THERAPEUTIC USES** - Medoroga, Prameha, Tṛṣṇā, Urustambha, Kaṇṭharoga, Śvāsa, Kāsa, Pīnasa, Tvagroga

**DOSE** - 100 - 200 g of the drug.

## YAVĀSAKA (Whole Plant)

Yavāsaka consists of dried whole plant of *Alhagi pseudalhagi* (Bieb). Desv. (Fam. Fabaceae); a small thorny shrub, mostly found in arid and dry regions of Gujarat, Punjab, Utter Pradesh and Rajasthan.

### SYNONYMS

Sanskrit	:	Yavāsa, Yāsa, Yavāsaka
Assamese	:	Bhatuashak
Bengali	:	--
English	:	Persian Manna Plant
Gujrati	:	Javaso
Hindi	:	Javasa
Kannada	:	Turuchana gida, Javasa, Neladangara, ballidurabi, Duralabha
Kashmiri	:	--
Malayalam	:	Venkatithura, Valiya Kotithuva
Marathi	:	Dhamasa
Oriya	:	--
Punjabi	:	---
Tamil	:	Punaikanjuri, Kanchori
Telugu	:	Chinnadoolagondi, Dhanvayasamu
Urdu	:	Turanjabeen

### DESCRIPTION

#### a) Macroscopic

Root - Well developed, 20-30 cm long and 0.2-1 cm thick; gradually tapering, secondary and tertiary root absent; dark brown; fracture, short.

## **b) Microscopic**

**Stem** - Cylindrical, glabrous, slightly rough at basal region with slender; hard, sharp axillary spines upto 3.8 cm long; branched, terete, striate, glabrous, nearly 0.1-1 cm thick; yellowish-green to yellowish-brown.

**Leaf** - Simple, alternate, oblong, mucronate obtuse, drooping, opposite, extipulate, 0.5-1 cm long, 0.5-0.7 cm broad. elliptical, smooth or puberulous with very short petiole, stipules green; no taste and odour.

**Root** -Shows 6-10 layers of tangentially elongated, radially arranged cork cells; cork cambium single layered, filled with reddish-brown contents; secondary cortex almost absent; phloem composed of sieve elements, phloem parenchyma and phloem fibres; some phloem parenchyma cells filled with tannin; xylem consists of vessels, tracheids, fibres parenchyma and xylem rays; vessels mostly solitary with simple pits; tracheids and fibres thick-walled, ascptate with bluntly pointed ends; medullary rays 1-4 cells wide, 3-45 cells long; pith composed of a few thin-walled, angular, parenchymatous cells; starch grains simple, rounded to oval, 5.5-14.75  $\mu$  in dia. present throughout the region.

**Stem** - Shows a single layered epidermis covered externally with thick cuticle; cortex composed of 8-15 layers of oval, tangentially elongated cells, numerous tanniferous cells found scattered in this region; pericycle present in form of fibre groups; phloem composed of sieve elements, parenchyma and fibres; some parenchyma cells filled with tannin; xylem consists of vessels, tracheids, xylem fibres, xylem parenchyma and xylem rays; vessels solitary or in groups of 2-3 with simple pits; tracheids and fibres, a few with thick wall and simple pits; medullary rays 2-3 cells wide pith composed of rounded, thin-walled, parenchymatous cells, some cells filled with tannin.

**Leaf-**

*Petiole* - appears circular in outline; shows single layered epidermis covered externally with cuticle; hypodermis 2-3 layered, filled with tannin, 'D' shaped collateral vascular bundle present in central region; rest of tissue between vasculr bundle and hypodermis composed of thin-walled, parenchymtous cells some of which are filled with tannin.

*Midrib* - appears biconvex in outline; epidermis single layered, covered externally with thick cuticle; hypodermis 1-2 layered, filled with tannin; pericycle present in the form of fibres strands; vascular bundle collateral; xylem situated above phlome, rest of tissue between vascular bundle and pericyclic strand is parenchymatous.

*Lamina* - epidermis consisting of single layered cells, covered with cuticle; paracytic stomata present on both surfaces hypodermis single layered filler with tannin; mesophyll not differentiated into palisade and spongy parenchyma, consisting of thin-walled oval to polygonal cells having chlorophyll; rounded to elongated tanniferous cells found scattered

in mesophyll.

Powder - Greenish-brown; shows fragments of epidermal cells consisting of rectangular to polygonal, elongated, thin-walled, parenchymatous cells with paracytic stomata, pitted vessels, fibres, tanniferous cells, simple, round and oval starch grains measuring 5.5-14.75  $\mu$  in diameter.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 13.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 10 per cent, Appendix	2.2.7.

### T.L.C.

**CONSTITUENTS** - Sugars (Melizitose, Sucrose, Invert Sugars).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphahara, Pittahara, Dīpana, Balakṛt

**IMPORTANT FORMULATIONS** - Chinnodbhavādi Kvātha Cūrṇa, Gandharvahastādi Kvātha Cūrṇa, Bhārṅgyādi Kvātha Cūrṇa, Arimedādi Taila

**THERAPEUTIC USES** - Tṛṣṇā, Chardi, Kāsa, Jvara, Vātarakta, Raktapitta, Visarpa

**DOSE** - 20 - 50 g of the drug in powder form for decoction.

# **THE AYURVEDIC PHARMACOPOEIA OF INDIA**

## **PART- I VOLUME – III**



**GOVERNMENT OF INDIA  
MINISTRY OF HEALTH AND FAMILY WELFARE  
DEPARTMENT OF ISM & H**

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## LEGAL NOTICES

In India there are laws dealing with drugs that are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by these laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of the law are being complied with.

In general, the Drugs & Cosmetics Act, 1940 (subsequently amended in 1964 and 1982), the Dangerous Drugs Act, 1930 and the Poisons Act, 1919 and the rules framed thereunder should be consulted.

Under the Drugs & Cosmetics Act, the Ayurvedic Pharmacopoeia of India (A.P.I.), Part-I, Vol. III, is the book of standards for single drugs included therein and the standards prescribed in the Ayurvedic Pharmacopoeia of India, Part-I, Vol. III would be official. If considered necessary these standards can be amended and the Chairman of the Ayurvedic Pharmacopoeia Committee authorised to issue such amendments. Whenever such amendments are issued the Ayurvedic Pharmacopoeia of India, Part-I, Vol. III, would be deemed to have been amended accordingly.

## GENERAL NOTICES

**Title** - The title of the book is "Ayurvedic Pharmacopoeia of

**Name of the Drugs** - The name given on the top of each monograph of the drug is in Sanskrit as mentioned in the Ayurvedic classics and/or in the Ayurvedic Formulary of India, Part-I and Part-II will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

**Introductory Para** - Each monograph begins with an introductory paragraph indicating the part, scientific name of the drug in Latin with short description about its habit, distribution and method of collection, if any.

**Synonyms** - Synonyms of each drug appearing in each monograph in Sanskrit, English, Hindi, Urdu and other Indian regional languages have been mentioned as found in the classical texts, Ayurvedic Formulary of India, Part-I and Part-II as procured from the experts, scholars of Ayurveda and officials in the field from different states.

**Italics** - Italic type has been used for scientific name of the drug appearing in the introductory paragraph of each monograph as also for chemicals and reagents, substances or processes described in Appendix.

**Odour and Taste** - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description, as large numbers of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour.

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case if poisonous drugs, indicated in monograph.

**Mesh Number** - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

**Weights and Measures** - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gramme (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube, which delivers in 20 drops 1 gram of distilled water at 15°C.

Metric measures are required by the Pharmacopoeia to be graduated at 20°C and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

**Identity, Purity and Strength** - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects,

pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive, water-soluble extractive, ether-soluble extractive, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method, which he uses, will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

**Limits for Heavy Metals** – All Ayurvedic Drugs (Single/Compound formulation) must comply with the limits for Heavy Metals prescribed in individual Monograph and wherever limit is not given then they must comply with the limits given in WHO publication "Quality Control Methods for Medicinal Plants and Material".

**Standards** - For statutory purpose, statements appearing in the API, Part-I, Vol. V, under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

**Thin Layer Chromatography (T.L.C.)** - Under this head, wherever given, the number of spots and R<sub>f</sub> values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

**Quantities to be weighed for Assays and Tests** - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

**Constant Weight** - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

**Constituents** - Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

**Percentage of Solutions** - In defining standards, the expression per cent (%), is used, according to circumstances, with one of the four meanings given below.

Per cent w/w (percentage weight in weight) expresses the number of grammes of active substance, in 100 grammes of product.

Per cent w/v (Percentage weight in volume) expresses the number of grammes of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent v/w (percentage volume in weight) expresses the number of millilitres of active substance in 100 grammes of product.

**Percentage of alcohol** - All statements of percentage of alcohol (C<sub>2</sub>H<sub>5</sub>OH) refer to percentage by volume at 15.56 °C.

**Temperature** - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

**Solutions** - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

**Reagents and Solutions** - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

**Solubility** - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities, which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that 1 gramme of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

<b>Descriptive terms</b>	<b>Relative quantities of solvent</b>
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1000 parts
Very slightly soluble	From 1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

**Therapeutic uses and important formulations** -Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognised Ayurvedic classics and in the Ayurvedic Formulary of India, Part -I and Part-II.

**Doses** - The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in Ayurvedic

texts. A conversion table is appended giving classical weights of Ayurvedic System of Medicine with their metric equivalents. Doses mentioned in the Ayurvedic Pharmacopoeia of India (A.P.I.) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

The abbreviations commonly employed are as follows:

<b>Abbreviations of technical terms</b>	
m	Metre
l	Litre
mm	Millimetre
cm	Centimetre
μ	Micron (0.001 mm)
kg	Kilogram
g	Gramme
mg	Milligram
ml	Millilitre
in	Normal solution
0.5 N	Half-normal solution
0.1 N	Decinormal solution
1M	Molar solution
Fam.	Family
PS	Primary Standards
TS	Transverse Section

<b>Abbreviations used for Languages</b>	
Sansk.	Sanskrit
Assam.	Assamese
Beng.	Bengali
Eng.	English
Guj.	Gujrati
Kan.	Kannada
Kash.	Kashmiri
Mal.	Malayalam
Mar.	Marathi
Ori.	Oriya
Punj.	Punjabi
Tam.	Tamil
Tel.	Telugu

### ABBREVIATIONS FOR PARTS OF PLANTS

Cotyledon	Cotldn.
Flower	Fl.
Fruit	Fr.
Heart Wood	Ht. Wd.
Leaf	Lf.
Pseudo-bulb	Pseudo-bulb
Root Bark	Rt. Bk.
Root	Rt.
Rhizome	Rz.
Seed	Sd.
Stem Bark	St. Bk.
Stem	St.
Tuberous Root	Tub. Rt.
Wood	Wd.
Whole Plant	Wh. Pl.

## ĀDHAKĪ (Root)

Āḍhakī consists of dried root of *Cajanus cajan* (Linn.) Millsp. (Fam. Fabaceae); an annual or perennial, erect shrub, 1.2-3.1 m high, cultivated almost throughout as a pulse crop upto an altitude of 1830 m in the Himalayas. It is mainly grown in Uttar Pradesh, Madhya Pradesh, Bihar, Maharashtra and Tamil Nadu.

### SYNONYMS

Sanskrit	:	Tuvarī
Assamese	:	Ruharmah
Bengali	:	Adar, Aaharee, Arhar
English	:	Pigeon Pea, Red Gram
Gujrati	:	Tuvar, Tuvera, Tur, Tuver
Hindi	:	Arahad, Arahar
Kannada	:	Togari, Tovaree, Togari, Kari Uddu, Togaribele
Kashmiri	:	--
Malayalam	:	Thuvara, Tuvara
Marathi	:	Toor, Toori, Tura
Oriya	:	Harada, Kandulagachha
Punjabi	:	Arhar
Tamil	:	Tovarai, Thovary, Adagi Tuvari, Thuvarai, Tuvarai, Thovarai
Telugu	:	Kandulu, Kadulu
Urdu	:	Arhar

### DESCRIPTION

#### a) Macroscopic

Root stout, branched, cylindrical, tapering having a number of secondary roots and rootlets, surface rough due to transversely running light brown lenticels, cream to light yellow externally, dirty white internally; fracture, hard and fibrous; odour, characteristic;

taste, acrid.

#### b) Microscopic

Mature root shows 3-7 layers of cork of rectangular, tangentially elongated, thin walled cells, interrupted at certain places by lenticels; secondary cortex consists of outer 3-7 layers of thin-walled, somewhat tangentially elongated parenchymatous cell, followed by a row of oval to elongated stone cells, thick-walled, elliptical, with wide lumen; some adjoining parenchymatous cells contain prismatic crystals of calcium oxalate; in the inner region strands of isolated or groups of 2-12 lignified fibres present; secondary phloem consists of sieve elements, fibres and phloem parenchyma, traversed by phloem rays; phloem fibres lignified, variable in size with pointed tips and wide lumen scattered throughout phloem region in single or in groups; some stone cells, mostly in groups and possessing yellowish contents, also found scattered in inner phloem; phloem rays numerous, uni to triseriate and straight; ray cells rectangular to rounded in inner phloem region, rounded to tangentially elongated in outer phloem; cambium consisting of 4-6 rows of thin-walled, narrow, tangentially elongated colourless cells; xylem occupies bulk of root and composed of vessels, tracheids, xylem parenchyma and fibres; vessels of varying sizes having pitted walls occur in small groups of 2-3 and also as occasionally isolated units in larger groups of 4-7; fibres short with wide lumen and pointed tips; parenchyma thin walled and rectangular; xylem rays numerous, uni to triseriate, biseriate being more common, straight, 3-25 cells high, radially elongated.

**Powder** - Cream coloured; shows numerous pieces of pitted vessels, fibres, cork cells, sclereids and a few prismatic crystals of calcium oxalate.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Ethylacetate : Methanol (90 : 10) v/v shows under U.V. (366 nm) six fluorescent zones at Rf. 0.06, 0.20, 0.69, 0.80, 0.90 (all blue) and 0.92 (yellow). On spraying with 5% Methanolic Sulphuric acid six spots appear on heating the plate at 105°C for about ten minutes at Rf. 0.06, 0.22, 0.30, 0.80, 0.88 and 0.92 (all grey).

CONSTITUENTS - Saponins and Reducing Sugars.

#### PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Madhura
Guṇa	:	Rūkṣa, Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vātakara, Pittahara, Kaphahara, Grāhī, Varṇya, Rucikara, Viṣaghna

IMPORTANT FORMULATIONS - Mahā Pañcagavya Ghṛta, Kāṅkāyana Guṭikā

THERAPEUTIC USES - Raktavikāra

DOSE - 2-6 g of the drug in powder form

## AGNIMANTHA (Root)

Agnimantha consists of dried mature roots of *Clerodendrum phlomidis* Linn. (Fam. Verbenaceae); a large shrub or small tree reaching upto 9 m in height, with more or less pubescent branches, found in dry parts throughout the country.

### SYNONYMS

Sanskrit	:	Gaṇikārikā , Jayantī, Jayā
Assamese	:	--
Bengali	:	Ganiyari, Arni, Goniari
English	:	--
Gujrati	:	Arani, Aranimula, Arni
Hindi	:	Urni
Kannada	:	Taggi, Taggi Beru
Kashmiri	:	--
Malayalam	:	Munja
Marathi	:	Takalimula
Oriya	:	Ganiary
Punjabi	:	--
Tamil	:	Tazhutazhai
Telugu	:	Taluki
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Drug pieces 7-15 cm long, 0.2 -3.0 cm thick, occasionally branched, cylindrical, tough, yellowish-brown externally, bark thin, occasionally easily peeled, outer surface rough due to exfoliation, wood light yellow, fracture hard; taste, slightly astringent.

## b) Microscopic

Root shows exfoliating cork, consisting of 10-15, occasionally more, rows of tangentially elongated, thin-walled cells; secondary cortex consists of round to oval parenchymatous cells, a few containing rhomboidal crystals of calcium oxalate; secondary phloem consists of isodiametric, thin-walled, parenchymatous cells, a few of them containing rhomboidal crystals of calcium oxalate; phloem rays distinct, consisting of radially elongated cells; secondary xylem shows a wide zone, consisting of usual elements, all being lignified; vessels found in single as well as in groups of 2-3, scattered throughout xylem region; xylem parenchyma simple pitted, squarish wide lumen; xylem rays 1-5 seriate, consisting of radially elongated cells; rhomboidal crystal of calcium oxalate packed in xylem parenchyma and xylem rays; abundant simple, round starch grains measuring 6-17  $\mu$  in dia., found scattered throughout.

**Powder** - Dull yellow; shows fragments of cork cells, small, pointed, aseptate, lignified fibres, simple, pitted vessels, lignified cells packed with rhomboidal crystals of calcium oxalate and numerous simple, round to oval starch grains having narrow hilum, measuring 6-11  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (85 : 15) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.10 (light yellow), 0.38, 0.59 and 0.90 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.10, 0.38,

0.59, 0.78, 0.87 and 0.98 (all yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent and heating the plate for about ten minutes at 105°C six spots appear at Rf. 0.10, 0.38, 0.59, 0.78, 0.87 and 0.98 (all grey).

CONSTITUENTS - Sterols

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Śvayathuhara, Vātakara

IMPORTANT FORMULATIONS - Daśamūlāriṣṭa, Daśamūla Kvātha Cūrṇa, Indukānta Ghṛta, Dhānvantara Ghṛta, Gorocanādi Vaṭī, Nārāyaṇa Taila

THERAPEUTIC USES - Śoṭha, Pāṇḍu, Arśa, Vātavikāra, Vibandha, Agnimāndya, Ādhmāna, Gulma, Mūtrakṛcchra, Mūtrāghāta

DOSE - 12-24 g of the drug in powder form for decoction.

## AMBAṢṬHAKĪ (Root)

Ambaṣṭhakī consists of dried roots of *Hibiscus sabdariffa* Linn. (Fam. Malvaceae); an annual, erect, shrub, generally cultivated in the hotter parts of India.

### SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Masts Pal, Mesta
English	:	Jamaican Sorrel
Gujrati	:	Ambodi
Hindi	:	Patsan, Patna
Kannada	:	Pudisoppu, Kempu Pundrike Pullichekir
Kashmiri	:	--
Malayalam	:	Pariccakam, Pulicheera
Marathi	:	Lalambari
Oriya	:	Khataa, Kaunria, Tak Bhend
Punjabi	:	Kolada
Tamil	:	Pulichikire
Telugu	:	Pundikura, Gongura
Urdu	:	Patsan

### DESCRIPTION

#### a) Macroscopic

Tap root greyish-brown in colour, stout, cylindrical with many lateral branches gradually tapering towards lower end, moderately rough due to minute longitudinal wrinkles, 1-2 cm thick; fracture, fibrous in bark region and short in wood region; no characteristic odour and taste.

## b) Microscopic

Mature root shows 3-5 layers of cork consisting of tangentially elongated rectangular cells; secondary cortex almost absent, when present 2-3 layered, oval to polygonal, thin-walled, parenchymatous cells; secondary phloem composed of usual elements; secondary xylem consists of vessels, tracheids, fibres and parenchyma traversed by xylem rays; vessels solitary or 2-4 in groups with pitted thickening; fibres and tracheids short to moderately long with pitted walls; medullary rays 1-3 cells wide and multicelled in height; starch grains both simple and compound and the later having 2-3 components, measuring 5.5-14  $\mu$  in dia. present in phloem parenchyma, xylem parenchyma and ray cells.

**Powder** - Greyish-brown; shows pitted vessels, fragments of cork cells, fibres and tracheids, both simple and compound starch grains measuring 5.5-14  $\mu$  in dia. having 2-3 components.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid : Water (4: 1: 5) shows under U. V. (366 nm) four fluorescent zones at Rf. 0.36, 0.61, 0.92 (all blue) and 0.95 (pink). On exposure to Iodine vapour twelve spots appear at Rf. 0.06, 0.12, 0.17, 0.22, 0.29, 0.36, 0.44, 0.59, 0.61, 0.72, 0.82 and 0.92 (all yellow). On spraying with 5% Ethanolic Sulphuric acid reagent and heating the plate at 105°C for ten minutes seven spots appear at Rf. 0.29 (grey), 0.36 (violet), 0.44, 0.61, 0.73, 0.82 and 0.92 (all grey).

CONSTITUENTS - Sterols and Polysaccharides

PROPERTIES AND ACTION

Rasa : Madhura, Amla, Tikta, Kaṣāya

Guṇa : Laghu

Vipāka : Amla

Karma : Pittahara, Kaphahara, Asthisandhānaka, Vraṇaropaṇa, Rucikara, Dīpana, Kaṇṭhaśodhana

IMPORTANT FORMULATIONS - Puṣyānuga Cūrṇa

THERAPEUTIC USES - Pakvātisāra, Kapharoga, Galaroga, Vātaroga, Asthibhagna, Vraṇa

DOSE - 5 -10 g

## ĀMRA (Seed)

Āmra consists of dried seed of *Mangifera indica* Linn. (Fam. Anacardiaceae), a tree found wild or cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Āmrabījamajjā
Assamese	:	--
Bengali	:	Am
English	:	Mango
Gujrati	:	Aambaro, Ambanoo, Aambo, Keri
Hindi	:	Aam
Kannada	:	Amavina
Kashmiri	:	--
Malayalam	:	Manga
Marathi	:	Aamba
Oriya	:	Amkoili, Ambakoiti
Punjabi	:	Amb
Tamil	:	Mangottai Paruppu, Maangottai
Telugu	:	Mamidi-Jeedi
Urdu	:	Aam

### DESCRIPTION

#### a) Macroscopic

Seed 3-4.5 cm long, 1.5-2.5 cm wide, ovoid, oblong covered with wrinkled integument, both outer and inner integument closely united, outer integument buff coloured, inner integument reddish-brown; taste, bitter and astringent.

## b) Microscopic

Seed shows outer integument consisting of tangentially elongated, irregular, thin-walled, parenchymatous cells, with poorly developed conducting tissues of vessels showing spiral thickenings towards inner integument, inner integument consisting of slightly rectangular, wavy and large thin-walled parenchymatous cells; cotyledons 2, composed of isodiametric, parenchymatous cells fully packed with simple and compound starch grains; compound starch grains consisting of 2-6 components, each starch grain round to oval, measuring 2-28  $\mu$  in dia., a few conducting tissues with spiral vessels also found scattered in parenchymatous cells of cotyledons.

**Powder** - Greyish-buff; shows reddish-orange coloured cells of integument, thin-walled, parenchymatous cells, simple and compound starch grains, consisting of 2-6 components, measuring 2-28  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	3 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10 per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.62 (yellowish) and 0.92 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.07, 0.29, 0.62, 0.77 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C five spots appear at Rf. 0.07 (grey), 0.29 (grey), 0.62 (grey), 0.77 (brown) and 0.93 (brown).

CONSTITUENTS - Tannins - Pyrogallotannins

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Madhura
Guṇa	:	Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Samgrāhī, Vātakara, Kṛmighna

IMPORTANT FORMULATIONS - Puṣyānuga Cūrṇa, Bṛhat Gaṅgādhara Cūrṇa, Aśokāriṣṭa

THERAPEUTIC USES - Atīsāra, Pravāhikā, Chardi, Dāha, Tvagroga

DOSE - 1-2 g of the drug in powder form

## ĀMRA (Stem Bark)

Āmra consists of dried stem bark of *Mangifera indica* Linn. (Fam. Anacardiaceae), a tree found wild or cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Āmra
Assamese	:	Aam
Bengali	:	Am, Ama
English	:	Mango
Gujrati	:	Ambo
Hindi	:	Ama
Kannada	:	Mavu
Kashmiri	:	--
Malayalam	:	Mavu
Marathi	:	Amba
Oriya	:	Am, Amba
Punjabi	:	Amb
Tamil	:	Mamaram
Telugu	:	Amaramu
Urdu	:	Aam

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces of variable size and thickness, surface rough due to longitudinal cracks, fissures and scattered, raised lenticels, greyish to dark brown externally and yellowish-white to reddish internally; odour, pleasant; taste, astringent.

## b) Microscopic

Mature bark, shows a wide cork consisting of tangentially elongated cells, a few outer layers brown and inner lighter in colour, at a few places lenticels appear; secondary cortex almost absent; secondary phloem wide, consisting of sieve elements, parenchyma and phloem fibres, traversed by medullary rays, resin canals and yellow coloured elongated, tannin sacs abundantly scattered throughout phloem region; stone cells thick walled, lignified, rectangular with wide lumen also present in single or in groups; starch grains and prismatic crystals of calcium oxalate present in number of phloem cells; phloem fibres in groups composed of 2-15 or more cells, long and thick walled, phloem rays 1-3 seriate, 3 seriate rays more common, somewhat wavy, thin-walled, radially elongated and filled with crystals of calcium oxalate and simple, round starch grains, measuring 12-16 $\mu$  in diameter.

**Powder** - Brown; shows fragments of cork cells, stone cells, single or in groups; phloem fibres, prismatic crystals of calcium oxalate; simple, spherical to elliptical, starch grains measuring 12 - 16  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 : 1 : 5) shows under U.V. (366 nm) three violet spots at Rf. 0.12, 0.73 and 0.87.

On exposure to Iodine vapour four yellow coloured spots appear at Rf. 0.33, 0.51, 0.74 and 0.88. On spraying with 5% Methanolic-Sulphuric acid reagent and after heating the plate at 105°C for ten minutes, three grey coloured spots appear at Rf. 0.49, 0.69 and 0.88.

CONSTITUENTS - Tannins - Protocatechuic Acid, Catechin, Mangiferin, Alanine, Glycine,  $\alpha$ -Aminobutyric acid, Kinic and Shikimic Acids.

#### PROPERTIES AND ACTION

Rasa	:	Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Grāhī, Kaphapittaśāmaka, Vraṇaropāṇa, Rucya

IMPORTANT FORMULATIONS - Nyagrodhādi Cūrṇa, Nyagrodhādi Kvātha Cūrṇa, Candanāsava, Grahaṇīmihira Taila, Mūtra Saṃgrahaṇīya Kaṣāya Cūrṇa

THERAPEUTIC USES - Atīsāra, Vraṇa, Agnimāndya, Grahaṇī, Prameha, Yoni Roga

DOSE - 3-6 g of powder

25-50 g for decoction

## ĀMRĀTA (Stem)

Āmrāta consists of dried stem of *Spondias pinnata* (Linn. f.) Kurz Syn. *S. mangifera* Willd., *S. acuminata* Roxb. non Gamble (Fam. Anacardiaceae); a small, aromatic, deciduous tree, upto 27 m high and 2-5 m in girth, found wild or cultivated almost throughout the country, ascending upto an altitude of 1500 m in the Himalayas, and also distributed in Andamans.

### SYNONYMS

Sanskrit	:	Āmrātaka, Markaṭamrah, Kapītana
Assamese	:	Amda
Bengali	:	Amda
English	:	Indian Hog Plum, Hog Plum
Gujrati	:	Jangali Ambo, Ambeda
Hindi	:	Ambada
Kannada	:	Ambate, Amatemara
Kashmiri	:	--
Malayalam	:	Ambazham
Marathi	:	Ambada
Oriya	:	Aabada
Punjabi	:	--
Tamil	:	Mampulecci, Mampulicci
Telugu	:	Ambalamu
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Stem occurs in cut pieces, about 3.5 - 10.0 cm long, 1.0-3.0 cm in dia., cylindrical, more or less rough due to longitudinal wrinkles; occasionally a few round, prominent leaf

scars also present, reddish-grey externally having lenticel, white or cream coloured internally with prominent dark brown centre, light in weight; fracture very hard; odour and taste not characteristic.

**b) Microscopic**

Mature stem shows a wide zone of cork ranging from 15-25 rows, comprising of tangentially elongated, radially arranged, thin-walled cells containing reddish-brown contents, a few outer cells exfoliating; secondary cortex consisting of 15-17 layers, oval to polygonal, tangentially elongated, thin-walled cells, followed by 2-3 tangential bands comprising of groups of stone cells; secondary phloem consisting of usual elements; phloem fibres arranged in tangential bands, thick-walled, lignified; prominent lysigenous cavities surrounded by a number of tannin sacs present in between the patches of phloem fibres; phloem parenchyma consisting of thin-walled cells having a few prismatic crystals of calcium oxalate; secondary xylem consists of usual elements, lignified; vessels single or in groups of 2-4 having simple pits, occasionally reticulate thickening, fibres fusiform with blunt tips; tracheids thick-walled; xylem rays 1-2 cells wide and 3-11 cells high; starch grains simple, round to oval having concentric striations and hilum, measuring 3-14  $\mu$  in dia., present in secondary cortex, phloem parenchyma, xylem parenchyma and xylem rays.

**Powder** - Grey; shows fragments of cork cells, phloem fibres, stone cells mostly in groups, occasionally single; a few prismatic crystals of calcium oxalate, simple and reticulate vessels; starch grains simple, round to oval having concentric striations and hilum in centre, measuring 3-14  $\mu$  in diameter.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Ethylacetate : Formic acid (5 : 4 : 1) shows in visible light three spots at Rf. 0.08, 0.74 and 0.83 (all grey). Under UV (366 nm) five fluorescent zones are visible at Rf. 0.04, 0.79, 0.83, 0.87 (all blue) and 0.93 (sky blue). On exposure to Iodine vapour six spots appear at Rf. 0.13, 0.48, 0.74, 0.83, 0.87 and 0.93 (all yellow). On spraying with 10% Ferric chloride solution (aqueous) reagent two spots appear at Rf. 0.04 and 0.93 (both blue).

## CONSTITUENTS - Tannins

## PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Amla
Guṇa	:	Guru
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātaghna, Sāraka

## IMPORTANT FORMULATIONS - Dādhika Ghṛta

## THERAPEUTIC USES - Dāha, Kṣaya, Rakta Vikāra, Atīsāra

DOSE - 1-3 g of powder

## APĀMĀRGA (Root)

Apāmārga consists of dried root of *Achyranthes aspera* Linn. (Fam. Amaranthaceae); a stiff erect, 0.1-0.9 m high, herb found commonly as a weed throughout the country up to 900 m.

### SYNONYMS

Sanskrit	:	Adhaḥśalya, Śikhari, Mayūraka
Assamese	:	Chirchita
Bengali	:	Apang
English	:	Prickly Chaff Flower
Gujrati	:	Aghedo
Hindi	:	Chirchira, Latjira
Kannada	:	Uttarane, Uttaren
Kashmiri	:	--
Malayalam	:	Kadaledee
Marathi	:	Anghada
Oriya	:	--
Punjabi	:	Puthakanda, Lattajeera
Tamil	:	Nayuruvi
Telugu	:	Uttareni
Urdu	:	Chirchita

### DESCRIPTION

#### a) Macroscopic

Tap root cylindrical slightly ribbed, upto 1.0 cm in thickness, gradually tapering, rough due to presence of some root scars; secondary and tertiary roots present; yellowish-brown; odour, not distinct; taste not characteristic.

## b) Microscopic

Mature root shows 6-10 layered, rectangular, tangentially elongated, thin-walled cork cells; secondary cortex consisting of 6-9 layers, oval to rectangular, thin-walled parenchymatous cells having scattered, thick-walled, irregular lignified stone cells, followed by 5-6 discontinuous rings of anomalous secondary thickening, composed of vascular tissues; small patches of sieve tubes are distinct in the phloem parenchyma demarcating the xylem rings; secondary xylem composed of tracheids, fibres and parenchyma; vessels with both simple and bordered pits and with scalariform thickening, measuring 135-348  $\mu$  in length and 32-64  $\mu$  in width; fibres pointed at both ends with walls moderately thickened, measuring 260-740  $\mu$  in length and 12-24  $\mu$  in width; tracheids have tapering ends, measuring 165-535  $\mu$  in length and 17-34  $\mu$  in width.

In *A. bidentata* BL. vessels show bordered pits and reticulate thickening; medullary rays not distinct; stone cells and prismatic crystals absent in cortex.

**Powder** - Yellowish-brown; shows fragments of rectangular cork cells, stone cells, vessels showing bordered pits and scalariform thickening, fibres and a few prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (95:5) shows under UV (366 nm) five fluorescent zones at Rf. 0.05, 0.19, 0.43, 0.50 and 0.97 (all light blue). On exposure to Iodine vapour six spots appear at Rf. 0.05, 0.12, 0.43, 0.50, 0.92 and 0.97 (all yellow). On spraying with Dragendorff reagent followed by 5%

Methanolic-Sulphuric acid reagent two spots appear at Rf 0.12 and 0.97 (both light orange).

CONSTITUENTS - Saponins

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Dīpana, Pācana, Rucya, Vātahara, Kaphanāśaka, Medohara, Mūtrala, Vāntihara

IMPORTANT FORMULATIONS - Agastya Harītakī Rasāyana, Mahā Pañcagavya Ghr̥ta, Vastyāmayāntaka Ghr̥ta, Mahā Viṣagarbha Taila, Apamārga Kṣāra Taila, Kṣāra Taila, Panaviralādi Kṣāra

THERAPEUTIC USES - Chardi, Ādhmāna, Kaṇḍū, Śūla, Apacī, Granthi, Bhagandara, Hṛdroga, Jvara, Śvitra, Bādhirya, Udara Roga, Yakṛt Roga, Danta Roga, Rakta Vikāra

DOSE - 5-10 g

## ARALU (Stem Bark)

Aralu consists of dried stem bark of *Ailanthus excelsa* Roxb. (Fam. Simarubaceae); a large deciduous tree occurring in Bihar, Chhota Nagpur, Madhya Pradesh, forests of Ganjam, Vishakhapatnam and Deccan.

### SYNONYMS

Sanskrit	:	Kaṭvaṅga, Dīrghavṛnta
Assamese	:	Aralu
Bengali	:	--
English	:	--
Gujrati	:	Aralavo
Hindi	:	Arlu, Maruk, Ghoda Karanj
Kannada	:	Hiremara Hebbever
Kashmiri	:	Merumaram, Mattipongilyam
Malayalam	:	Merumaram, Mattipongilyam
Marathi	:	Ghoda Karanj
Oriya	:	Dakshinakabala, Mahala
Punjabi	:	Aruo
Tamil	:	Peruvagai
Telugu	:	Peddmanu
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Bark thick, external surface light grey, granular and rough due to presence of longitudinal ridges, internal surface yellowish-white and fibrous; fracture, fibrous; odour, disagreeable when fresh; taste, bitter.

## b) Microscopic

Stem Bark cork multilayered, compactly arranged, tangentially elongated, thinwalled cells obliterated at certain points due to rhytidoma; secondary cortex narrow, composed of tangentially elongated cells, a few cells contain rosette and prismatic crystals of calcium oxalate; phloem, wide, consisting of sieve elements, parenchyma, fibres and stone cells; a few layers of outer phloem collapsed forming ceratenchyma; stone cells, in groups and in singles, present towards outer region of phloem; lignified fibres present in groups in radial rows in inner phloem region; calcium oxalate crystals similar to those found in secondary cortex also found in phloem region; medullary rays not distinct.

**Powder** - Brownish-yellow, fragments of cork cells; groups or single, oval to polygonal, thick-walled, lignified, stone cells, having wide lumen with distinct striations, lignified phloem fibres, a few rosette and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 8.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 1.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 5.5 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (95 : 5) shows under U.V. (366 nm) twelve fluorescent zones at Rf. 0.07 (sky blue), 0.10 (sky blue) 0.21, 0.38, 0.47 (all yellow), 0.57 (sky blue), 0.71 (light sky blue), 0.76, 0.81 (both yellow), 0.84 (sky blue), 0.93 (whitish blue) and 0.97 (sky blue). On exposure to Iodine vapour twelve spots appear at Rf. 0.07, 0.10, 0.21, 0.38, 0.47, 0.57, 0.71, 0.76, 0.81, 0.84, 0.93 and 0.97 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for fifteen minutes thirteen spots appear at Rf. 0.07, 0.01(both grey), 0.21 (light brown), 0.24 (blue), 0.38, 0.47 (both light brown), 0.52 (pink), 0.59 (blue), 0.71, 0.76 (both light brown), 0.84 (blue), 0.93 and 0.97 (both dark grey).

CONSTITUENTS -  $\beta$ -Sitosterol, Quassinoids, Ailantic Acid, 2-6 Dimethoxy-Benzoquinone and Melanthin.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Kaphapitta Śāmaka, Dīpana, Pācana, Grāhī, Vraṇaśodhana, Śodhaka

IMPORTANT FORMULATIONS - Puṣyānuga Cūrṇa, Bṛhat Gaṅgādhara Cūrṇa, Aralu Puṭapāka

THERAPEUTIC USES - Atīsāra, Kṛmi, Arśa, Sannipāta Jvara, Bhrama, Tvagroga, Chardi, Kuṣṭha, Pravāhikā, Grahaṇī, Prameha, Śvāsa, Gulma, Mūṣaka Viṣaja Roga

DOSE - 1-3 g

## ARKA (Stem Bark)

Arka consists of dried stem bark of *Calotropis procera* (Ait.) R. Br. (Fam. Asclepiadaceae); an erect shrub exuding milky white latex from cut parts, found wild more or less throughout India.

### SYNONYMS

Sanskrit	:	Sūrya
Assamese	:	Akand, Akan
Bengali	:	Akanda, Akone
English	:	Maddar
Gujrati	:	Aakado
Hindi	:	Aak, Madar, Akavana
Kannada	:	Ekka, Ekkagida
Kashmiri	:	--
Malayalam	:	Errikku
Marathi	:	Rui
Oriya	:	Arakka
Punjabi	:	Akk
Tamil	:	Vellerukku, Erukku
Telugu	:	Jilledu
Urdu	:	Madar, Aak

### DESCRIPTION

#### a) Macroscopic

Drug occurs in channelled, quilled and fibrous pieces, upto 0.1 - 0.5 cm thick, external surface yellowish brown having longitudinal cracks, internal surface greenish, smooth, with an occasional wood tissue attached; fracture, fibrous; odour and taste not distinct.

## b) Microscopic

Stem bark shows exfoliated cork, consisting of 6-8 layers of tangentially elongated, thick-walled cells; where cork has not developed, epidermis present consisting of a single layered rectangular cells covered externally with striated cuticle; secondary cortex composed of tangentially elongated, oval, rounded or rectangular thin-walled, parenchymatous cells having intercellular spaces, some cells contain rosette crystals of calcium oxalate, a number of rounded, oval to elongated, single or groups of stone cells and latex cells also found scattered in this region; pericyclic fibres numerous, lignified; secondary phloem composed of sieve elements, phloem parenchyma, phloem fibres and phloem rays; phloem parenchyma rectangular to polygonal in shape having rosette crystals of calcium oxalate, latex cells and stone cells similar to those found in secondary cortex; phloem fibres aseptate with bordered pits; phloem rays mostly uniseriate and run straight.

**Powder** - Light yellowish-green; shows fibres, stone cells, rosette crystals of calcium oxalate and latex cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	15	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (1: 1) shows under UV (366 nm) four fluorescent zones at Rf. 0.63, 0.71, 0.81 and 0.87 (all

blue). On spraying with Dragendorff reagent followed by 5% Methanolic Sulphuric acid reagent one spot appears at Rf. 0.08 (orange).

CONSTITUENTS -  $\alpha$  - and  $\beta$ - Calotropeols,  $\beta$ -Amyrin, Giganteol, a Colourless wax, small amount of Tetracyclic Terpenes and Traces of Sterols.

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śodhana, Virecana, Vātahara, Dīpana, Lekhana, Ropaṇa

IMPORTANT FORMULATIONS - Abhayā Lavaṇa, Arka Lavaṇa

THERAPEUTIC USES - Udararoga, Kuṣṭha, Kaṇḍū, Vraṇa, Plīhāroga, Gulma, Arśa, Kṛmiroga

DOSE - 0.5-1 g in powder form

## ASANA (Stem Bark)

Asana consists of dried stem bark of *Pterocarpus marsupium* Roxb. (Fam. Fabaceae); a moderate to large sized, deciduous tree, upto 30 m high and 2.5 m in girth, with straight clear bole, found throughout deciduous forests in peninsular India.

### SYNONYMS

Sanskrit	:	Asanaka, Bījaka, Bījasāra, Pītasāra
Assamese	:	Aajar
Bengali	:	Pitasala, Piyasala
English	:	Indian Kino Tree
Gujrati	:	Biyo
Hindi	:	Bija, Vijayasara
Kannada	:	Asana, Bijasara
Kashmiri	:	Lal Chandeur
Malayalam	:	Venga
Marathi	:	Bibala
Oriya	:	Piashala
Punjabi	:	Channanlal, Chandan Lal
Tamil	:	Vengai
Telugu	:	Yegi, Vegisa
Urdu	:	Bijasar

### DESCRIPTION

#### a) Macroscopic

Drug consists of pieces of stem bark, 1-1.5 cm thick, channeled, usually yellowish-grey with brownish spots due to exudates, outer surface rough and uneven due to protuberances and exfoliations, longitudinal and horizontal cracks present, inner surface fairly smooth; fracture fibrous, breaks with much difficulty; taste, astringent.

## b) Microscopic

Stem bark shows the presence of rhytidoma; idioblasts consisting of lysigenous cavities, present in a row just below cork; secondary cortex not distinct; secondary phloem occupies almost two third of the thickness of bark consisting of sieve elements, phloem parenchyma, phloem fibres, crystal fibres and traversed by a number of phloem rays; sieve elements and parenchyma found collapsed towards the middle and outer regions of phloem, forming ceratenchyma; phloem parenchyma thin-walled, circular to oval; phloem fibres single usually numerous in groups forming alternating bands throughout phloem region, thick-walled and lignified with a small lumen; rhomboidal crystals of calcium oxalate found scattered throughout the region; lysigenous cavities and tanniferous ducts filled with red colour masses distributed throughout phloem region; phloem rays very close to each other, mostly uniseriate but biseriate rays also occasionally found .

**Powder** - Yellowish-brown; shows plenty of lignified fibres, crystal fibres, reddish - brown contents and free rhomboidal crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	18 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11.5 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic Acid: Water (4:1:5) shows six spots at Rf 0.09, 0.22, 0.41, 0.52, 0.63 and 0.78 (all brown). On exposure to Iodine vapour six spots appear at Rf 0.09, 0.22, 0.41, 0.63, 0.78 (all brown) and 0.92 (yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent six spots appear on heating the plate at 105°C for about ten minutes at Rf. 0.09, 0.22 (both blue), 0.41 (faint blue), 0.63, 0.78 and 0.92 (all blue).

CONSTITUENTS - Tannins and Gum Kino (which contains Kino-Tannic Acid, 1--  
Epicatechin and a reddish brown colouring matter).

#### PROPERTIES AND ACTION

Rasa : Kaṣāya, Kaṭu, Tikta  
Guṇa : Laghu, Rūkṣa  
Vīrya : Uṣṇa  
Vipāka : Kaṭu  
Karma : Sāraka, Vātārtidoṣanut, Galadoṣaghna, Keśya, Tvacya, Raktamaṇḍalnāśin  
ī, Śleṣmahara, Pittahara

IMPORTANT FORMULATIONS - Nārasimha Ghṛta Rasāyana

THERAPEUTIC USES - Pāṇḍu, Prameha, Medodoṣa, Kuṣṭha, Kṛmiroga, Śvitra, Madhumeha,  
Sthaulya

DOSE - 32-50 g of the drug for decoction

## ASTHISAMHṚTA (Stem)

Asthisaṃhṛta consists of dried stem of *Cissus quadrangularis* Linn. (Fam. Vitaceae); a perennial fleshy cactus-like climber with tendrils and a quadrangular stem, found throughout the hotter parts of India alongside hedges.

### SYNONYMS

Sanskrit	:	Vajravallī, Caturdhārā
Assamese	:	Harjara
Bengali	:	Hadajora
English	:	--
Gujrati	:	Hadasankala
Hindi	:	Hadjod
Kannada	:	Mangaraballi
Kashmiri	:	--
Malayalam	:	Changalam Parande
Marathi	:	Kandvel
Oriya	:	Hadbhanga
Punjabi	:	Haddjor
Tamil	:	Perandai
Telugu	:	Nalleru
Urdu	:	Hathjod

### DESCRIPTION

#### a) Macroscopic

Drug occurs as pieces of stem of varying lengths; stem quadrangular, 4-winged, internodes constricted at nodes; a tendril occasionally present at nodes; internodes 4-15 cm long and 1-2 cm thick; surface smooth, glabrous, buff coloured with greenish tinge, angular portion reddish-brown; no taste and odour.

## b) Microscopic

Mature stem shows squarish outline with prominent projection at each angular point; epidermis single layered, covered externally with thick cuticle; epidermal cells thin-walled, rectangular and tangentially elongated, followed by 2-3 layers of cork and single layered cork cambium; cortex composed of 8-16 layers of thin-walled, circular to oval parenchymatous cells; four patches of collenchymatous cells present in all the four angular points embedded in cortical region like an umbrella arching over large vascular bundles; in the projected portion of angular region cortical cells filled with brown-red contents present; endodermis not distinct; stele consists of a large number of vascular bundles varying in size arranged in the form of a ring separated by rays of parenchyma; 3 -4 vascular bundles larger in size, in each angular region, below collenchymatous patch, while rest of bundles smaller in size; vascular bundles collateral and open type, capped by sclerenchymatous sheath which is well developed in larger bundles; cambium and interfascicular cambium quite distinct; central region occupied by a wide pith composed of thin-walled, circular to oval parenchymatous cells; idioblasts containing raphides and isolated acicular crystals of calcium oxalate present in the outer region of cortex and also in a number of cells throughout the region; rosette crystals of calcium oxalate also found in most of the cells in cortical region; starch grains present throughout the cortical and the pith regions.

**Powder** - Brown; shows fragments of vessels, fibres, parenchymatous cells and a few rosette crystals of calcium oxalate, starch grains and idioblast, containing raphides and isolated acicular crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	22	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.59 and 0.91 (both blue). On exposure to Iodine vapour four spots appear at Rf. 0.46, 0.56, 0.66 and 0.91 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.06, 0.46 (both violet), 0.59 (light violet), 0.66 and 0.91 (both violet).

CONSTITUENTS - Calcium Oxalate, Carotene and Ascorbic Acid

### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Madhura
Guṇa	:	Laghu, Rūkṣa, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Dīpana, Vātāśleṣmahara, Asthisandhānakara, Cakṣuṣya, Vṛṣya

THERAPEUTIC USES - Kṛmi, Arśa, Asthibhagna, Sandhi Cyuta

DOSE - 10-20 ml (Svarasa)

3-6 g (Powder)

## ĀTMAGUPTĀ (Seed)

Ātmaguptā consists of dried mature seed of *Mucuna prurita* Hook., Syn. *M. pruriens* Baker. (Fam. Fabaceae); a slender extensive climbing plant found almost all over the country.

### SYNONYMS

Sanskrit	:	Kapikacchu, Markaṭī, Kaṇḍura
Assamese	:	Banar Kakua
Bengali	:	--
English	:	Cowhage
Gujrati	:	Kavach, Kaucha
Hindi	:	Kewanch, Kaunch
Kannada	:	Nasugunne, Nasugunnee
Kashmiri	:	--
Malayalam	:	Naikuruna
Marathi	:	Khajkuhilee, Kavach
Oriya	:	Baikhujnee
Punjabi	:	Tatgajuli, Kawach
Tamil	:	Poonaiikkali
Telugu	:	Doolagondi, Duradagondi
Urdu	:	Kanwach, Konch

### DESCRIPTION

#### a) Macroscopic

Seed ovoid, slightly laterally compressed, with a persistent oblong, funicular hilum, dark brown with spots; usually 1.2-1.8 cm long, 0.8-1.2 cm wide, hard, smooth to touch, not easily breakable; odour, not distinct; taste, sweetish-bitter.

## b) Microscopic

Mature seed shows a thin seed-coat and two hard cotyledons; outer testa consists of single layered palisade-like cells; inner testa composed of 2 or 3 layers, outer layer of tangentially elongated, ovoid, thin-walled cells, inner 1 or 2 layers of dumb-bell or beaker-shaped, thick-walled cells; tegmen composed of a wide zone of oval to elliptical, somewhat compressed, thin-walled, parenchymatous cells; some cells contain starch grains; cotyledons composed of polygonal, angular, thin-walled, compactly arranged, parenchymatous cells, containing aleurone and starch grains; starch grains small, simple, rounded to oval measuring 6-41  $\mu$  in dia., but not over 45  $\mu$  in dia.; a few vascular bundles with vessels showing reticulate thickening or pitted present,

Powder - Pale cream coloured; shows fragments of testa with palisade-like cells thinwalled parenchyma, reticulate and pitted vessels, aleurone and starch grains small, simple, rounded to oval measuring 6-41  $\mu$  in dia., but not over 45  $\mu$ . in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.
Fixed oil	Not less than	3	per cent, Appendix	2.2.8

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate, using n-Butanol : Acetic acid: Water (4:1:5), shows in visible light four spots at Rf. 0.51, 0.59, 0.69 (all grey) and 0.92 (light yellow). Under UV (366 nm) six fluorescent zones are visible at Rf. 0.45 (blue), 0.51, 0.59, 0.69 (all grey), 0.79 (light blue) and 0.92 (blue). On spraying with Ninhydrin reagent

and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.17, 0.28, 0.34 (all pink) 0.51 (orange), 0.59 (pink), 0.69 (grey) and 0.92 (pink).

CONSTITUENTS - Fixed Oil, Alkaloid and 3,4-Dihydroxyphenylalanine.

#### PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta
Guṇa	:	Guru, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātaśamana, Vṛṣya, Kaphanāśaka, Pittanāśaka, Raktadoṣanāśaka, Bṛmhaṇa, Balya

IMPORTANT FORMULATIONS - Bṛhat Māṣa Taila

THERAPEUTIC USES - Vātavyādhi, Kāṃpavāta, Klaibya, Raktapitta, Duṣṭavraṇa, Daurbalya

DOSE - 3-6 g

## BHĀRĀṄĪ (Root)

Bhāraṅī consists of dried roots of *Clerodendrum serratum* (Linn.) Moon (Fam. Verbenaceae); a shrub distributed throughout the country.

### SYNONYMS

Sanskrit	:	Aṅgāravallī, Brāhmaṇayaṣṭikā
Assamese	:	--
Bengali	:	Bamun Hatee, Baman hatee, Bhuijam
English	:	--
Gujrati	:	Bharangee
Hindi	:	Bharangee
Kannada	:	Gantubarangee
Kashmiri	:	--
Malayalam	:	Cheruteku
Marathi	:	Bharangee, Bharang
Oriya	:	Chinds
Punjabi	:	Bhadangee
Tamil	:	Cheruteku
Telugu	:	Gantubharangee
Urdu	:	Bharangi, Baharangi

### DESCRIPTION

#### a) Macroscopic

Mature root hard, woody, cylindrical, upto 5 cm thick, external surface light brown having elongated lenticels; bark, thin and easily separated from a broad wood which shows marked medullary rays and concentric growth rings in a transversely cut surface; fracture, short; taste, acrid.

## b) Microscopic

Mature root shows stratified cork composed of 14-20 layers of thin-walled, tangentially elongated cells; each stratification consists of 3-5 layers of cells; secondary cortex wide, outer 2 or 3 layers radially arranged and tangentially elongated, inner cells polyhedral or circular to ellipsoidal with intercellular spaces; a few cells modified into stone cells with greatly thickened wall having concentric striations and radiating canals with narrow lumen; some cells contain acicular crystals of calcium oxalate and a few contain brown colouring matter; secondary phloem consists of sieve elements and parenchyma mostly collapsed in outer region, forming ceratenchyma; some phloem parenchymatous cells modified into stone cells similar to those in secondary cortex but somewhat smaller and with greater thickening' of walls; secondary xylem diffused porous consisting of vessels, tracheids, fibres and xylem parenchyma traversed by xylem rays; macerated preparation show wider vessels cylindrical, drum-shaped, some being elongated at one end having bordered pits, rarely reticulate or pitted, while narrower ones elongated with spiral to reticulate thicken- tracheids long, cylindrical with tapering ends and bordered pits; xylem fibres moderately thick-walled with mostly tapering, pointed ends and oblique bordered pits; xylem parenchyma square to rectangular with simple pits on their walls; medullary rays 1-4 cells wide and 2-50 cells high, 2 or 3 cell wide rays more common, having simple pits on their walls; acicular crystals and abundant simple and compound starch grains measuring up to 20  $\mu$  in dia. present in a number of cells throughout the region.

**Powder** - Light-brown; shows vessels reticulate, spiral and with bordered pits, starch grains simple and compound, round to oval, measuring upto 20  $\mu$  in dia. and acicular crystals; stone cells as describes under microscopy present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light two spots at Rf. 0.62 and 0.74 (both dirty yellow). Under UV light (366 nm) three fluorescent zones are visible at Rf. 0.62 (yellowish green), 0.68 (blue) and 0.74 (yellowish green). On spraying with 5% Methanolic Sulphuric acid and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.62 and 0.74 (both grey).

## CONSTITUENTS - Saponins

### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Dīpana, Pācana, Śvāsahara, Rucya

IMPORTANT FORMULATIONS - Ayaskṛti, Kanakāsava, Daśamūlāriṣṭa, Rāsnādi Kvātha Cūrṇa, Dhānvantara Ghṛta, Mahā Vātagajāñkuśa Rasa

THERAPEUTIC USES - Gulma, Jvara, Śvāsa, Kāsa, Yakṣmā, Pīnasa, Śoṭha, Hikkā, Raktadoṣa

DOSE - 3-6 g of powder

10-20 g of kwatha curna

## BĪJAPŪRA (Fresh Fruit)

BĪjapūra consists of fresh fruit of *Citrus medica* Linn. (Fam. Rutaceae); an evergreen shrub or small tree, about 3.6 m high with short, thick and thorny branches, cultivated sparsely throughout the warm-moist regions of the country.

### SYNONYMS

Sanskrit	:	Mātulūṅga
Assamese	:	Jaradeda
Bengali	:	Bijipura, Mutulanga
English	:	Wild Lemon, Citron
Gujrati	:	Bijora
Hindi	:	Bijoura
Kannada	:	Madavala, Madalahannu, Madala
Kashmiri	:	--
Malayalam	:	Matala Narakam, Gonapatinarakam, Bongi, Mathulanarakam, Mathulanga
Marathi	:	Mahalunga, Bijora
Oriya	:	Jambhira
Punjabi	:	Galgal
Tamil	:	Turunji Pazham, Kadarangai
Telugu	:	Madi Phalam
Urdu	:	Turanj

### DESCRIPTION

#### a) Macroscopic

Fruit-hesperidium, 5-10 cm long, ovoid, oblong or globose, nipple-shaped at the end with thick, rough or irregular or warted rind; dark green when unripe and yellow when ripe; pulp, pale yellow; taste, acidic and sweetish.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Nil	per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	45 per cent, Appendix	2.2.7.

### ASSAY

#### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene : Ethylacetate (9 : 1) shows under U.V. (3661 nm) seven fluorescent zones at Rf. 0.03 (light sky blue), 0.08 (yellowish green), 0.11(light sky blue), 0.19(light sky blue), 0.39 (light sky blue), 0.56 (dark sky blue) and 0.66 (light sky blue). On exposure to Iodine vapour ten spots appear at Rf. 0.03, 0.04, 0.08, 0.11, 0.16, 0.38, 0.43, 0.53, 0.72 and 0.93 (all yellow).

#### CONSTITUENTS - Volatile oil

### PROPERTIES AND ACTION

Rasa	:	Amla, Madhura
Guṇa	:	Laghu, Snigdha

Vīrya : Uṣṇa  
Vipāka : Amla  
Karma : Vātahara, Pittahara, Kaphahara, Dīpana, Hṛdya, Kaṇṭha Śodhaka,  
Jihvāśodhaka, Varṇanāśaka, Medhya, Chardinigrahaṇa, Śodhaka

IMPORTANT FORMULATIONS - Kṣāra Taila, Hingvādi Cūrṇa, Kāṅkāyana Guṭikā,  
Taruṇārka Rasa, Śaṅkha Drāvaka, Mādiphala Rasāyana

THERAPEUTIC USES - Raktapitta, Śvāsa, Kāsa, Aruci, Trṣṇā, Udara Roga, Vibandha,  
Madātyaya, Hikkā, Agnimāndya

DOSE - 10-20 ml of juice

## BILVA (Root)

Bilva consists of dried root of *Aegle marmelos* Corr. (Fam. Rutaceae); an armed, medium sized tree, occurring in the plains and upto 1000 m in the hills, as well as cultivated throughout the country, particularly in sacred groves.

### SYNONYMS

Sanskrit	:	Śrīphala
Assamese	:	Bael, Vael
Bengali	:	Bela, Bilva
English	:	Bael Root, Bengal Quince
Gujrati	:	Bilivaphal, Bill, Bilum
Hindi	:	Bel, Bela, Sripthal
Kannada	:	Bilva
Kashmiri	:	--
Malayalam	:	Koovalam
Marathi	:	Baela, Bel
Oriya	:	Bela
Punjabi	:	Bil
Tamil	:	Vilvam
Telugu	:	Maredu
Urdu	:	Bel

### DESCRIPTION

#### a) Macroscopic

Root cream yellow or pale yellowish-brown, thin, irregularly and shallowly ridged due to formation of longitudinal and transverse lenticels, surface ruptured, peeling off in layers, internal surface cream to light yellow; fracture, short; taste, sweet.

## b) Microscopic

Root shows lignified and stratified cork consisting of 3 or 4 alternating bands of 4-14 layers of smaller cells and a few layers of larger cells having golden yellow contents; secondary cortex, a wide zone, consisting of large, polyhedral, parenchymatous cells and stone cells of varying shapes and sizes, thick-walled, lignified, scattered throughout region; secondary phloem consists of sieve elements, fibres, parenchyma and crystals fibres traversed by phloem rays; some sieve elements compressed, forming tangential bands of ceratenchyma alternating with bands of lignified phloem fibres in outer phloem region, but intact in inner phloem region; phloem parenchyma radially and transversely elongated; phloem fibre groups arranged in concentric rings, fibre groups in inner phloem region extend tangentially from one medullary ray to another, each group consisting of 2-35 or more cells; fibres long, generally with tapering ends but occasionally forked, lignified, some others have wavy walls; crystal fibres numerous, long, about 9-30 chambered, each containing a prismatic crystal of calcium oxalate; medullary rays uni to triseriate in inner region while bi to pentaseriate in outer region of phloem; cambium consists of 3-7 rows of tangentially elongated to squarish cells; secondary xylem consists of vessels tracheids, fibres and xylem parenchyma; vessels scattered throughout xylem region, in groups of 2-5, single vessels also found, varying in shape and size, mostly drum-shaped, with bordered pits some having a pointed, tail-like process at one end; fibres thick-walled with blunt or pointed tips; xylem parenchyma rectangular in shape; medullary rays uni to triseriate, bi and triseriate rays more common, triseriate rays 12-40 cells high, uniseriate rays 4-10 cells high; prismatic crystals of calcium oxalate present; starch grains simple, 5-19  $\mu$  in dia., mostly round to oval with centric hilum; compound starch grains having 2-3 components present in inner few layers of cork cells, secondary cortex, phloem and xylem rays.

**Powder** - Grey to greyish-brown; shows thick-walled, angular cells of cork, numerous prismatic crystal of calcium oxalate, crystal fibres, starch grains simple, 5-19  $\mu$  in dia., mostly round to oval with centric hilum; compound starch grains having 2-3 components, fragments of xylem vessels with bordered pits and thick-walled xylem fibres.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.

Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under UV (366 nm) three fluorescent zones at Rf. 0.54 (bright sky blue). 0.84 (light sky blue) and 0.93 (bright sky blue). On exposure to Iodine vapour seven spots appear at Rf. 0.15, 0.27, 0.54, 0.67, 0.78 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes eight spots appear at Rf. 0.15, 0.27, 0.32, 0.38 (all grey), 0.54 (yellow) 0.67, 0.84 (light grey) and 0.93 (brown)

CONSTITUENTS - Auraptene, Coumarins, Glycosides

#### PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Mūtrala, Tridoṣaghna

IMPORTANT FORMULATIONS - Mānasa Mitra Vaṭaka, Amṛtāriṣṭa, Dantyādyariṣṭa, Agastya Harītakī Rasāyana, Daśamūlāriṣṭa, Daśamūla Kvātha Cūrṇa, Bilvādi Leha

THERAPEUTIC USES - Vātavyādhi, Śoṭha, Śūla, Agnimāndya, Chardi, Mūtrakṛcchra, Āmavāta

DOSE - 2-6 g of the drug in powder form

## BIMBĪ (Whole plant)

BimbĪ consists of dried whole plant of *Coccinia indica* W. & A. = *C. cordifolia* Cogn. Syn. *Cephalandra indica* Naud. (Fam. Cucurbitaceae); a climbing or prostrate, much branched, perennial herb, growing wild throughout the country.

### SYNONYMS

Sanskrit	:	Tuṇḍikā, Tuṇḍikerī
Assamese	:	Kawabhaturi
Bengali	:	Bimbu, Telakucha
English	:	Ivy-Gourd
Gujrati	:	Kadavighilodi, Ghilodi
Hindi	:	Kundaruki-Bel
Kannada	:	Tonde-Balli
Kashmiri	:	--
Malayalam	:	Kova, Nallakova
Marathi	:	Tondale
Oriya	:	Pitakundii, Kainchikakudi
Punjabi	:	Kanduri
Tamil	:	Kovai
Telugu	:	Donda Tiga
Urdu	:	Kunduru

### DESCRIPTION

#### a) Macroscopic

**Root** -Root available in cut pieces with a few lateral roots, surface rough due to longitudinal striations and lenticels, cylindrical, 0.5 -2.5 cm in dia., greyish-brown.

**Stem** -Slender, soft, 0.3-1.5 cm in dia., branched, longitudinally grooved, glabrous, nodes swollen, whitish dots over external surface, a few tendrils attached with nodes, greyish

coloured externally and cream to light yellow internally, fracture, fibrous; no odour and taste.

**Leaf** -Petiolate, petiole cylindrical, simple 2-3.2 cm long, 3.8-9 cm or rarely 10 cm long, palmately lobed, with 3 to 5 lobes or angles, lobes broad, obtuse or acute, more or less sinuate, occasionally constricted at the base, often with circular patches of glands between nerves; lamina bright green above, paler beneath, surface studded and sometimes rough with papillae.

**Flower** -Ebracteate, pedicellate, incomplete, unisexual, actinomorphic, pentamerous. *Male Flower* pedicel 2-3.8 cm long, subfiliform, calyx tube glabrous, broadly campanulate, 4.5 mm long linear; corolla 2.5 cm long, white, veined, pubescent inside, glabrous outside, segments 4.5 -7.5 mm long, triangular, acute, staminal column glabrous, capitulum of anthers subglobose; *Female Flower* pedicel 1.3 - 2.5 cm long, calyx and corolla as in male flowers; staminodes 3, subulate, 3 mm long, ovary fusiform, glabrous, slightly ribbed, stigma 3, bifid.

**Fruit** -A pepo, ovoid, glabrous, 3.5 - 4.5 cm long and 1.5-2 cm thick, greenish-brown to yellowish-brown with white linings; no odour and taste.

**Seed** - Somewhat obovoid, 0.7 cm long and 0.2-0.3 cm wide rounded at apex, much compressed, yellowish-grey.

#### **b) Microscopic**

**Root** - Shows 7 or more rows of thin-walled cork cells having lenticels at places; secondary cortex 4-7 layered, oval to elliptical, tangentially elongated, thin-walled, parenchymatous cells having groups of oval to rectangular, elongated stone cells in lower region; secondary phloem composed of usual elements; phloem fibres absent; secondary xylem consists of usual elements; vessels mostly solitary with simple pits; tracheids simple pitted; fibres simple pitted with pointed tips and arranged around the vessels; medullary rays 6-10 or more cells wide; starch grains abundant, simple, round to oval, measuring 3-11  $\mu$  in dia., and compound having 2-4 components present in secondary cortex, phloem and xylem parenchyma and ray cells.

**Stem** -Mature stem with ridges and furrows, shows a single layered epidermis composed of tabular cells externally covered with cuticle, or the epidermis interrupted at certain places due to formation of cork cells; collenchyma 2-4 layered consisting of isodiametric cells;

secondary cortex narrow, consisting of thin-walled, parenchymatous cells; pericycle present in the form of discontinuous ring of pericyclic fibres; vascular bundles 10 in number, bicollateral, widely separated by broad strips of ground tissue arranged in a single ring, inner part of which almost meeting at centre of stem; secondary phloem consists of sieve-tubes, companion cells and phloem parenchyma; inner phloem semi-lunar in shape; secondary xylem in the centre of each bundle, consists of vessels, tracheids, fibres and xylem parenchyma; vessels numerous uniformly scattered throughout xylem, lignified, pitted and with spiral thickening; tracheids pitted; pith small, composed of thin walled parenchymatous cells.

#### Leaf -

*Petiole* - Shows single layered epidermis, consisting of flattened, tangentially elongated cells, covered externally with, striated cuticle; cortex differentiated into 2-5 layered collenchyma and 2-6 layered circular, thin-walled, parenchymatous cells with conspicuous intercellular spaces; vascular bundles bicollateral, arranged in a single ring, usually nine, seven larger and two smaller, traversed by wide parenchymatous cells of medullary rays; some bundles capped by one or two layered, thick-walled, lignified, polygonal pericyclic sclerenchyma; centre occupied by very wide pith composed of large isodiametric parenchymatous cells.

*Midrib* -Single layered epidermis, on either side, externally covered with striated cuticle, followed by 1-3 layers of well developed collenchyma on the dorsal side and 3-5 layers on the ventral side; vascular bundles, bicollateral, three, ventral larger and two dorsal smaller; layers of collenchymatous cells gradually reduce to 2 or 3 towards dorsal side, 1 or 2 on ventral side and ultimately towards apex of leaf, collenchyma reduces to 1 layer on ventral side and 2 layers on dorsal side; parenchyma 2-3 layered on both sides; vascular bundles single, semicircular; vessels arranged in radial rows.

*Lamina* -Dorsiventral structure with single layered upper and lower epidermis, externally covered with striated cuticles; epidermal cells show almost straight walls and anomocytic stomata in surface view; below upper epidermis palisade single layered; spongy parenchyma represented by 3-6 layers of loosely arranged cells, a number of veins surrounded by parenchyma, present in mesophyll.

*Fruit* -Epicarp single layered; mesocarp composed of a wide zone of thin-walled parenchymatous cells differentiated into two regions, outer 5-6 layers rectangular to polygonal, smaller in size, while inner region composed of oval to polygonal cells of larger size; a few fibro-vascular bundles present in this region.

**Seed** -Testa show ridges and furrows at a few places, more prominent at lateral sides, and consisting of oval to polygonal, thin-walled parenchymatous cells, upper most layer forms radially elongated thin-walled colourless cells; tegmen consists of single layered radially elongated, thin walled, lignified cells, followed by a layer of thin-walled, collapsed parenchymatous cells; a few starch grains 3-6  $\mu$  in dia. scattered in this region; embryo consists of hexagonal to polygonal, thin-walled cells having a few oil globules.

**Powder** - Greyish-brown; shows groups of round to polygonal parenchymatous cells, reticulate, spiral and pitted vessels, aseptate fibres, palisade cells, stone cells, simple and compound, round to oval, starch grains, measuring 3-11  $\mu$  in diameter, fragments of epidermis with straight walled cells and anomocytic stomata.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	21	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

#### ASSAY

##### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol : Ammonia (90:18:2) shows under UV (366 nm) three fluorescent zones at Rf. 0.23 (blue), 0.47 (red) and 0.61 (blue). On spraying with Dragendorff reagent one spot appears at Rf. 0.38 (orange).

**CONSTITUENTS** - Saponins and Fixed Oil in seeds.

## PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Guru, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vātakara, Pittahara, Atirucya, Lekhana, Stambhana, Vibandhādhmānakara, Chardikara

IMPORTANT FORMULATIONS - Vastyāmayāntaka Ghṛta

THERAPEUTIC USES - Kāsa, Śvāsa, Jvara, Raktavikāra, Dāha , Śopha, Pāṇḍu

DOSE - 3-6 g of the drug in powder form

5-10 ml (Svarasa)

## CĀṄGERĪ (Whole Plant)

Cāṅgerī consists of dried whole plant of *Oxalis corniculata* Linn. (Fam. Oxalidaceae); a small annual or perennial, more or less erect herb with creeping or subterranean stem, 6-25 cm high, found throughout warmer parts of the country and also in all tropical and temperate climate, growing upto an elevation of 3000 m in North- West Himalayas.

### SYNONYMS

Sanskrit	:	Cāṅgerī, Amlapatrikā
Assamese	:	Chengeritenga
Bengali	:	Amrul
English	:	Indian Sorrel
Gujrati	:	Ambole, Changeri, Teen Panaki, Rukhadi
Hindi	:	Ambilosa, Tinpatiya, Changeri
Kannada	:	Pullamouradi, Sivargee, Purachi Soppu
Malayalam	:	Pulliparel
Marathi	:	Ambutee, Ambatee, Ambti, Bhui Sarpati
Punjabi	:	Khatkal, Khatmittha, Khattibootee
Tamil	:	Puliyarai
Telugu	:	Pulichinta
Urdu	:	Changeri, Teen Patiya

### DESCRIPTION

#### a) Macroscopic

Root - Dark brownish, thin, about 1-2 mm thick, branched, rough, soft; no odour and taste.

Stem - Creeping, brownish-red, soft, very thin, easily breakable; no odour and taste.

Leaf - Palmately compound, trifoliate; petiole-green, thin, about 3-9 cm long, cylindrical,

pubescent; leaflet-green, 1-2 cm long, obcordate, glabrous, sessile or sub sessile, base cuneate; taste, somewhat sour.

Flower -Yellow, axillary, sub-umbellate.

Fruit - Capsules cylindrical, tomentose.

Seed -Tiny, dark brown, numerous, broadly ovoid transversely striate.

#### b) Microscopic

**Root** - Shows 3-4 layers of cork, composed of thin-walled rectangular cells, brownish in appearance; cortex, a wide zone, consisting of rectangular and oval, thin-walled parenchymatous cells filled with simple starch grains, yellowish pigment and tannin; inner cortical cells rectangular and polygonal, smaller in size than miter ones; cortex followed by thin strips of phloem consisting of sieve tubes, companion cells and phloem parenchyma, cambium not distinct; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels cylindrical, pitted some with tail-like projection at one end; tracheids pitted with pointed ends; a few starch grains simple, round to oval measuring 3-11 $\mu$  in dia., present scattered throughout the region.

**Stem** - Shows single layered epidermis, composed of rectangular to oval cells, some of which are elongated to become unicellular covering trichomes; cortex consists of 4-5 layers of thin-walled, circular and polyhedral parenchymatous cells; endodermis single layered of thin-walled rectangular cells; pericycle composed of two or three layers of squarish and polygonal sclerenchymatous cells; vascular bundles 6-7 in number, arranged in a ring, composed of a few elements of phloem towards outer side and xylem towards inner side; xylem composed of pitted vessels, tracheids, fibres and xylem parenchyma; central region occupied by pith composed of thin-walled, parenchymatous cells, a few simple, round to oval starch grains measuring 3-11  $\mu$  in dia, scattered throughout the region.

**Leaf** -

**Petiole** - Shows rounded or plano-convex outline consisting of single layered epidermis of rectangular or circular, thin-walled cells; cortex 3-4 layers of thin-walled, circular, oval or polygonal parenchymatous cells, generally filled with green pigment; endodermis single layered followed by 2-3 layers of sclerenchymatous pericycle, less developed towards upper side of petiole; vascular bundles 5 in number, arranged in a ring, consisting of

phloem towards outer side and xylem towards inner side; centre occupied by a small pith; a few simple, round to oval starch grains, measuring 3-11  $\mu$  in dia., scattered throughout.

*Lamina* - Shows single layered epidermis on upper and lower surfaces, composed of rectangular cells; covering trichomes unicellular; palisade single layered composed of thin-walled, columnar cells, filled with green pigment; below palisade 2-3 layers of thinwalled, spongy parenchyma consisting of circular to oval cells filled with green pigment; stomata paracytic.

**Powder-** Greenish-brown; shows fragments of trichomes, parenchymatous, sclerenchymatous cells, fibres, epidermis showing irregular cell walls in surface view; a few simple, rounded to oval starch grains, measuring 3-11  $\mu$  in diameter.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	20	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	10	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene :Ethylacetate (8 : 2) shows under UV (366 nm) one fluorescent zone at Rf. 0.65 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.27, 0.53 and 0.65 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.27, 0.53 and 0.65 (all grey).

**CONSTITUENTS** - Vitamin C, Carotene, Tartaric Acid, Citric Acid and Malic Acid.

## PROPERTIES AND ACTION

Rasa	:	Amla, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Amla
Karma	:	Grāhī, Pittakara, Dīpana, Agnivardhaka, Rucikara, Vātahara, Kaphahara

IMPORTANT FORMULATIONS - Cāṅgerī Ghṛta

THERAPEUTIC USES - Grahaṇī, Arśa, Kuṣṭha, Atisāra

DOSE - 5-10 ml (Svarasa)

It is also used externally

## CIRABILVA (Fruit)

Cirabilva consists of dried fruit of *Holoptelea integrifolia* Planch. (Fam. Ulmaceae); a large, spreading, glabrous, deciduous tree, 15-18 m high, distributed throughout the greater part of India upto an altitude of 600 m and sometimes grown on the road side.

### SYNONYMS

Sanskrit	:	Pūtīgandha
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	Kanjo, Chirbil, Chirmil
Hindi	:	Chirabil, Chiramil, Papri
Kannada	:	Tapasimara, Chirabilwa
Malayalam	:	Aval, Avil
Marathi	:	Vavala, Bavala
Oriya	:	Karanj, Duranja, Putikaranj
Punjabi	:	Papri, Chirbid
Tamil	:	Avil Pattai
Telugu	:	Nemalinara, Tapazi
Urdu	:	Papri

### DESCRIPTION

#### a) Macroscopic

Fruit a one seeded samara; light brown, obliquely elliptic or orbicular, 1.5- 2.5 cm wide, 2.5-3.5 cm long, winged and stalked, indehiscent, pubescent, wings reticulately veined.

## b) Microscopic

Fruit shows single layered epicarp having numerous, pointed, unicellular hairs; mesocarp composed of 3-5 layered, oval to polygonal, elongated parenchymatous cells; a few vascular bundles and tannin cells found scattered in this region; endocarp consisting of 2-3 layered, round to oval, sclerenchymatous cells with striations and narrow lumen; perisperm in seed composed of single layered, parenchymatous cells filled with reddish-brown content; endosperm and embryo composed of colourless cells containing oil globules.

**Powder** - Reddish-brown; shows fragments of thin walled, oval to polygonal parenchymatous cells of endosperm, taniniferous oil globules, unicellular hairs, thick-walled, polygonal, sclerenchymatous cells, polygonal cells of testa in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) a fluorescent zone at Rf 0.85 (blue). On exposure to Iodine vapour five spots appear at Rf 0.11, 0.38, 0.44, 0.50 and 0.85 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes five spots appear at Rf. 0.11, 0.38, 0.44, 0.50 and 0.85 (all violet)

CONSTITUENTS - Fixed Oil

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Pittahara, Stambhaka

IMPORTANT FORMULATIONS - Pīyūṣavallī Rasa, Gandharvahastādi Kvātha Cūrṇa

THERAPEUTIC USES - Chardi, Arśa, Kṛmi, Kuṣṭha, Prameha

DOSE - 1-3 g

## DANTĪ (Root)

Dantī consists of dried root of *Baliospermum montanum* Muell.-Arg. (Fam. Euphorbiaceae); a leafy undershrub, distributed in outer range of Himalayas from Kashmir to Assam and in moist deciduous forests elsewhere in India.

### SYNONYMS

Sanskrit	:	Dantī
Assamese	:	Danti
Bengali	:	Danti
English	:	Wild Croton
Gujrati	:	Danti
Hindi	:	Danti
Kannada	:	Kadu Haralu
Malayalam	:	Dantti, Neervalam
Marathi	:	Danti
Oriya	:	Danti
Punjabi	:	Danti
Tamil	:	Konda Amudamu, Danti
Telugu	:	Konda Amudamu
Urdu	:	Danti

### DESCRIPTION

#### a) Macroscopic

Root pieces almost cylindrical, straight or ribbed with secondary and tertiary roots, 0.2-1 cm thick and upto 10 cm or more in length, tapering at one end, tough, externally brown; surface, rough due to longitudinal striations, transverse cracks and scars of rootlets; internally cream-coloured; transversely smoothed root shows thin, brown bark and yellowish-white central core; taste, bitter.

## b) Microscopic

Shows 5-18 layered cork, consisting of brown coloured, suberised or lignified brick-shaped cells, a few cells containing tannin and red colouring matter; secondary cortex consists of 2-7 layers of oval to elliptical, tangentially elongated cells, a few cortical fibres are also present in this region; secondary phloem consists of usual elements, traversed by uni to biseriate phloem rays; secondary xylem consists of usual elements; vessels and tracheids, bordered pits, a few having reticulate thickening; fibres slightly thick-walled, narrow lumen and blunt tips; xylem rays 1 or 2 cells wide; rosette crystals of calcium oxalate and starch grains, present only in secondary cortex and phloem; starch grains solitary and in groups, simple, round to oval measuring 6-17  $\mu$  in dia.

**Powder** - Brown; shows fragments of cork more or less rectangular, thick-walled in surface view; rosette crystals of calcium oxalate; numerous phloem fibres with narrow lumen and blunt tips, border pitted- and reticulate vessels, tracheid and tannin cells, round to oval simple starch grains measuring 6-17  $\mu$  in diameter, and in groups occasionally.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under U.V. (366 nm) a fluorescent zone at Rf 0.65 (blue). On exposure to Iodine vapour two spots appear at Rf 0.51 and 0.65 (both yellow). On spraying with 50% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C two spots appear at Rf 0.51 and 0.65 (both grey).

CONSTITUENTS -  $\beta$  - Sitosterol and Triterpenoids, Resinous Glycosides, Phorbol Esters.

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu
Guṇa	:	Tīkṣṇa, Sara, Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphahara, Raktadoṣahara, Viḍhara, Dīpana, Rocaka, Śodhaka, Vikāśi, Vraṇa

IMPORTANT FORMULATIONS - Dantyādyariṣṭa, Punarnavā Maṇḍura, Abhayāriṣṭa, Kāṅkāyana Guṭikā, Dantīharītakī, Kalyaṇaka Kṣāra, Kaiśora Guggulu

THERAPEUTIC USES - Tvak doṣa, Dāha, Śoṭha, Udararoga, Śūlaroga, Kṛmi, Arśa, Aśmarī, Kaṇḍū, Kuṣṭha, Vraṇa, Plīhā Vṛddhi, Gulma, Kāmalā

DOSE - 1-3 g of the drug in powder form

## DHATTŪRA (Seed)

Dhattūra consists of dried seeds of *Datura metel* Linn.; Syn. *D. fastuosa* L., *D. alba* Ramph; *D. cornucopaea* Hort. (Fam. Solanaceae); occurring wild throughout the country.

### SYNONYMS

Sanskrit	:	Kanaka, Dhustūra, Ummatta
Assamese	:	Dhatura
Bengali	:	Dhutura, Dhutra
English	:	White Thorn Apple
Gujrati	:	Dhaturo
Hindi	:	Dhatura
Kannada	:	Umbe
Kashmiri	:	--
Malayalam	:	Ummam
Marathi	:	Dhatra
Oriya	:	Dudura
Punjabi	:	Dhatura
Tamil	:	Oomattai, Umattai
Telugu	:	Ummettha, Erriummetta
Urdu	:	Dhatura

### DESCRIPTION

#### a) Macroscopic

Seed reniform, compressed, flattened, surface finely pitted; 0.6 cm long, 0.4 cm wide; light brown to yellowish-brown in colour; thicker towards the curved edge, which is rugose; large, pale strophiole near micropyle; odourless; taste, bitter.

#### b) Microscopic

Shows in outline more or less elongated, irregular or wavy structure having bulgings at either side; testa single layered consists of thick-walled, lignified, sclerenchymatous cells forming club-shaped structure, followed by 3-5 layered more or less tangentially elongated, thin-walled, parenchymatous cells; endosperm encloses more or less curved embryo composed of polygonal, thin-walled, parenchymatous cells, filled with aleurone grains and abundant oil globules.

**Powder** - Brown and oily; shows fragments of testa of groups of thick-walled, light brown sclerenchymatous cells; polygonal, thin-walled parenchymatous cells containing oil globules and aleurone grains.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene Ethylacetate: Diethylamine (7:2: 1) shows under U.V. (366 nm) three fluorescent zones at Rf 0.18, 0.33 (both light blue) and 0.93 (blue). On exposure to Iodine vapour three spots appear at Rf 0.33, 0.47 and 0.93 (all yellow). On spraying with Dragendorff reagent two spots appear at Rf 0.33 and 0.47 (both orange).

**CONSTITUENTS** - Alkaloids - Tropane Alkaloids - Hyoscyamine etc. and Fixed Oil

## PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṭu, Kaṣāya, Tikta
Guṇa	:	Tīkṣṇa, Rūkṣa, Guru
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Madakāri, Kaphahara, Viṣahara, Kṛmihara, Vraṇahara, Kaṇḍūhara, Bhramahara, Varṇya, Vāmaka

IMPORTANT FORMULATIONS - Kanakāsava, Sūtaśekhara Rasa, Jvarāṅkuśa Rasa, Lakṣmī Vilāsa Rasa (Nāradīya), Kanakasundara Rasa, Dugdha Vaṭī, Pīyūṣavallī Rasa

THERAPEUTIC USES - Kṛmi, Yūkā, Likṣā

DOSE - 30-60 mg

## DRĀKṢĀ (Fruit)

Drākṣā consists of dried mature fruits of *Vitis vinifera* Linn. (Fam. Vitaceae); a deciduous climber, mostly cultivated in north western India in Punjab, Himachal Pradesh and Kashmir for their use as dessert fruit. However, the dried fruits, known in trade as 'Raisins', are mostly imported into India, from the Middle East and Southern European countries.

### SYNONYMS

Sanskrit	:	Mṛdvikā, Gostanī
Assamese	:	Dakh, Munaqqa
Bengali	:	Maneka
English	:	Dry Grapes, Raisins
Gujrati	:	Drakh, Darakh
Hindi	:	Munkka
Kannada	:	Draksha
Kashmiri	:	--
Malayalam	:	Munthringya
Marathi	:	Draksha, Angur
Oriya	:	Drakya, Gostoni
Punjabi	:	Munaca
Tamil	:	Drakshai, Kottai Drakshai
Telugu	:	Draksha
Urdu	:	Munaqqa

### DESCRIPTION

#### a) Macroscopic

Fruit a berry, sticky and pulpy, dark brown to black; oblong or oval, sometimes spherical; 1.5 -2.5 cm long and 0.5-1.5 cm wide; outer skin irregularly wrinkled forming ridges and furrows; usually contain 1-4 seeds, 4-7 mm long, ovoid rounded to triangular or

simply ovoid, brown to black; odour, sweetish and pleasant; taste, sweet.

#### b) Microscopic

A single layered epidermis cells filled with reddish-brown contents; mesocarp pulpy, made up of thin-walled, irregular cells containing prismatic crystals of calcium oxalate, measuring 13.75 -41  $\mu$  in dia.; some fibro-vascular bundles also present in this region; seeds composed of testa and endosperm; testa composed of thick-walled yellowish cells; endosperm composed of angular parenchymatous cells containing oil globules and cluster crystals of calcium oxalate, measuring 11-16  $\mu$  in diameter.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	25	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	70	per cent, Appendix	2.2.7.
Loss on drying	Not more than	15	per cent, Appendix	2.2.9

#### ASSAY

#### T.L.C.

T.L.C of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: I: 5) shows under UV (366 nm) a fluorescent zone at Rf. 0.29 (blue). On exposure to Iodine vapour four spots appear at Rf. 0.08, 0.29, 0.69 and 0.85 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.08 (black), 0.29 (black) and 0.98 (violet)

CONSTITUENTS - Malic, Tartaric & Oxalic Acids, Carbohydrates and Tannins.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Guru, Sara, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Bṛmhaṇa, Cakṣuṣya, Vṛṣya, Vātapittahara, Svarya

IMPORTANT FORMULATIONS - Drākṣāsava, Drākṣāriṣṭa, Drākṣāvaleha, Drākṣādi Kvātha Cūrṇa, Drākṣādi Cūrṇa, Elādi Guṭikā

THERAPEUTIC USES - Tṛṣṇā, Jvara, Kāsa, Śvāsa, Dāha, Śoṣa, Kāmalā, Raktapitta, Kṣata Kṣīṇa, Vibandha, Arśa, Agnimāndya, Madātyaya, Pāṇḍu, Udāvarta, Āsya Śoṣa, Vātarakta

DOSE - 5-10 g of the drug

## DŪRVĀ (Root)

Dūrvā consists of dried fibrous roots of *Cynodon dactylon* (Linn.) Pers. (Fam. Poaceae); an elegant, hard, perennial, creeping grass growing throughout the country and ascending to 2440 m.

### SYNONYMS

Sanskrit	:	Śatavīrya
Assamese	:	--
Bengali	:	Durva
English	:	Creeping Cynodon, Conch Grass
Gujrati	:	Khadodhro, Lilidhro, Dhro
Hindi	:	Doob
Kannada	:	Garika Hullu
Kashmiri	:	--
Malayalam	:	Koruka Pullu
Marathi	:	Doorva, Hariyalee, Harlee
Oriya	:	--
Punjabi	:	Dubada
Tamil	:	Aruvam Pullu
Telugu	:	Garika, Pacchgaddi
Urdu	:	Doob Ghas, Doob

### DESCRIPTION

#### a) Macroscopic

Roots fibrous, cylindrical, upto 4 mm thick, minute hair-like roots arise from the main roots; cream coloured.

## b) Microscopic

Mature root shows epiblema or piliferous layer composed of single layered, thin-walled, radially elongated to cubical cells; hypodermis composed of 1-2 layered, thin-walled, tangentially elongated to irregular shaped cells; cortex differentiated into two zones, 1 or 2 layers of smaller, thin-walled, polygonal, lignified sclerenchymatous and 4-6 layers of thin-walled, elongated parenchymatous cells being larger; endodermis quite distinct being single layered, thick-walled, tangentially elongated cells; pericycle 1-2 layers composed of thin-walled sclerenchymatous cells; vascular bundles consisting of xylem and phloem, arranged in a ring on different radials; xylem exarch, having usual elements; centre occupied by wide pith, composed of oval to rounded thick-walled parenchymatous cells containing numerous simple, round to oval or angular starch grains measuring 4-16  $\mu$  in dia., and compound starch grains having 2-4 components.

**Powder** - Cream coloured; fragments of xylem vessels with pitted walls, thick-walled lignified sclerenchymatous cells and numerous simple round to oval or angular starch grains measuring 4-16  $\mu$  in dia., and compound starch grains having 2-4 components.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

T.L.C of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under UV (366 nm) three fluorescent zones at Rf 0.70, 0.89 (both blue) and 0.92 (pink). On exposure to Iodine vapour six spots appear at Rf 0.22, 0.30, 0.37, 0.80, 0.89 and 0.92 (all yellow) On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appear at Rf 0.22, 0.30, 0.37, 0.80, 0.89, 0.92 (all grey).

CONSTITUENTS - Phenolic Phytotoxins and Flavonoids.

#### PROPERTIES AND ACTION

Rasa : Kaṣāya, Madhura, Tikta  
Guṇa : Laghu  
Vīrya : Śīta  
Vipāka : Madhura  
Karma : Kaphapittaśāma, Raktapittanāśaka, Dāhaghna, Atisāraghna, Śramahara, Tr̥ptikara

IMPORTANT FORMULATIONS - Balāśvagandhalākṣādi Taila, Madhuyasṭyādi Taila, Marma Guṭikā, Mānasa Mitra Vaṭaka, Candrakalā Rasa

THERAPEUTIC USES - Raktapitta, Tṛṣṇāroga, Dāharoga, Visarpa, Tvagroga, Arocaka, Duḥsvapna, Bhūtaroga, Chardi, Mūrccā, Raktapradara, Mūtra Dāha

DOSE - 5-10 ml (Svarasa)

## ERANḌA (Fresh Leaf)

Eraṇḍa consists of fresh leaf of *Ricinus communis* Linn. with entire petiole (Fam. Euphorbiaceae), a tall glabrous shrub or almost small tree, 2-4 m high; found throughout India, mostly growing wild on waste land and also cultivated for its oil seeds.

### SYNONYMS

Sanskrit	:	Gandharva-Hasta, Pañchāṅgul, Vātāri
Assamese	:	Erri
Bengali	:	Bherenda
English	:	Castor Oil Plant
Gujrati	:	Erando
Hindi	:	Erand, Rendee, Andu
Kannada	:	Harlu
Kashmiri	:	--
Malayalam	:	Ambanakka, Avanakku
Marathi	:	Erand, Erandee
Oriya	:	Bheranda
Punjabi	:	Erand
Tamil	:	Amanakku
Telugu	:	Amudanu, Amudmuchetu
Urdu	:	Erand

### DESCRIPTION

#### a) Macroscopic

Leaves green or reddish-green, broad, palmately lobed, with 5-11 lobes, 30-60 cm. dia., nearly orbicular, lobes oblong linear, acute or acuminate, margin serrate, vary from 4-20 cm in length, 2.5 -7.5 cm in width; petiole 10-20 cm long, cylindrical or slightly

flattened towards distal and peltately attached to the blade, solid when young, becomes hollow on maturity.

b) Microscopic

IDENTITY, PURITY AND STRENGTH

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṭu, Kaṣāya
Guṇa	:	Snigdha, Tīkṣṇa, Sūkṣma
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Kaphavātaśāma, Vṛṣya, Kṛmighna, Pittaprapakā, Raktaprapakā, Yakṛtutejaka

IMPORTANT FORMULATIONS - Caturbhuja Rasa, Caturmukha Rasa, Cintāmaṇi  
Caturmukha Rasa

THERAPEUTIC USES - Kṛmi, Mūtrakṛcchra, Gulma, Vātavyādhi, Vasti Śūla, Arocaka,  
Vidradhī

DOSE - 10-20 ml (Svarasa)

2-5 g (Powder)

## ERAᅇDA (Seed)

Eraᅇda consists of dried seed of *Ricinus communis* Linn. (Fam. Euphorbiaceae); a tall glabrous shrub or almost small tree, 2-4 m high; found throughout India, mostly growing wild on waste land and also cultivated for its oil seeds.

### SYNONYMS

Sanskrit	:	Gandharva-Hasta, Paᅇchāᅅgul, Vātāri
Assamese	:	Erri
Bengali	:	Bherenda
English	:	Castor Oil Plant
Gujrati	:	Erando
Hindi	:	Andeo, Erand, Rende
Kannada	:	Harlu
Kashmiri	:	--
Malayalam	:	Avanakku, Abanakka
Marathi	:	Eramd, Eramdee
Oriya	:	Bheranda
Punjabi	:	Erand
Tamil	:	Amanakku
Telugu	:	Amudamu, Amudmuchetu
Urdu	:	Erand

### DESCRIPTION

#### a) Macroscopic

Seeds oblong, one face convex and the other slightly flattened, 1-1.5 cm long, 0.6-0.9 cm wide, 0.4-0.8 cm thick, testa hard, glossy, smooth, grey or brown to reddish-brown or black and may be variously marbled or striped, raphe extends from the caruncle to chalaza; odour, not distinct; taste, weakly acrid.

## b) Microscopic

Seed shows a hard testa, membranous tegmen, a fleshy endosperm, and thin embryo with flat, broad cotyledons; testa consists of hard, single layered epidermis, radially elongated, compactly arranged, slightly curved tabular cells, having reddishbrown contents followed by 8-10 layered, tangentially elongated parenchymatous cells, most of them containing oil globules, fibro-vascular bundles found scattered in this zone; endosperm consisting of oval, irregular cells filled with oil globules, abundant aleurone grains, measuring 8.2 - 13.75  $\mu$  in dia.; cotyledons, thin, flat and leafy.

**Powder** - Dark brown, oily; shows fragments of numerous elongated thick-walled, polygonal cells of testa, reddish-brown tabular cells, thin-walled oval to round parenchymatous cells of endosperm oil globules, numerous aleurone grains measuring upto 13.75  $\mu$  in dia. and including crystalloids and globoids within.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	36	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.
Fixed oil	Not less than	37	per cent, Appendix	2.2.8

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Ethylacetate (95 : 5) shows under U.V. (366 nm) a fluorescent spot at Rf. 0.95 (sky blue). On exposure to Iodine vapour seven spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all yellowish brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 105° C seven spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all brown).

CONSTITUENTS - - Fixed Oil.

PROPERTIES AND ACTION

Rasa : Madhura, Kaṭu, Kaṣāya  
Guṇa : Snigdha, Tīkṣṇa, Sūkṣma  
Vīrya : Uṣṇa  
Vipāka : Madhura  
Karma : Dīpana, Āmapācana, Viḍbhedana, Anulomana, Srotośodhana,  
Vayasthāpana, Medohara

IMPORTANT FORMULATIONS - Bṛhat Saindhavādi Taila, Gandharvahastādi Taila,  
Siṃhanāda Guggulu, Miśraka Sneha

THERAPEUTIC USES - Āmavāta, Vibandha, Yakṛt Roga, Plīhodara, Arśa, Kaṭi Śūla, G  
rdhrasī

DOSE - 1/2 - 3 g (Powder)

## GAMBHĀRĪ (Stem)

Gambhārī consists of dried stem of *Gmelina arborea* Roxb. (Fam. Verbenaceae), an unarmed, moderate sized, deciduous tree, found scattered in deciduous forest throughout the greater part of India upto an altitude of 1500 m., and the Andamans

### SYNONYMS

Sanskrit	:	Kāśmarī
Assamese	:	Gomari
Bengali	:	Gamar, Gambar
English	:	Candahar Tree, Cashmere Tree
Gujrati	:	Sawan, Shewan
Hindi	:	Gambhari
Kannada	:	Seevani, Kasmiri-mara
Kashmiri	:	--
Malayalam	:	Sevana, Kumizhu
Marathi	:	Sivan
Oriya	:	Gambhari
Punjabi	:	Khambhari
Tamil	:	Perunkurmizh
Telugu	:	Gummaditeku
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Stem occurs as longitudinally and transversely cut pieces having varying length and thickness; hard, woody, smooth except for a few scars of branches; yellowish-grey externally and cream coloured internally.

## b) Microscopic

Thin stem shows 10-15 or more layers of lignified cork, consisting of tangentially elongated, rectangular cells; secondary cortex 5-10 layers, oval to elliptical, thin-walled cells with tangential groups of fibres; pericycle present in the form of continuous ring consisting of patches of fibres alternating with stone cells: secondary phloem composed of usual elements, phloem fibres absent; in thick stem secondary cortex almost absent; secondary phloem well developed, consisting of usual elements; groups of stone cells and fibres scattered throughout this region; secondary xylem consists of usual elements; vessels solitary or 2-4 in groups having spiral thickening and bordered pits; fibres mostly aseptate but some septate with wide lumen; parenchyma paratracheal, a few in number; medullary rays 3-22 cells high and 1-4 cells wide; starch grains, simple as well as compound having 2-4 components measuring 3-11 $\mu$  in dia., present in secondary cortex, phloem and xylem parenchyma and ray cells.

**Powder** - Creamish-grey; shows fragments of lignified cork cells, thin-walled, parenchymatous cells, aseptate and a few septate fibre with wide lumen; vessels with spiral thickening and bordered pits, stone cells, simple, round to oval starch grains, measuring 3-1  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

## T.L.C.

T. L. C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (95 : 5) shows under U.V. (366 nm) two fluorescent zones at Rf 0.39 and 0.48 (both blue) On exposure to Iodine vapour three spots appear at Rf 0.39, 0.48 and 0.85 (all yellow). On

spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C three spots appear at Rf 0.39, 0.48 and 0.85 (all violet)

CONSTITUENTS - Lignans

#### PROPERTIES AND ACTION

Rasa : Madhura, Tikta, Kaṣāya, Kaṭu  
Guṇa : Guru  
Vīrya : Uṣṇa  
Vipāka : Madhura  
Karma : Vātahara, Pittahara, Kaphahara, Dīpana, Pācana, Bhedanī, Medhya,  
Virecanopaga, Viṣahara, Śramahara

IMPORTANT FORMULATIONS - Karpūrādi Kuzambu (Laghu), Candanāsava,  
Dantyaḍyariṣṭa, Uśīrāsava

THERAPEUTIC USES - Śopha, Jvara, Dāha, Tṛṣṇā, Raktadoṣa, Viṣavikāra, Arśa, Śūla,  
Raktapitta, Bhrama, Śoṣa, Āma Śūla

DOSE - 5-10 g of the drug for decoction

## GOJIHVĀ (Aerial Part)

Gojihvā consists of dried leaf and stem portion of *Onosma bracteatum* Wall. (Fam. Boraginaceae); a perennial, hirsute or hispid herb, sparsely distributed in North Western Himalayas from Kashmir to Kumaon at altitudes of 3,500-4,500 m.

### SYNONYMS

Sanskrit	:	Darvīpatra, Vṛṣajihvā, Kharaparṇinī
Assamese	:	--
Bengali	:	Gojika Sak, Gojialata, Dadisha
English	:	--
Gujrati	:	Bhonpathari, Galajibhi
Hindi	:	Gaujaban, Gojiya
Kannada	:	Shankha Huli, Aakalanalige, Gojaba
Kashmiri	:	--
Malayalam	:	Kozhuppu
Marathi	:	Govjaban, Paatharee
Oriya	:	Kharsan, Kharaptra
Punjabi	:	Kazban
Tamil	:	Dharviptra, Kharaptra, Kozha
Telugu	:	Yeddunaluka
Urdu	:	Gaozaban

### DESCRIPTION

#### a) Macroscopic

**Stem** - Cut pieces available in 5-9 cm long and 3.2 to 4.7 cm in dia., flattened, erect, stout; rough due to white, hard, hispid hairs and cicatrices, and longitudinal wrinkles; colour greenish-yellow; fracture, short; odour and taste not characteristic.

**Leaf** - Lanceolate to ovate-lanceolate, 12-30 cm long, 1.5-3.5 cm broad, acuminate

tubercle-based hispid hairs present on both surfaces; greenish to light yellow on top and white beneath.

#### b) Microscopic

**Stem** - shows single-layered epidermis, covered with thick cuticle, some epidermal cells elongate to form long, warty, tubercle-based unicellular hairs, cortex differentiated in two zones, 5-7 layered outer collenchyma, 3-4 layered inner parenchymatous cells, consisting of thin-walled, round to oval cells; phloem composed of usual elements; phloem fibres absent; xylem consisting of usual elements, vessels mostly solitary or rarely 2-3 in groups having spiral thickening, and fibres and tracheids having blunt tips and simple pits; xylem ray not distinct: pith consisting of round, thin-walled, parenchymatous cells.

#### Leaf -

**Midrib** -single layered epidermis with thick cuticle and long warty, tubercle-based unicellular hairs present on both surfaces followed by 5-7 layers of collenchymatous and 3-4 layers parenchymatous cortical cells; vascular bundle situated centrally.

**Lamina** - isobilateral, single layered epidermis on either surface covered with thick cuticle, long warty, tubercle-based, simple, unicellular hairs present on both surfaces; palisade 2 layered, spongy parenchyma 8-10 layered, stomata paracytic

**Powder** - Greenish-brown; shows groups of oval to polygonal, thin-walled straight epidermal cells; spiral vessels; a few fibres entire or in pieces, elongated with blunt tips; long warty, tubercle-based unicellular hairs and a few paracytic stomata.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	26	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.

-

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol ; Acetic acid: Water (4 : 1 : 5) shows in visible light six spots at Rf. 0.38 (yellow), 0.55 (grey), 0.62, 0.69 (both yellow), 0.76 (grey) and 0.99 (green). Under UV (366 nm) six fluorescent zones at Rf. 0.30 (pale blue), 0.55 (violet), 0.62, 0.69 (both yellow), 0.76 (green) and 0.99 (red). On exposure to Iodine vapour eight spots appear at Rf. 0.29, 0.38, 0.46 (all yellow), 0.56 (grey), 0.62, 0.66 (both yellow), 0.76 and 0.99 (both grey). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes, six spots appear at Rf. 0.29, 0.56, 0.62, 0.66, 0.76 and 0.99 (all violet).

## CONSTITUENTS - Tannin and Sugars

### PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta, Madhura
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātala, Pittahara, Kaphahara, Hṛdya, Grāhī

THERAPEUTIC USES - Raktapitta, Kuṣṭha, Jvara, Śvāsa, Kāsa, Aruci, Prameha, Raktavikāra, Vraṇa, Danta Roga

DOSE - 3-6 g of the drug in powder form

## GRANTHIPARṆĪ (Root)

Granthiparṇī consists of root of *Leonotis nepetaefolia* R. Br. (Fam. Lamiaceae), an ornamental herb or shrub, 1.2 -1.8 m high, cultivated and naturalized throughout the hotter parts of the country.

### SYNONYMS

Sanskrit	:	Kākapuccha
Assamese	:	Granthika
Bengali	:	Hejurchei
English	:	Knod Grass
Gujrati	:	Hatisul
Hindi	:	Gathivan
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Dipmal
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Ranathem
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Root system well developed, numerous lateral roots arise from main root, about 0.8 cm in dia., secondary and tertiary roots thin and fibrous, greyish coloured, main root slightly brownish coloured with a few longitudinal furrows; fracture, hard and short; no characteristic odour and taste.

## b) Microscopic

Mature root shows a thin bark and a very wide xylem; cork exfoliating, generally detached, where present, consists of a few layers of tangentially elongated compressed cells possessing brown contents; secondary cortex, a narrow zone, composed of 3-6 layers or more, rounded, irregular or tangentially elongated, thin-walled, parenchymatous cells having brown contents; secondary phloem consists of thin-walled cells of sieve elements; fibres absent; secondary xylem forms major part of root consisting of vessels, xylem fibres and xylem parenchyma; vessels more or less uniformly distributed throughout secondary xylem; vessels with bordered pits and of various shapes and sizes, a few having elongated projection at one or both ends; xylem fibres elongated, lignified with pointed ends with moderately wide lumen; xylem parenchyma rectangular or square in shape and pitted; medullary rays uni to triseriate, uni and biseriate rays being more common.

**Powder** - Brown; shows numerous parenchymatous cells of secondary cortex, a few fragments and entire xylem vessels with bordered pits, fibres and xylem parenchyma

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) on exposure to Iodine vapour shows six spots at Rf. 0.04, 0.05, 0.08, 0.19, 0.23 and 0.35 (all yellow). On spraying with Vanillin Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.04, 0.08 and 0.35 (all violet).

CONSTITUENTS - Sterols.

PROPERTIES AND ACTION

Rasa	:	Tikta
Guṇa	:	Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Dīpana, Kaphavātahara, Daurgandhyanāśana

IMPORTANT FORMULATIONS - Bṛhat Guḍūcī Taila, Mṛtasañjīvanī Surā

THERAPEUTIC USES - Śvāsa, Kaṇḍū, Viṣa

DOSE - 5-10 g of the drug in powder form

## HAMSAPADĪ (Whole Plant)

Hamsapadī consists of dried whole plant of *Adiantum lunulatum* Burm. (Fam. Polypodiaceae); a fern found throughout moist places, generally on the slopes of hills, ascending up to an elevation of about 1370 m.

### SYNONYMS

Sanskrit	:	Hamsapādī, Raktapādī, Kiṭamātā, Tripādikā
Assamese	:	Sharul Arj, Sharujeena, Parsiyav
Bengali	:	Kali Jhat
English	:	Maiden Hair
Gujrati	:	Hansaraja
Hindi	:	Hanspadee, Hansaraj
Kannada	:	Hamsapadi
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Hamsaraj
Oriya	:	--
Punjabi	:	Hamsaraj
Tamil	:	--
Telugu	:	Hamsapadi
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

**Root** - Very thin, fibrous, about 10-15 cm long, reddish-black in colour, soft and branched.

**Rhizome** - Long, upto 2 mm thick, glabrous, prostrate or erect, dark reddish-brown or a black in colour.

**Frond** - Rachis shiny black, simply pinnate, pinna roughly lunulate, subdimidiate, lower edge nearly in line and oblique with its black shiny petiole, upper edge bluntly rounded and more or less lobed, a few sori in a continuous line on the under surface along the edge, with a false indusium.

#### b) Microscopic

Root mature root shows single layered epidermis consisting of thin-walled, small and irregular cells, followed by 3-4 layers of large thick-walled, polygonal, parenchymatous cells of cortex; endodermis single layered composed of square or somewhat rounded cells; pericycle single layered composed of square shaped sclerenchymatous thick and dark reddish-brown wall; pericycle encloses a diarch stele with a few elements of xylem and phloem.

**Rhizome** - Mature rhizome consists of thick walled, rectangular, small cells of epidermis, followed by 3-4 layers of sclerenchymatous cells of hypodermis, composed of thickwalled cells; cortex wide, made up of thin-walled, rounded or oval-shaped parenchymatous cells, enclosing an amphiphloic siphonostele; endodermis present; vascular bundle with xylem consisting protoxylem towards both ends and metaxylem in centre; phloem surrounds the xylem externally and also internally; tracheid with scalariform to reticulate thickening present; a central pith consists of thick-walled cells, and fibres, and is sclerenchymatous.

#### **Frond-**

**Petiole** - Shows concave-convex outline; epidermis single layered; hypodermis consists of 2 or 3 layers, lignified, thick-walled, sclerenchymatous cells; ground tissue composed of oval to polygonal, thin-walled parenchymatous cells; stele single, slightly triangular in shape, located centrally and surrounded by peri cycle and endodermis.

**Pinnule** - Shows single layered epidermis on either surface; mesophyll round to oval in shape and not differentiated into palisade and spongy parenchyma; a few stomata present only on lower surface; a few sori also seen.

**Powder** - Dark reddish-brown in colour; shows dark reddish-brown pieces of sclerenchymatous cells and light coloured crushed cells of cortex, a few tracheids having reticulate thickening, fibres and a few spores.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	11	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 :1 : 5) shows under UV (366 nm) two fluorescent zones at Rf. 0.80 and 0.96 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.19, 0.30 and 0.80 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.19, 0.30 and 0.80 (all yellowish brown).

## PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Guru
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Raktavikārahṛt, Viṣaghna

IMPORTANT FORMULATIONS - Madhuyaṣṭyādi Taila, Mānasa Mitra Vaṭaka, Mukṭā Pañcāmṛta Rasa, Svarṇabhūpati Rasa, Kālakūṭa Rasa

**THERAPEUTIC USES** - Visarpa, Vraṇa, Dāha, Atīśāra, Lutā Viṣa, Bhūta Graha, Kakṣa Sphoṭa, Rakta Vikāra

**DOSE** - 1-3 g

## HAPUṢĀ (Fruit)

Hapuṣā consists of dried fruit of *Juniperus communis* Linn (Fam. Cupressaceae); a dense, more or less procumbent shrub, rarely a small tree, found in the Himalayas from Kumaon westwards at an altitude of 1500-4250 m.

### SYNONYMS

Sanskrit	:	Havuṣā, Matsyagandha
Assamese	:	Arar, Abahal, Habbul
Bengali	:	Hayusha
English	:	Juniper Berry, Common Juniper
Gujrati	:	Palash
Hindi	:	Havuber, Havubair
Kannada	:	Padma Beeja
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Hosh
Oriya	:	--
Punjabi	:	Havulber
Tamil	:	--
Telugu	:	Hapusha
Urdu	:	Abhal, Aarar

### DESCRIPTION

#### a) Macroscopic

Fruit sub-spherical, berry like, purplish-black, occasionally showing a 'bloom', about 0.5-1.0 cm in dia., apex shows triradiate mark and depression indicating the suture of three fleshy-bracts; at the base are six, small, pointed, bracts arranged in 2 whorls, but occasionally 3 or 4 whorls present; three hard, triangular seeds are embedded in the fleshy mesocarp, each with a woody testa bearing large partly sunk oily glands; odour terebinthine

and taste bitter.

**b) Microscopic**

Outer layer of fruit shows 3-4, large, cubic or tabular cells having thick, brown porous walls externally covered by single layered, colourless cuticle; sarcocarp consists of large, elliptical, thin-walled, loosely coherent cells, containing drops of essential oil and prismatic crystals of calcium oxalate; oval to elongated, elliptical, triangular or irregular shaped cells abundant in this region; seed coat shows 2 or 3 layers of tabular, thin-walled cells covered externally by a thin cuticle and followed internally by a wide zone of thick-walled polygonal sclerenchymatous cells; endosperm and embryo not distinct.

**Powder** - Brown; shows oval to elongated, elliptical and irregular shaped, thick-walled stone cells; rectangular to hexagonal, straight, thick walled epidermal cells in surface view; prismatic crystals of calcium oxalate and oil globules.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.11 (light blue), 0.20 (light blue) and 0.58 (blue). On exposure to Iodine vapour ten spots appear at Rf. 0.17, 0.25, 0.30, 0.36, 0.46, 0.58, 0.64, 0.67, 0.90 and 0.96 (all yellow). On spraying with Vanillin Sulphuric acid and heating the plate for ten minutes at 110°C twelve spots appear at Rf. 0.11, 0.17, 0.25, 0.30 (all brown), 0.36 (light brown), 0.46, 0.52 (both brown), 0.58 (dirty yellow), 0.64 (brown), 0.73 (light brown), 0.90 (light brown) and 0.96 (brown).

CONSTITUENTS - Essential Oil and Flavonoids

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Guru, Mr̥du
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Agnidīpaka, Vātanāśaka, Kaphanāśaka, Viṣaghna

IMPORTANT FORMULATIONS - Kumāryāsava, Saptaviṃśatika Guggulu, Dād̥hika Ghṛta, Nārāyaṇa Cūrṇa, Trayodaṣāṅga Guggulu, Pradarāntaka Lauha, Nityānanda Rasa

THERAPEUTIC USES - Pittodara, Arśa, Grahaṇī, Gulma, Śūla, Kṛmi, Vātodara, Plīhāroga

DOSE - 2-6 g in powder form

## INDRAVĀRUṆĪ (Fruit)

Indravāruṇī consists of dried/peeled cut pieces of the fruit of *Citrullus colocynthis* Schrad. (Fam. Cucurbitaceae); an annual or perennial creeper growing wild in the warm, arid and sandy tracts of North West, Central and Southern parts of the country.

### SYNONYMS

Sanskrit	:	Gavākṣī, Indravallī, Aindrī
Assamese	:	Gavadani
Bengali	:	Rakhal
English	:	Colocynth
Gujrati	:	Indrayan
Hindi	:	Indrayan
Kannada	:	Havumekke
Kashmiri	:	--
Malayalam	:	Kattu Vellarikkai, Valiya Pekkummatti
Marathi	:	Endrayana
Oriya	:	Gothakakudi, Indrayanalata, Garukhiya
Punjabi	:	Indrayana
Tamil	:	Peitummatti
Telugu	:	Chedupuchcha, Peikummatti
Urdu	:	Hanjal

### DESCRIPTION

#### a) Macroscopic

White or pale yellowish-white, light, pithy fragments upto about 6 cm long and 2 cm thick; externally convex with ridges and flattened areas 5-10 mm wide resulting from peeling with a knife; internally irregularly concave and showing numerous ovoid depressions about 10 mm long, left by the removal of the seeds; pulp bitter, seeds flattened, ovoid, yellowish-white to dark brown, about 7 x 5 x 2 mm; endosperm narrow and oily; cotyledons 2, oily;

radicle, small; epicarp woody, about 1 mm thick, buff coloured externally; odourless; taste, intensely bitter.

#### b) Microscopic

Pulp consists of large, thin-walled, pitted parenchyma of rounded cells showing oval, flat, pitted areas where they are in contact with many slender bicollateral vascular strands having spiral vessels and occasional associated latex vessels; epicarp, where present, with epidermis of radially elongated cells having thick outer walls and thin inner walls and partially thickened anticlinal walls with occasional stomata of the anomocytic type; the adjacent parenchymatous layer about 15 cells thick, and an inner layer of sclereids, the outer sclereids very thick, smaller, about 15 to 30  $\mu$  in diameter, isodiametric and the inner sclereids layer upto about 60  $\mu$ , radially elongated, with thinner walls; seed, testa with outer epidermis of thick-walled unlignified palisade cells having vertical strips of thickening on the anticlinal walls, with inner layers of very thick-walled, striated, pitted, lignified sclereids, and an inner most layer of sclereids with reticulately thickened walls; endosperm and cotyledons parenchymatous with fixed oil and aleurone grains upto 7  $\mu$  in diameter.

**Powder** - Yellowish-brown; shows, groups of pitted parenchymatous cells, annular and spiral vessels, stone cells, oil globules and aleurone grains measuring up to 7  $\mu$  dia.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 14 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 7 per cent, Appendix	2.2.4.
Light petroleum soluble matter :	On continuous extraction with light petroleum (b.p.40°C to 60°C) and drying at 100°C, not more than	
	3.0 percent	

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.88 (light blue) and 0.98 (yellow). On exposure to Iodine vapour two spots appear at Rf. 0.88 and 0.98 (both yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for ten minutes at 105°C four spots appear at Rf. 0.65 (blue), 0.84 (blue), 0.96 (blue) and 0.98 (dark blue).

CONSTITUENTS - Resins - Resinous Glycosides (Colocynthin and Colocynthitin), Phytosterol Glycoside, Citrullol, Pectin and Albuminoids, Cucurbitacins - Cucurbitacin E & I.

#### PROPERTIES AND ACTION

Rasa	:	Tikta
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vāmaka, Recana, Kṛmighna, Śleṣmahara, Viṣahara

IMPORTANT FORMULATIONS - Jvaraghni Guṭikā (II)

THERAPEUTIC USES - Kṛmiroga, Kāmalā, Śvāsa, Kāsa, Kuṣṭha, Gulma, Udararoga

DOSE - 0.125 - 0.5 g of powder

0.25 - 0.5 g of powder

## INDRAYAVA (Seed)

Indrayava consists of dried seeds of *Holarrhena antidysenterica* Wall. (Fam. Apocynaceae); a small to medium sized tree, found throughout India.

### SYNONYMS

Sanskrit	:	Bhadra Yava, Kaliᅅga, Śakra, Vatsaka
Assamese	:	Dudhkuri
Bengali	:	Kurchi
English	:	Ester Tree, Conessi Seeds
Gujrati	:	Kuda, Kudo
Hindi	:	Indraju, Kurchi, Kuraiya
Kannada	:	Kodasige Beeja
Kashmiri	:	--
Malayalam	:	Kutakappala
Marathi	:	Kudayache Beej
Oriya	:	Kurei, Keruan
Punjabi	:	Indrajau, Kaurasakh, Kura
Tamil	:	Kudasapalai
Telugu	:	Kodisapala Vittulu, Palakodisa-Vittulu
Urdu	:	Tukhm-e-Kurchi, Indarjao Talkh

### DESCRIPTION

#### a) Macroscopic

Seeds compressed, linear, or oblong, elongated, margins curved inside, one side convex and other side concave with a longitudinal striation; 1-2 cm long, 0.2-0.3 cm thick, surface light yellowish- brown; odour, not distinct; taste, bitter.

## b) Microscopic

Seed shows 2-3 layered integument consisting of single layered, rounded, oval or radially elongated, thick-walled, reddish-brown parenchymatous cells, some of them elongate outwards forming small papillose structure, covered by a few unicellular, and uniseriate, multicellular types of trichomes; below this layer, 1 or 2 layers of small rounded or irregular cells, a few having single prismatic crystals of calcium oxalate, followed by a few layers of collapsed, brown coloured cells; endosperm 4-6 layered consisting of rounded, oval or polygonal, thin-walled, parenchymatous cells, containing aleurone grains; most of the cells also contain oil globules; embryo having conical radicle and two foliaceous, convoluted cotyledons consisting of single layered tabular epidermal cells towards dorsal side and rectangular cells towards ventral side, and externally covered with cuticle; rest of the cotyledon cells composed of rounded, oval or rectangular parenchymatous cells containing rosette crystals of calcium oxalate and oil globules.

**Powder** - Light yellowish-brown; shows fragments of endosperm, pigment cells, oil globules, prismatic and rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (1:1) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.67, 0.72, 0.76 and 0.93 (all blue). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent five spots appear at Rf. 0.15, 0.28, 0.43, 0.59 and 0.67 (all orange).

CONSTITUENTS - Alkaloids -Steroidal Alkaloid, Conessine etc., Fats, Tannin and resin.

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Dīpana, Tridoṣaśāmakā, Saṃgrāhī

IMPORTANT FORMULATIONS - Pañca Nimba Cūrṇa, Palāśa Bījādi Cūrṇa, Laghu Gaṅgādhara Cūrṇa, Kṛmi Kuṭhāra Rasa, Pīyūṣavallī Rasa, Jvaraghni Guṭikā, Siddha Prāṇeśvara Rasa, Ahiphenāsava

THERAPEUTIC USES - Atīsāra, Kuṣṭha, Jvarātisāra, Kṛmi, Visarpa, Grahaṇī, Raktātisāra, Śūla, Chardi, Tvagroga, Dāha

DOSE - 3-6 g (Cūrṇa)

20-30 g (Decoction)

## ĪŚVARĪ (Root)

Īśvarī consists of dried root of *Aristolochia indica* Linn, (Fam. Aristolochiaceae); a perennial shrubby, twiner, found throughout the low hills and plains of India,

### SYNONYMS

Sanskrit	:	Gandhnākulī, Nāgadamanī
Assamese	:	Jarvande
Bengali	:	Isheri
English	:	Indian Birthwort, Serpent Root
Gujrati	:	Ruhimool, Iswarimool
Hindi	:	Ishwari
Kannada	:	Ishwari Beru, Toppalu
Kashmiri	:	--
Malayalam	:	Karaleyan
Marathi	:	Sapsan
Oriya	:	Gopikaron
Punjabi	:	--
Tamil	:	Perumarundu, Ichchuramule
Telugu	:	Iswari, Nallaiswari
Urdu	:	Zarawand Hindi

### DESCRIPTION

#### a) Macroscopic

Root considerably long, cylindrical, a few irregularly bent; 2-10 mm in dia; surface almost smooth with fine longitudinal wrinkles and transverse cracks; external surface, light greyish-brown; inner whitish; fracture, short and splintery; odour, camphoraceous; taste, strongly bitter.

## b) Microscopic

Cork 8-10 layers, composed of tabular, thin-walled cells excepting the outer most layer, having thick-walled cells externally and filled with brownish content; cork cambium single layered; secondary cortex 15 to 17 layers of thin-walled, somewhat rounded and isodiametric cells in the outer region but tangentially elongated in the inner region; plenty of simple, round to oval starch grains measuring 5-18  $\mu$  in dia. and compound starch grains having 2-4 components measuring 10-15  $\mu$  in dia. and oil globules present in a few cells; in the middle region stone cells round, rectangular, oval or elongated present in small irregular patches having simple pits and radiating canals; centre occupied by xylem, split into strips of radiating arms by wedged masses of parenchyma; each xylem arm is capped by thin patches of phloem consisting of sieve elements and phloem parenchyma, phloem fibres, and occasionally stone cells also found in this region; a ring of cambium present between phloem and xylem; xylem consists of large vessels, tracheids, fibres tracheids and parenchyma, all being lignified; in older roots, tyloses formation takes place in vessels; medullary rays 8 to 10 in number, multiseriate and dilating towards periphery and alternating with radiating arms of wood; scattered group of stone cells present in a few wider rays; micro-crystals with a few appearing as elongated small prisms and unaffected by acids, are present in a few cortical and ray cells.

**Powder** - Brownish-yellow; fragments of cork cells, very few, oval to rectangular, lignified, thick-walled stone cells having distinct striations with narrow lumen, vessels with spiral thickenings, non-lignified, thick-walled tracheids, numerous simple, round to oval, starch grains measuring 5-18  $\mu$  in dia., and compound grains having 2 to 4 components, measuring 10 - 15  $\mu$  in dia., a few crystals and oil globules

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene. Ethylacetate (85 : 15) shows under UV (366 nm) four fluorescent zones at Rf 0.21, 0.60 (both blue), 0.89 (red), 0.96 (blue). On exposure to Iodine vapour six spots appear at Rf 0.11, 0.21, 0.50, 0.63, 0.96 and 0.98 (all yellow) On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf 0.14, 0.63 (both violet) and 0.96 (brown)

CONSTITUENTS - Alkaloids, Essential Oils, Bitter Principles and Fixed Oil.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāma, Śothahara, Rakṣoghna, Grahabādhaghna

IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila, Gorocanādi Guṭikā

THERAPEUTIC USES - Sarpaviṣa, Lūtā Viṣa, Jālagardabha, Vṛścikaviṣa, Jvara, Kṛmi, Vraṇa

DOSE - 1-2 g (For external use also)

## JĀTĪ (Leaf)

Jātī consists of dried leaves of *Jasminum officinale* Linn. (Fam. Oleaceae); a large climbing shrub with dark green twigs and pinnate leaves, found in Kashmir at an altitude of 900 - 2700 m and cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Mālatī
Assamese	:	Yasmeen
Bengali	:	Chamelee
English	:	Jasmine
Gujrati	:	Chamelee
Hindi	:	Chamelee
Kannada	:	Jati Maltiga, Sanna Jati Mallige
Kashmiri	:	--
Malayalam	:	Pichi
Marathi	:	Chamelee
Oriya	:	--
Punjabi	:	Chamelee
Tamil	:	Pichi, Jatimalli
Telugu	:	Jati, Sannajati
Urdu	:	Chameli, Yasmeen

### DESCRIPTION

#### a) Macroscopic

Leaf single or in groups of 2-7 leaflets, upto 7.5 cm long and upto 2.5 cm broad; imparipinnately compound; terminal leaflet larger; ovate or lanceolate, acuminate; lateral leaflets shorter, acute, sessile or shortly petiolate; brownish-green; taste, bitter

## b) Microscopic

*Rachis* - Rachis shows more or less convex outline with two lateral wings; epidermis single layered covered by thick cuticle; hairs mostly unicellular with pointed apex, glandular rarely found only on the upper surface; collenchyma 2 - 5 layered; pericycle represented by slightly lignified small fibre groups; vascular bundles three, median crescent-shaped, small accessory bundle present in each wing.

*Midrib* - shows similar structure as rachis; 3 - 5 layers of collenchymatous cells towards lower surface; pericycle present in the form of non-lignified fibre groups; vascular bundle single and crescent-shaped.

*Lamina* - shows dorsiventral structure, epidermis single layered on either side, covered by a thick striated cuticle; hairs as in rachis; palisade 1- 2 layered; spongy parenchyma 4-6 layers; stomata anomocytic only in lower surface.

**Powder** - Yellowish-green; shows palisade and spongy parenchyma, unicellular hairs, fibres and vessels with spiral thickening, polygonal epidermal cells and anomocytic stomata in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	18	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene. Ethylacetate (9 : 1) shows under UV (366 nm) three fluorescent zones at Rf 0.44 (blue), 0.52 (light blue) and 0.91 (blue). On exposure to Iodine vapours ten spots appear at Rf. 0.08, 0.18, 0.38, 0.44, 0.49, 0.53, 0.59, 0.67, 0.81 and 0.91 (all yellow). On spraying with Dragendorff reagent

followed by 5% Methanolic-Sulphuric acid reagent four spots appear at Rf. 0.08, 0.18 (both orange), 0.44 and 0.91 (both light orange). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C many spots of brown, yellow, blue and violet colour appear from the point of application to the solvent front.

CONSTITUENTS - Resin, Salicylic Acid, Alkaloid (Jasminine) and Essential Oil.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu, Snigdha, Mṛdu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śirovirecana, Cakṣuṣya

IMPORTANT FORMULATIONS - Jātyādi Taila, Jātyādi Ghṛta, Vasanta Kusumākara Rasa

THERAPEUTIC USES - Śīroroga, Akṣiroga, Viṣaroga, Kuṣṭha , Vraṇa, Arśa, Mukhapāka, Pūt  
īkarṇa, Stana Śoṭha, Raktavikāra

DOSE - 10-20 g of powder for decoction

## KADALĪ (Rhizome)

Kadalī consists of fresh rhizome of *Musa paradisiaca* Linn. (Fam. Musaceae); plant found cultivated throughout India, upto 1200 m.

### SYNONYMS

Sanskrit	:	Vāraṇā, Ambusārā, Rambhā
Assamese	:	Kal, Talha
Bengali	:	Kela, Kala, Kanch Kala, Kodali
English	:	Banana
Gujrati	:	Kela
Hindi	:	Kela
Kannada	:	Bale Gadde
Kashmiri	:	--
Malayalam	:	Vazha
Marathi	:	Kela
Oriya	:	Kadali, Kadila
Punjabi	:	Kela
Tamil	:	Vazhai
Telugu	:	Arati Gadda
Urdu	:	Kela

### DESCRIPTION

#### a) Macroscopic

Drug available in 0.1-4 cm thick, transversely cut pieces, pinkish-brown to greyish-brown, occasionally attached with a few roots.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

-  
-  
-  
-  
-

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under U.V. (366 nm) two fluorescent zones at Rf 0.25 (orange) and 0.33 (green). On exposure to Iodine vapour three spots appear at Rf. 0.11, 0.25 and 0.73 (all yellow).

CONSTITUENTS - Fixed Oil and 4 á -Methyl Sterol Ketone.

### PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Śīta, Guru, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Balya, Kaphahara, Pittahara, Dīpana, Rucya, Keśya

IMPORTANT FORMULATIONS - Abhraka Bhasma (Śatapuṭī), Kṣāra Taila

THERAPEUTIC USES - Kṛmi, Kuṣṭha, Karṇa Śūla, Somaroga, Amlapitta, Dāha, Raktavikāra, Rajodoṣa, Mūtrakṛcchra

DOSE - 10-20 g in powder form

10-20 ml in juice form.

## KĀKAJAṄGHĀ (Root)

Kākajaṅghā consists of dried root of *Peristrophe bicalyculala* Nees (Fam. Acanthaceae) an erect, hispid, herb or undershrub, 60-180 cm high found in forest undergrowth, hedges and waste lands almost throughout the country.

### SYNONYMS

Sanskrit	:	Nadīkāntā, Kākatiktā, Prācibalā, Sulomaśā
Assamese	:	--
Bengali	:	Nasabhaga, Naskaga
English	:	--
Gujrati	:	Kaliadhedi, Kariadhedi, Lasiadhedi
Hindi	:	Atrilal, Itrelal, Masi, Nasbhanga, Kakajangha
Kannada	:	Cibigid, Cibirsoppu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Ghatipittapapada, Ramkirayat, Pitpapra
Oriya	:	--
Punjabi	:	--
Tamil	:	Chebisa
Telugu	:	Chebira
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Root occurs upto 0.7 cm thick, and upto 4 cm long cylindrical with branched lateral roots, dirty brown; fracture, fibrous; odour and taste not characteristic.

## b) Microscopic

Shows poorly developed cork, consisting of 2-4 layers of tangentially elongated, thin-walled cells; where cork is not developed, epidermis present, consisting of single layered cells; secondary cortex narrow, consisting of 5-7 layers of elliptical or tangentially elongated, thin-walled, parenchymatous cells; secondary phloem narrow, consisting of sieve elements and parenchyma; phloem rays not distinct; secondary xylem consisting of pitted vessels, fibres, tracheids and parenchyma; vessels occur singly or in groups of 2-4 or more and arranged radially throughout secondary xylem; vessels with simple pits, tracheids thick-walled and lignified.

Powder - Dirty-brown; shows parenchymatous cells, aseptate fibres and pitted vessels.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (93:7) shows under U.V. (366 nm) five fluorescent zones at Rf. 0.15, 0.30, 0.52, 0.90 and 0.98 (all light blue). On exposure to Iodine vapour six spots appear at Rf. 0.07, 0.15, 0.30, 0.43, 0.57 and 0.98 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.07, 0.30, 0.43, 0.57 and 0.98 (all violet).

## CONSTITUENTS - Volatile Oil.

### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Sara, Picchila
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara, Kaphahara, Varṇya

### IMPORTANT FORMULATIONS - Āragvadhādi Kvātha Cūrṇa

THERAPEUTIC USES - Vraṇa, Jvara, Raktapitta, Kaṇḍū, Kṛmi, Kuṣṭha, Raktavikāra, Viṣa Vikāra, Sidhma, Ślīpada, Bālagraha, Aikāhnikajvara, Bādhirya, Anidrā, Rājayakṣmā, Pradara, Dantakṛmi, Sarpaviṣa

DOSE - 1-5 g in powder form.

## KĀKANĀSIKĀ (Seed)

Kākanāsikā consists of dried seed of *Martynia annua* Linn. Syn. *M diandra* Glox. (Fam. Martyniaceae); an annual herb found throughout the country in waste places.

### SYNONYMS

Sanskrit	:	Kākāṅgī, Śirobal, Cerasnaya
Assamese	:	--
Bengali	:	Kurki, Kaih, Baghnoki
English	:	Tigers Claw, Devil's Claw
Gujrati	:	--
Hindi	:	Bichu Hathajori, Kawathodi
Kannada	:	Garuda Mugu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Vinchuachajada
Oriya	:	--
Punjabi	:	Kaktundi, Bichu, Hathajari
Tamil	:	Kakatundi
Telugu	:	Garudamukku, Telukondikaya
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Seed oblong, hard, woody, 2-5 cm long and 1.5-1.7 cm wide; surface wrinkled, light brown to black; two sharp recurved hooks present at anterior end; four prominent grooves present each on convex and concave side and on lateral sides, 2-4 hairy spines present inside groove on concave side; no taste and odour.

## b) Microscopic

**Powder-** Black and rough; shows groups of thick-walled cells, numerous fibres, unicellular hairs and oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.66 and 0.95 (both blue). On exposure to Iodine vapour four spots appear at Rf. 0.11, 0.42, 0.57 and 0.95 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105<sup>0</sup> C four spots appear at Rf. 0.11, 0.42, 0.57 and 0.95 (all violet).

CONSTITUENTS - Fixed Oil- (Semidrying type).

## PROPERTIES AND ACTION

Rasa	:	Madhura
Gūṇa	:	Śīta
Vīrya	:	Śīta
Vipāka	:	Madhura

Karma : Pittaghna, Dārḍhyakara, Rasāyana

IMPORTANT FORMULATIONS - Cyavanaprāśa, Avaleha, Tryūṣaṇādi Ghṛta

THERAPEUTIC USES - Palita

DOSE - 2 - 5 g

## KĀKOLĪ (Tuberous Root)

Kākolī consists of dried tuberous root of *Lilium polyphyllum* D.Don (Fam. Liliaceae); a plant found growing in Western temperate Himalayas from 1800-3600 m from Kumaon to Kashmir.

### SYNONYMS

Sanskrit	:	Vāyasolī, Svādumānisi
Assamese	:	--
Bengali	:	Kakoli
English	:	--
Gujrati	:	Kakoli
Hindi	:	Kakoli
Kannada	:	Kakoli
Kashmiri	:	--
Malayalam	:	Kakoli
Marathi	:	Kakoli
Oriya	:	Kakoli
Punjabi	:	--
Tamil	:	Kakoli
Telugu	:	Kakoli, Kakoli Moola, Kandhambu
Urdu	:	Kakoli

### DESCRIPTION

#### a) Macroscopic

Roots straight or curved, dark brown and occur in bunches of 4-15; each root about 2-10 cm long, upto 0.7 cm thick; external surface rough due to presence of longitudinal wrinkles; odour, slightly aromatic; taste, acrid.

## b) Microscopic

Tuberous root shows ridges and furrows in outline; cork 8-10 layered, consisting of thin-walled, tangentially elongated, almost radially arranged cells, upper cells filled with reddish-brown content; secondary cortex consisting of oval to elongated, thin-walled, parenchymatous cells filled with abundant, simple, ovoid to ellipsoidal starch grains, measuring 5-11 $\mu$  in dia.; vascular bundles composed of usual elements, vessels arranged alternatively with phloem patches, vessels mostly solitary with spiral thickening; pith composed of oval to polygonal, thin-walled, parenchymatous cells.

**Powder** - Greenish-yellow; slightly aromatic in smell; shows spiral vessels, fragments of cork cells and simple, ovoid to ellipsoidal starch grains, measuring 5-11  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows in visible light two spots at Rf. 0.84 (yellow) and 0.97 (light yellow). Under UV (366 nm) five fluorescent zones visible at Rf. 0.23, 0.31 (both yellow), 0.44 (light yellow), 0.54 and 0.97 (both blue). On exposure to Iodine vapour thirteen spots appear at Rf. 0.15, 0.22, 0.23, 0.25, 0.31, 0.44, 0.54, 0.68, 0.78, 0.84, 0.88, 0.92 and 0.97 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.44, 0.54, 0.78, 0.84 and 0.97 (all violet).

**CONSTITUENTS** - Sugars.

## PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Guru, Śīta
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātahara, Pittahara, Śukrala, Bṛṃhaṇa

IMPORTANT FORMULATIONS - Bṛhat Aśvagandhā Ghr̥ta, Bṛhacchāgalādyā Ghr̥ta, Daśam ūlāriṣṭa, Śivā Gutīkā, Amṛtaprāśa Ghr̥ta

THERAPEUTIC USES - Raktapitta, Śoṣa, Jvara, Śvāsa, Kāsa, Kṣaya, Dāha

DOSE - 3-6 g

## KAMALA (Rhizome)

Kamala consists of dried rhizome with roots attached at nodes of *Nelumbo nucifera* Gaertn. Syn. *Nelumbium nelumbo* Druce, *N. speciosum* Willd. (Fam. Nymphaeaceae); an aquatic herb, with stout creeping rhizome found in lakes and ponds throughout the warmer parts of the country, ascending upto 1000 m.

### SYNONYMS

Sanskrit	:	Padnakanda, Sāluka, Ambhoruha
Assamese	:	Kamal Kakdi
Bengali	:	--
English	:	Sacred Lotus
Gujrati	:	Loda
Hindi	:	Kamal Kand, Kamal Kakdi
Kannada	:	Tavare Kanda
Kashmiri	:	--
Malayalam	:	Tamara Kizangu
Marathi	:	Kamal Kand
Oriya	:	Padma
Punjabi	:	Kaul, Bhein
Tamil	:	Tamardi Kizangu
Telugu	:	Tamara Gadda
Urdu	:	Kanwal Kakdi

### DESCRIPTION

#### a) Macroscopic

Drug occurs as cut pieces of rhizome with distinct nodes and internodes, cylindrical, 0.5-2.5 cm in dia., longitudinally marked with brown patches, smooth, yellowishwhite to yellowish-brown; root adventitious, less developed, 0.5-1 mm thick, attached to node of

rhizome; dark brown.

#### b) Microscopic

**Rhizome** - Shows a single layered epidermis followed internally by 2-4 layered lignified cells; cortex differentiated into three regions; outer cortex consisting of a wide zone of isodiametric thin-walled cells of which outer 5-6 layers collenchymatous and rest parenchymatous, having intercellular spaces and groups of fibres; middle cortex mostly composed of air cavities traversed by trabeculae of thin-walled small and nearly isodiametric cells; inner cortex forming central core, consists of spherical cells enclosing large intercellular spaces; vascular strands consists of scattered closed vascular bundles surrounded by thick-walled, lignified sclerenchymatous fibres, resembling a monocotyledonous structure; vessels having spiral and spiro-reticulate thickening; phloem composed of sieve tubes and companion cells; air cavities large, elliptic or rounded, largest at middle cortex and smaller towards inner cortex; air cavities lined by thin-walled, elongated, parenchymatous epithelial cells; starch grains abundant, rounded to oval, mostly simple, rarely compound measuring 8-27  $\mu$  in dia., loaded in cells.

**Root** - Appears more or less circular in outline, epidermis consists of oval, thin-walled parenchymatous cells; cortex composed of 5-8 layers of oval to polygonal, thin-walled parenchymatous cells, vascular elements surrounded by slightly lignified endodermis; phloem cells, xylem fibres aseptate with blunt ends; vessels with spiral thickening, rounded to oval, poorly developed and consisting of usual elements; xylem composed of vessels, tracheids and parenchyma; vessels and tracheids have simple pits.

**Powder** -Light brown; shows groups of oval to elongated, parenchymatous cells, xylem fibres aseptate with blunt ends; vessels with spiral thickening, rounded to oval simple starch grains measuring 8-27  $\mu$  in dia.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 14 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 3.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 1.5 per cent, Appendix	2.2.6.

Water-soluble extractive

Not less than 6.5 per cent, Appendix 2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (4:1) shows in visible light one spot at Rf. 0.97 (light yellow). Under U.V. (366 nm) seven fluorescent zones visible at Rf. 0.06 (blue), 0.13 (blue) 0.43 (blue) 0.55 (blue), 0.78 (blue) 0.91 (blue) and 0.98 (reddish). On exposure to Iodine vapour eight spots appear at Rf. 0.13, 0.31, 0.45, 0.64, 0.76, 0.86, 0.93 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid and heating the plate for about ten minutes at 110°C four spots appear at Rf. 0.10 (grey), 0.64 (brown), 0.76 (brown) and 0.96 (brown).

CONSTITUENTS - Starch and Reducing Sugars.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura, Kaṣāya, Kaṭu, Lavaṇa
Guṇa	:	Guru, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Kaphahara, Rucya, Viṣṭambhakara, Vṛṣya, Cakṣuṣya, Varṇya, Kṛmighna, Dāhaśāmaka, Raktaduṣṭihara, Durjara, Stanyajanana, Saṃgrāhī, Mūtravirecanīya, Viṣaghna, Vātakara

IMPORTANT FORMULATIONS - Guḍūcyādi Modaka

THERAPEUTIC USES - Dāha, Tṛṣṇā, Chardi, Raktapitta, Mūrccā, Kāsa, Vātagulma, Visarpa, Visphoṭa, Mūtrakṛcchra, Daṃśodbhava, Jvara, Bhrama, Śoṣa, Hṛdroga

DOSE - 10-20 ml of the drug in juice form

5-10 g of the drug in powder form

## KARAVĪRA (Root)

Karavīra consists of dried root of *Nerium indicum* Mill, Syn. *N. odorum* Soland (Fam. Apocynaceae); a large glabrous, evergreen, woody shrub with milky juice, found throughout the year in upper Gangetic plains, Himalayas from Nepal to Kashmir upto 2000 m, Central and Southern India; also cultivated near the temples and gardens.

### SYNONYMS

Sanskrit	:	Aśvamāraka, Śatakumbha, Divyapuṣpa, Hayamara
Assamese	:	Diflee, Sammulhimar
Bengali	:	Karbbe, Karbee
English	:	Sweet-Scented Oleander
Gujrati	:	Kaner
Hindi	:	Kaner
Kannada	:	Kanagilu, Kharjahar, Kanigale, Kanagile
Kashmiri	:	--
Malayalam	:	Kanaveeram
Marathi	:	Kanher
Oriya	:	--
Punjabi	:	Kanir
Tamil	:	Sevvarali, Arali
Telugu	:	Kastooripatte, Errugumeru
Urdu	:	Kaner

### DESCRIPTION

#### a) Macroscopic

Drug available in cut pieces, 0.5-2.6 cm thick, branched, cylindrical, external surface greyish with long irregular streaks caused by rupture of bark, internal surface cream coloured; fracture, short; taste, bitter.

## b) Microscopic

Root shows cork consisting of 5-12 layered, thin-walled, rectangular, compactly arranged, parenchymatous cells, with a few outer layers occasionally exfoliated; secondary cortex consisting of 6-10 layers of oval, tangentially elongated, thinwalled, parenchymatous cells, a few thick-walled laticiferous cells present in this region; secondary phloem composed of oval to polygonal, thin-walled, parenchymatus cells; secondary xylem consisting of usual elements, having pitted vessels, fibres with pointed tips; xylem rays usually uniseriate and rarely biseriate; prismatic crystals of calcium oxalate and simple starch grains scattered in secondary cortex, secondary phloem and phloem rays; simple, oval to round, elliptical starch grains measuring 3-11  $\mu$  in dia., found-scattered in cortical cells, phloem and xylem rays.

**Powder** - Greyish-brown; shows thin-walled, parenchymatous cells, fragments of cork cells, pitted xylem fibres and vessels, a few prismatic crystals of calcium oxalate, simple, round to oval, elliptical starch grains measuring 3-11  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (8 : 2) shows under U.V. (366 nm) ten fluorescent zones at Rf. 0.11, 0.15 (both yellow) 0.19 (blue), 0.26 (yellow), 0.49 (pink), 0.60, 0.64, 0.72, 0.88 (all blue) and 0.95 (yellow). On exposure to Iodine vapour ten spots appear at Rf. 0.11, 0.22, 0.30, 0.49, 0.53, 0.64, 0.68, 0.72, 0.90 and 0.95 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 105°C for about ten minutes eleven spots appear at Rf. 0.05, 0.11,

0.22, 0.30, 0.49, 0.53 (all grey) 0.64 (yellow), 0.68, 0.72 (both grey), 0.90 (violet) and 0.95 (brown).

CONSTITUENTS - Glycosides-Cardiac Glycosides and Resinous Matter.

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śothaghna, Kṛmighna, Kaṇḍūghna, Kuṣṭhahara, Śirovirecana, Cakṣuṣya

IMPORTANT FORMULATIONS - Bṛhanmaricādyā Taila, Karavīrādyā Taila

THERAPEUTIC USES - Vraṇa, Upadaṃśa, Kuṣṭha, Jalodara, Kaṇḍū

DOSE - 30-125 mg of the drug in powder form.

## KARAMARDA (Root)

Karamarda consists of dried root of *Carissa carandas* Linn. (Fam. Apocynaceae); a dichotomously branched large shrub or small tree with strong simple or forked thorns in pairs, found throughout the country.

### SYNONYMS

Sanskrit	:	Karamla, Karamardaka
Assamese	:	--
Bengali	:	Karamacha
English	:	--
Gujrati	:	Karamada
Hindi	:	Karaonda, Karaondi
Kannada	:	Karayige
Kashmiri	:	--
Malayalam	:	Modakam
Marathi	:	Karabanda
Oriya	:	--
Punjabi	:	--
Tamil	:	Kalakkai
Telugu	:	Vaka, Karavande
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Root considerably long, often irregularly bent, woody, cylindrical; rusty or yellowish-brown; 1-1.5 cm thick; surface smooth; fracture, hard; odour and taste, not distinct.

## b) Microscopic

Mature root shows a stratified cork, lignified and tangentially elongated cells, consisting of alternating bands of smaller and larger cells; a few inner layers filled with red contents; secondary cortex very narrow, composed of 1 or 2 layers of thinwalled cells; secondary phloem composed of usual elements having a number of cavities, present in a row just below the secondary cortex; a number of stone cells present in large compact patches in different rows, in outer and inner phloem regions interrupting phloem rays; phloem rays uni-to biseriate; prismatic crystals of calcium oxalate occur in a number of cells throughout phloem region; cambium not distinct; secondary xylem very wide consisting of xylem vessels, fibres, tracheids and xylem parenchyma, all elements being lignified, xylem rays uni to biseriate, consisting of radially elongated cells; simple, round to oval, starch grains measuring 5.5-11  $\mu$  in dia., present throughout.

**Powder** - Yellowish-brown; shows patches of stratified cork, xylem fibres, stone cells, prismatic crystals of calcium oxalate and simple, round to oval, starch grains, measuring 5.5 - 11  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) a conspicuous fluorescent zone at Rf. 0.07 (sky blue). On

exposure to Iodine vapour four spots appear at Rf. 0.07, 0.26, 0.46 and 0.80 (all yellowish brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C five spots appear at Rf. 0.07, 0.26, 0.46, 0.80 and 0.92 (all violet).

CONSTITUENTS - Glycosides -Cardiac Glycosides

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vāmaka, Mūtrala

IMPORTANT FORMULATIONS - Marma Guṭikā

THERAPEUTIC USES - Mūtra Roga, Visphoṭa, Vidradhī, Vraṇa

DOSE - 1-3 g of the drug in powder form.

## KĀŚĀ (Root Stock)

Kāśā consists of dried root stock with attached stem portion of *Saccharum spontaneum* Linn. (Fam. Poaceae), a perennial grass with slender culms, found throughout the country in warmer parts ascending upto 1,800 m in the Himalayas.

### SYNONYMS

Sanskrit	:	Kāśā, Śvetacāmara
Assamese	:	--
Bengali	:	Chhote-Kase, Kash, Keshe
English	:	Thatch-Grass
Gujrati	:	Kansado, Kansa, Kansado, Ghans
Hindi	:	Kans, Kasa
Kannada	:	Kirayikagachchha, Kasalu
Kashmiri	:	--
Malayalam	:	Nannana, Kusa, Kuruvikarimpu
Marathi	:	Kasai
Oriya	:	--
Punjabi	:	Kani
Tamil	:	Nanal, Nanalu, Karumbu, Kasa, Amaver
Telugu	:	Kakicheraku, Relu
Urdu	:	Kansa, Kasa

### DESCRIPTION

#### a) Macroscopic

Drug occurs in the form of root stock with attached stem portions having numerous dark brown roots; cylindrical, yellowish-brown to brown, 2-25 cm or more in length and 0.2-1 cm thick; fracture, splintery.

## b) Microscopic

Root stock shows single layered epidermis, consisting of slightly oval, thin-walled cells, a few elongated, pointed, aseptate, long unicellular hairs arise from epidermis; cortex composed of 2-3 layered, elongated, thick-walled, palisade-like cells and 3-4 layers of thin-walled, oval to polygonal parenchymatous cells; endoderm is consisting of thin-walled, single layered cells, followed by 6-9 layered, thick-walled, lignified, polygonal, continuous ring of sclerenchymatous cells; pericycle single layered, composed of very small, thin-walled cells beneath endoderm is; ground tissues wide, composed of thin-walled, oval to polygonal, elongated parenchymatous cells having numerous, round to oval starch grains measuring 8-24  $\mu$  in dia., scattered 'U' shaped vascular bundle with sheath, also seen in this region.

**Powder** - Dark brown; shows fragments of thin-walled, tabular, somewhat rectangular, epidermal cells in surface view, oval to polygonal: thin-walled parenchymatous and thick-walled polygonal sclerenchymatous cells, pointed unicellular hairs, vessels with reticulate thickening, small round to oval starch grains, measuring 8-24  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. (366 urn) one fluorescent zone at Rf. 0.83 (green). On exposure to Iodine vapour three spots appear at Rf. 0.30, 0.83 and 0.90 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C six spots appear at Rf. 0.13, 0.23, 0.30 (all dull yellow), 0.69, 0.83 and 0.90 (all grey).

## PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta
Guṇa	:	Sara
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Balakṛt, Vṛṣya, Śramahara, Rūcikṛt

IMPORTANT FORMULATIONS - Karpūrādyarka, Brāhma Rasāyana, Sukumāra Ghr̥ta, Traikaṇṭaka Ghr̥ta, Tṛṇapañcamūla Kvātha Cūrṇa, Mūtravirecanīya Kaṣāya Cūrṇa, Stanyajanana Kaṣāya Cūrṇa, Aśmarīhara Kaṣāya Cūrṇa

THERAPEUTIC USES - Raktapitta, Mūtrakṛcchra, Aśmarī, Dāha, Raktadoṣa, Śoṣa, Kṣaya

DOSE - 3-6 g of the drug in powder form.

## KATPHALA (Fruit)

Katphala consists of dried fruit of *Myrica esculenta* Buch.- Ham. Ex D. Don Syn. *M. nagi* Hook.f. (Fam. Myricaceae); a dioecious, evergreen, small or moderate sized tree, 3-15 m high, found in sub-tropical Himalayas from Ravi eastwards to Assam, and in Khasi, Jaintia, Naga and Lushai hills a elevation of 900-2100 m,

### SYNONYMS

Sanskrit	:	Mahāvālkala
Assamese	:	Ajooree, Vdulbark
Bengali	:	Kayachhal, Katphal, Kayphal
English	:	Box Myrtle, Bay Berry
Gujrati	:	Kayphal
Hindi	:	Kayphajl
Kannada	:	Kadujai Kai, Katphala, Kirisivari, Kirishivane
Kashmiri	:	--
Malayalam	:	Marut
Marathi	:	Kaayphal
Oriya	:	--
Punjabi	:	Kanphal, Kayphal
Tamil	:	Marudam, Marudampatai
Telugu	:	Kaidaryamu
Urdu	:	Kaiphāl

### DESCRIPTION

#### a) Macroscopic

Fruit - A drupe, ellipsoid or ovoid, 0.7-1.0 cm long, 0.5-0.7 cm wide, dark brown, surface tubercled, very hard; taste, sourish sweet.

**Seed** - Ovoid, 0.6 cm long, 0.3 cm wide, surface very smooth, light brown; taste, oily.

**b) Microscopic**

**Fruit** - Shows epicarp cells isodiametric in surface view, mass of reddish-brown, thinwalled, parenchymatous cells, a few elongated tubercled cells with smooth walls; endocarp hard and stony consisting of sclerenchymatous cells.

**Seed** - Seed coat shows single layered, thick, brown coloured cells; cotyledons composed of single layered, thin-walled epidermal cells containing oil globules and aleurone grains; mesophyll cells thin-walled, isodiametric, fully packed with oil globules and aleurone grains.

**Powder** - Yellowish-brown; shows rectangular to hexagonal, thin-walled seed coat and polygonal epidermal cells in surface view; tubercled parenchymatous cells, oil globules and aleurone grains.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17 per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'GF 254' plate using n-Butanol: Acetic acid: Water (4:1:5) shows in visible light five spots at Rf. 0.25, 0.43, 0.57, 0.75 (all grey) and 0.88 (yellowish green). Under U.V. (366 nm) seven fluorescent zones are visible at Rf. 0.09, 0.18 and 0.30 (all light blue), 0.43 (green), 0.49 (blue), 0.65 (blue) and 0.71 (pink). On exposure to Iodine vapour eleven spots appear at Rf. 0.07, 0.09, 0.12, 0.25, 0.30, 0.35, 0.43, 0.52, 0.57, 0.75 and 0.88 (all yellow). On spraying with 5% Methanolic-Sulphuric acid

reagent and heating the plate for ten minutes at 110°C six spots appear at Rf. 0.09 (black), 0.30 (black), 0.57 (light brown), 0.71 (light pink), 0.82 (light pink) and 0.88 (yellowish green).

CONSTITUENTS - Waxy Material.

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātahara, Dāhahara, Mukharogaśāmaka, Dhātuvikārajit, Rucya

IMPORTANT FORMULATIONS - Bṛhatphala Ghṛta, Puṣyānuga Cūrṇa, Arimedādi Taila, Balā Taila, Mahā Viṣagarbha Taila, Khadirādi Guṭikā (Kāsa), Khadirādi Guṭikā (Mukha Roga), Mahā Vātagajāṅkuśa Rasa

THERAPEUTIC USES - Gulma, Meha, Jvara, Arśa, Grahaṇī, Pāṇḍu Roga, Hṛllāsa, Mukha Roga, Kāsa, Śvāsa

DOSE - 3-5 g

## KATPHALA (Stem Bark)

Katphala consists of dried stem bark of *Myrica esculenta* Buch.- Ham. Ex D. Don, Syn. *M. nagi* Hook.f. (Fam. Myricaceae); a dioecious evergreen, small or moderate sized tree, 3-15 m high, found in subtropical Himalayas from Ravi eastward to Assam, Khasi, Jaintia, Naga and Lushai hills upto an elevation of 900-2100 m.

### SYNONYMS

Sanskrit	:	Mahāvālkala
Assamese	:	Vdulbark, Ajooree
Bengali	:	Katphal, Kayphal, Kaychhal
English	:	Bay Berry, Box Myrtle
Gujrati	:	Kayphal
Hindi	:	Kayphal
Kannada	:	Kadujai Kai, Katphala, Kirishivane, Kirisivari
Kashmiri	:	--
Malayalam	:	Marut
Marathi	:	Kaayphal
Oriya	:	--
Punjabi	:	Kanphal, Kayphal
Tamil	:	Marudam, Marudampatai
Telugu	:	Kaidaryamu
Urdu	:	Kaiphāl

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces of variable length, 1-2.5 cm thick, slightly quilled, fissured longitudinally and transversely, outer surface rough, grey to brownish-grey, inner surface dark brown and smooth; fracture, hard; taste, bitter.

## b) Microscopic

Mature stem bark shows multilayered cork, composed of rectangular, tangentially elongated, thin-walled cells, some filled with red contents; secondary cortex a wide zone, composed of thin-walled, rectangular to polygonal, parenchymatous cells, a number of cells filled with red colouring matter and simple, round to oval starch grains measuring 6-11  $\mu$  in dia.; a number of stone cells, in singles or in groups, circular polygonal or oval, thick-walled, lignified with simple pits and radiating canals, found scattered throughout secondary cortex; secondary phloem consists of sieve elements, phloem fibres, crystal fibres, stone cells and phloem parenchyma traversed by phloem rays; numerous prismatic crystals of calcium oxalate present in secondary phloem; phloem fibres with blunt or pointed end and highly thick-walled, with very narrow lumen present in groups; stone cells similar to those found in secondary cortex, mostly in singles or in groups of 2-3, sometimes associated with fibre groups in phloem parenchyma; in isolated preparation and tangential sections crystal fibres show more than twenty chambers having single prismatic crystals of calcium oxalate in each chamber; a number of phloem parenchyma cells containing red colouring matter; phloem rays 1-4 seriate, containing red colouring matter.

**Powder** - Rusty red; shows a number of stone cells, phloem fibres, crystal fibres and prismatic crystals of calcium oxalate and simple, round to oval, starch grains measuring 6-11  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	13	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (7 : 3) in visible light shows four spots at Rf. 0.08 (grey), 0.32 (yellow), 0.51 (grey) and 0.58 (yellow). Under UV (366 nm) three fluorescent zones appear at Rf. 0.49, 0.67 (both light blue) and 0.86 (blue). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate at 110°C for ten minutes six spots appear at Rf 0.08, 0.21 (both grey), 0.35 (Pink), 0.52, 0.67 and 0.80 (all grey).

CONSTITUENTS - Tannin and Glycosides.

## PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātahara, Dāhahara, Mukharogaśāmaka, Dhātuvikārajit, Kaṭphalādi Nasya

IMPORTANT FORMULATIONS - Bṛhatphala Ghṛta, Puṣyānuga Cūrṇa, Arimedādi Taila, Balā Taila, Mahā Viṣagarbha Taila, Khadirādi Guṭikā (Mukha Roga), Khadirādi Guṭikā (Kāsa), Mahā Vātagajāṅkuśa Rasa

THERAPEUTIC USES - Gulma, Meha, Jvara, Arśa, Grahaṇī, Pāṇḍu Roga, Hṛllāsa, Mukha Roga, Kāsa, Śvāsa, Agnimāndya, Aruci, Kaṇṭharoga

DOSE - 3-5 g

## KOLA (Fruit Pulp)

Kola consists of dried fruit pulp (devoid of seed) of *Zizyphus mauritiana* Lam. Syn. *Z. jujuba* Lam. (Fam. Rhamnaceae); a small, evergreen sub-deciduous tree, wild and also extensively cultivated throughout the country and found in Himalayan region upto about 1370 m.

### SYNONYMS

Sanskrit	:	Kolī, Badarī
Assamese	:	Vagari
Bengali	:	Kul Vadar, Vadar, Vadai, Narkolikul
English	:	Jujube
Gujrati	:	Bor
Hindi	:	Desi Ber
Kannada	:	Borehannu
Kashmiri	:	--
Malayalam	:	Lanta, Lantakkura
Marathi	:	Bor
Oriya	:	Borakoli
Punjabi	:	Desi ber
Tamil	:	Ilandai
Telugu	:	Regi
Urdu	:	Ber

### DESCRIPTION

#### a) Macroscopic

Pulp pieces irregular in shape, shrunk, with external surface smooth and glossy, 2 mm in thickness, brittle, colour, orange red; odour, not distinct; taste, sour.

## b) Microscopic

Fruit pulp shows single layered epicarp consisting of thin-walled, parenchymatous cells, covered with thin layer of cuticle; mesocarp differentiated into two zones, outer zone consisting of 5-10 layers of rectangular, thin-walled, parenchymatous cells, inner mesocarp consisting of oval to polygonal, thin-walled, crushed parenchymatous cells, most of the mesocarp cells filled with reddish-brown substance, which is tannin when tested; a few fibro-vascular bundles found scattered in this region,

**Powder** - Orange; shows round to oval, thin-walled, reddish-brown cells of meso carp, slightly thick-walled, polygonal epicarp cells in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 1 per cent, Appendix	2.2.2.
Total Ash	Not more than 4.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 25 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 45 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (9: 1: 10) shows under U.V. (366 nm) a fluorescent zone at Rf. 0.34 (light blue). On exposure to Iodine vapour seven spots appear at Rf. 0.11, 0.17, 0.34, 0.43, 0.54, 0.66 and 0.84 (all yellow). On spraying with 60 % Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 120°C five spots appear at Rf. 0.17, 0.34 (both black), 0.43, 0.66 and 0.84 (all grey). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.17 and 0.34 (both black).

**CONSTITUENTS** - Vitamin C, Sugars and Minerals.

### PROPERTIES AND ACTION

Rasa	:	Madhura, Amla, Kaṣāya
Guṇa	:	Guru, Snigdha
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Grāhī, Vātahara, Rucya, Dīpana, Pācana

IMPORTANT FORMULATIONS - Dhānvantara Taila, Yavānī Ṣāḍava

THERAPEUTIC USES - Dāha, Raktavikāra, Tṛṣṇā, Aruci

DOSE - 3-6 g (Dried Pulp).

## KOLA (Steam Bark)

Kola consists of dried stem bark of *Zizyphus mauritiana* Lam. Syn *Z. jujuba* Lam. (Fam Rhamnaceae); a small, evergreen sub-deciduous tree, wild and also extensively cultivated throughout the country and found on Himalayan region upto about 1370 m.

### SYNONYMS

Sanskrit	:	Badarī, Kolī, Badara, Karkandhū
Assamese	:	Bagori, Bayur
Bengali	:	Kula
English	:	Jujube
Gujrati	:	Bor
Hindi	:	Desi Ber
Kannada	:	Boehannumara
Kashmiri	:	--
Malayalam	:	Lanta
Marathi	:	Bor
Oriya	:	Borakali
Punjabi	:	Desi ber
Tamil	:	Ilandai
Telugu	:	Regi, Regu
Urdu	:	Ber

### DESCRIPTION

#### a) Macroscopic

Bark available in pieces of variable length, usually 0.6 - 1 cm thick, external surface, blackish-grey, hard, rough due to deep furrows and fissures, exfoliating in irregular scales exposing inner brownish-red fibrous zones; no taste or odour

## b) Microscopic

Stem bark shows a thick portion of rhytidoma, made up of about 25 - 30 alternate bands of cork and dead cells of secondary cortex and secondary phloem, cork consists of thin-walled, rectangular, about 5-6 layered, crushed, parenchymatous cells, mostly filled with dark brown pigment; secondary cortex consists of round, oval and crushed rectangular cells; groups of stone cells, fibres and prismatic crystals of calcium oxalate scattered throughout rhytidorna; secondary phloem consists of sieve elements, phloem fibres, crystal fibres, phloem parenchyma, a few stone cells and phloem rays; phloem fibres arranged in alternate bands with phloem parenchyma, phloem parenchyma consists of rectangular, thin-walled cells, a few contain prismatic crystals of calcium oxalate; crystal fibres present, divided into numerous chambers, each containing single prismatic crystal of calcium oxalate; phloem rays uniseriate to biseriate, upto 10 cells high, consists of round, thin-walled, parenchymatous cells; stone cells, mostly rectangular, occur associated In groups of 2-4 with bands of phloem fibres.

**Powder** - Reddish-brown; shows fragments of cork cells, phloem fibres with wide lumen and pointed tips, crystal fibres, phloem rays, rectangular stone cells and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	15	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (95 : 5) shows under U.V. (366 nm) a fluorescent zone at Rf. 0.84 (light blue). On exposure to Iodine vapour two spots appear at Rf. 0.80 and 0.84 (both yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid a spot appears at Rf. 0.84 (orange).

CONSTITUENTS - Tannins and Alkaloids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Viṣphoṭaśamanī, Stambhana, Vraṇaśodhana

IMPORTANT FORMULATIONS - Nyagrodhādi Kvātha Cūrṇa

THERAPEUTIC USES - Tvak, Raktātisāra, Vraṇa

DOSE - 3-5 g. (Powder)

10-2- g (Decoction).

## KOṢĀTAKĪ (Whole Plant)

Koṣātakī consists of dried whole plant of *Luffa acutangula* (Linn.) Roxb. (Fam. Cucurbitaceae); a large monoecious, annual climber, found wild and also cultivated throughout the greater part of India.

### SYNONYMS

Sanskrit	:	Kṛtavedhanā, Jālī, Dhāmārg
Assamese	:	--
Bengali	:	Zinga
English	:	Ribbed Gourd
Gujrati	:	Turiya, Kadawa, Turiya
Hindi	:	Turai, Satputia
Kannada	:	Hire-Valli
Kashmiri	:	--
Malayalam	:	Peerkam Kai
Marathi	:	Dodka Turiya
Oriya	:	Tarada
Punjabi	:	Turiya
Tamil	:	Peerkkku
Telugu	:	Beera, Chedu beeha, Varri beera
Urdu	:	Turai

### DESCRIPTION

#### a) Macroscopic

**Root** - Occurs in cut pieces, 8-12 cm long, and 0.5-0.7 cm thick, yellowish-brown; almost cylindrical, rough due to longitudinal wrinkles, having a few adventitious roots; fracture, short

**Stem** - 0.2-0.4 cm thick, 5 angled, glabrous, scabrid, having tendrils; brownish-yellow.

**Leaf** - petiole 3-8 cm long; somewhat twisted, wrinkled, scabrid, angular; brownish-yellow; lamina crimped, curled, corrugated, pale or light-green, 6-9 cm long and broad; palmately 5-7 angled or sub lobate, scabrid on both surfaces, base cordate, nerves and veins prominent beneath

**Flower** - Male flower in small racemes or single, calyx pubescent, 1.3 cm long, lobes lanceolate, light greenish-yellow; corolla yellow, 2 cm long, spreading, obovate; stamens 3; Female flower solitary, yellow; pedicel 5-10 cm long; ovary strongly ribbed; stigma, trifold.

**Fruit** - A pepo; 9-12 cm long, and 2-4 cm broad; cylindrical or club-shaped, obovate in shape, tapering towards the base; pale yellowish-brown; outer surface covered with 8-10 prominent longitudinal ribs; three chambers, inner part being fibrous and easily detachable as a whole from the outer part.

**Seed** - Ovoid-oblong, 0.6-0.8 cm long, and 0.5-0.6 cm wide; much compressed, slightly corrugated on the edges, black; taste, bitter.

#### b) Microscopic

**Root** - Shows wavy outline composed of cork cells, a few outermost layers of secondary cortex disintegrated, remaining outer cortical cells lignified, and a number of large, thinwalled, lignified, variously shaped stone cells with very wide lumen found; inner cortical cells thin-walled and parenchymatous; secondary phloem consisting of thin-walled cells of usual elements; secondary xylem tissues lignified traversed by multi seriate, radially elongated, thin-walled ray cells; xylem vessel simple pitted; a few simple, round to oval starch grains measuring 4-7  $\mu$  in dia., having striations and distinct hilum found in secondary cortex.

**Stem** - Shows 5 prominent ridges; epidermis single layered, covered by cuticle; cortex composed of 6 -10 or more layered, oval to polygonal, collenchyma cells under ridges, followed by 4-6 layered, compact band of thick-walled, polygonal, lignified cells; ground tissues composed of round to oval, thin-walled, parenchymatous cells, embedded with 10 bicollateral, open, conjoint, endarch vascular bundles, 5 of outer ring present opposite the ridges while rest 5 of the inner ring face the furrows; secondary phloem and xylem consisting of usual elements; xylem vessel bordered pitted; a few simple starch grains, round to oval, having striations with distinct hilum, measuring 5-8  $\mu$  in dia., found scattered in cortical and pith region.

#### **Leaf** -

**Petiole** - shows 6-7 prominent ridges having single layered epidermis, covered by thick cuticle; secondary cortex -wide in each ridge, composed of thin-walled, parenchymatous

cells; ground tissue a wide zone having 6 or 7 bicollateral, vascular bundles present in each ridge.

*Lamina* - shows single layered epidermis on both surfaces, having simple unicellular hairs with blunt tips and glandular hairs with unicellular stalk of variable length and spherical head having 3 or 4 cells; mesophyll differentiated into palisade and spongy parenchyma; vascular bundles bicollateral; stomata, anomocytic, present on both surfaces; stomatal number 59 - 64 on lower surface and 29 -39 on upper surface; stomatal index 13-14 on lower surface and 9-10 on upper surface; palisade ratio not over 3; vein islets number. 14-19 per sq. mm.

**Fruit** - Section shows irregular outline due to 8-10 prominent ribs; epicarp consist of single layered papillose epidermis covered with thick, striated cuticle having a few bristles, followed by 4-6 layers of thin-walled, tangentially elongated parenchymatous cells, some cells especially near the ribs, having brownish contents; below this thick-walled, polyhedral, continuous band of stone cells present, measuring 24-40  $\mu$  in dia.; outer 6-8 layers of this band consists of closely packed thick-walled sclereids, while the inner 2-4 layers, thick-walled and distinctly pitted; mesocarp broad, composed of a zone of rounded to tangentially elongated, parenchymatous cells having bicollateral vascular bundles, followed by 8-10 layers of thick-walled, polyhedral, sclerenchyma and fibres.

**Seed** - Testa consists of a single layer of rectangular, thick-walled, sclerenchymatous cells, followed by a tegmen, composed of 5 or 6 layered, oval to polygonal, parenchymatous cells and a single layered elongated, lignified, sclerotic palisade-like cells; endosperm composed of thin-walled, parenchymatous cells; cotyledons flat, consisting of thin-walled, oval to polygonal, parenchymatous cells.

**Powder** - Greyish-brown; shows fragments of cork cells, thick-walled, wavy or sinuous epidermal cells, lignified sclerotic or palisade-like cells of testa, sclerenchymatous cells, pieces of unicellular and glandular hairs, vessel with spiral and reticulate thickening, simple or groups of elongated, lignified stone cells, simple, rounded to oval starch grains having concentric striations and narrow hilum, measuring 4-7  $\mu$  in dia.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 4	per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (8:2) shows under UV (366 nm) four fluorescent zones at Rf. 0.34, 0.74, 0.80 and 0.91 (all blue). On exposure to Iodine vapour eight spots appear- at Rf. 0.13, 0.17, 0.34, 0.51, 0.65, 0.74, 0.78 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.34, 0.78 and 0.96 (all grey).

**CONSTITUENTS** - Bitter Principles, Saponins, Sapogenins and Fixed Oil.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Alpa Kaṣāya
Guṇa	:	Tīkṣṇa, Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Kaphapittaghna, Malaviśodhanī, Vamanopaga, Tridoṣahara

**IMPORTANT FORMULATIONS** - Abhayā Lavaṇa

**THERAPEUTIC USES** - Kuṣṭha, Pāṇḍu, Plīhāroga, Śōpha, Gulma, Ādhmāna, Garaviṣa, Arśa, Kāmālā, Gaṇḍamālā

**DOSE** - 5 - 10 g

## KUMUDĀ (Flower)

Kumudā consists of dried flowers of *Nymphaea alba* Linn. (Fam. Nymphaeaceae); a perennial aquatic herb, very common in ponds, streams and fresh water lakes and upto 1800 m.

### SYNONYMS

Sanskrit	:	Kumudam, Sitolpalam, Śaśikāntā, Śyāmavṛntā
Assamese	:	--
Bengali	:	Kumuda, Shandh Shaluka
English	:	Indian Blue Water Lily
Gujrati	:	Piyanu
Hindi	:	Kui, Kanval, Kokka
Kannada	:	Bilenaydile, Biletavare
Kashmiri	:	--
Malayalam	:	Ampal
Marathi	:	Kamod
Oriya	:	--
Punjabi	:	--
Tamil	:	Nalla Kalav, Vellampal, Allittamarai
Telugu	:	Allikada, Tellakaluva
Urdu	:	Kamal

### DESCRIPTION

#### a) Macroscopic

Flower white, solitary, 10-13 cm across; sepals 4, outside greenish to brownish, inside whitish; petals about 10, white; stamens many, outer ones being transformed successively from petals; anthers linear small without appendages; pistil syncarpous, carpels 10-16, sunk in fleshy disk, ovary multicellular and crowned by a large stigma with 16 rays, each with a cylindrical appendages, ovules many, fruit a berry.

## b) Microscopic

**Powder** - Light-brown; shows polygonal, thin-walled epidermal cells in surface view, stellate hairs and spherical or trigonal pollen grains, measuring 11-24  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	9	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (85 : 15) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.66 (red), 0.77 (blue) and 0.88 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.66, 0.92 and 0.96 (all brown).

**CONSTITUENTS** - Alkaloids and Glycosides.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu, Snigdha, Picchila
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura

**Karma** : Vātahara, Pittahara, Stambhana, Hṛdya, Garbha Sthāpana, Balya,  
Śramahara

**IMPORTANT FORMULATIONS** - Triphalādi Taila, Balāśvagandhalākṣādi Taila

**THERAPEUTIC USES** - Raktadoṣa, Dāha, Hṛdroga, Raktapitta

**DOSE** - 3-6 g

## KUŚĀ (Root Stock)

Kuśā consists of dried root stock of *Desmostachya bipinnata Stapf.* (Fam. Poaceae); a tall, tufted, perennial grass, 30-150 cm high, found throughout the country in hot and dry places.

### SYNONYMS

Sanskrit	:	Yagyabhūṣaṇa, Sūcyagra
Assamese	:	Kush
Bengali	:	Kush
English	:	Saved Gram
Gujrati	:	Dabb
Hindi	:	Kush
Kannada	:	Darbha Hullu
Kashmiri	:	--
Malayalam	:	Darbha, Darbhapullu
Marathi	:	Darbha
Oriya	:	Kusha
Punjabi	:	Kush, Dale
Tamil	:	Darbaipul
Telugu	:	Darbhadaddi
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Drug occurs in 6-20 cm long, 0.3-0.5 cm thick cut pieces, almost cylindrical; internodes smooth, stout, mostly covered with shining sheath, having distinct nodes; brownish-yellow; a few thin, fibrous, ash coloured roots arise at nodes; fracture, short.

## b) Microscopic

Root stock shows single layered epidermis, covered with striated cuticle; hypodermis composed of 3-5 layered, circular to polygonal, sclerenchymatous cells; cortex consisting of 5-9 layered, circular parenchymatous cells with small intercellular spaces; a few collateral vascular bundles found scattered in this zone, followed by 5-8 layered, discontinuous sclerenchymatous ring; ground tissue composed of continuous mass of slightly thick-walled, non-lignified, parenchymatous cells; numerous, collateral, vascular bundles found scattered in this zone and each covered by sclerenchymatous sheath; xylem vessels simple pitted; starch grains simple round to oval, with centric hilum, measuring 8-14  $\mu$  in dia., and compound having two components, found scattered in hypodermis, cortex and ground tissues.

**Powder** - Yellowish-brown; shows fragments of circular to polygonal sclerenchymatous cells with distinct lumen and striations; long, pointed fibres; simple pitted xylem vessels; starch grains simple round to oval with centric hilum measuring 8-14  $\mu$ . in dia. and compound having two components.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. (366 nm) seven fluorescent zones at Rf. 0.06, 0.15, 0.24, 0.36, 0.64, 0.83 and 0.94 (all blue). On exposure to Iodine vapour twelve spots appear at Rf. 0.06, 0.15, 0.24, 0.36, 0.47, 0.55, 0.64, 0.70, 0.76, 0.83, 0.90 and 0.94 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C eight spots appear at Rf. 0.15, 0.24, 0.36, 0.64, 0.76, 0.83, 0.90 and 0.94

(all grey).

CONSTITUENTS - Terpenes.

#### PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Kaphapittahara, Mūtrala

IMPORTANT FORMULATIONS - Karpūrādyarka, Sukumāra Ghṛta, Aśmarīhara Kaṣāya Cūrṇa, Tṛṇapañcamūla Kvātha Cūrṇa, Mūtravirecanīya Kaṣāya Cūrṇa, Stanyajanana Kaṣāya Cūrṇa

THERAPEUTIC USES - Mūtrakṛcchra, Visarpa, Dāha, Aśmarī, Tṛṣṇā, Bastiroga, Pradararoga, Raktapitta

DOSE - 50-100 g of powder for decoction.

## LĀṄGALĪ (Tuberous Root)

Lāṅgalī consists of dried tuberous root of *Gloriosa superba* Linn. (Fam. Liliaceae) a climber with leaf tendril and large, solitary or corymbose, showy flowers with perianth segments having wavy margins, greenish at first, later becoming yellow and finally scarlet or crimson coloured, and found wild throughout the tropical regions upto 2,000 m.

### SYNONYMS

Sanskrit	:	Kalihārī, Garbhanut, Halinī, Agniśikhā
Assamese	:	--
Bengali	:	Bisalanguli
English	:	Glory Lily
Gujrati	:	Khadiyanag
Hindi	:	Kalihari
Kannada	:	Kolikutumana Gade
Kashmiri	:	--
Malayalam	:	Mathonni
Marathi	:	Karianag
Oriya	:	--
Punjabi	:	Kariyari
Tamil	:	Kizhangu, Kalappai
Telugu	:	Potthidumpa
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Tuberous roots thick, almost cylindrical or slightly laterally flattened, occurring in pieces of 15-30 cm long and 2.5 - 3.8 cm thick, often bifurcated with tapering ends, resembling a plough-share, one arm generally more than double the length of the other;

brownish externally and yellowish internally; fracture, short; taste, acrid and bitter.

#### b) Microscopic

Tuberous root shows single layered epidermis, externally cuticularised, consisting of rectangular cells, followed by ground parenchyma, with scattered small vascular bundles; parenchyma cells large, thin-walled, polygonal to circular, having conspicuous intercellular spaces, most of the cells specially of the outer layers filled with starch grains, simple, round to oblong, or polyhedral, measuring 8-33  $\mu$  in dia., showing clear hilum and concentric striations, occasionally compound with 2-3 components, measuring 24-36  $\mu$  in dia.; vascular bundles collateral, numerous, scattered throughout ground tissue, consisting of xylem and phloem; each vascular bundle enclosed by sclerenchymatous sheath, xylem composed of vessels, tracheids and parenchyma; vessels having mostly reticulate thickening, smaller ones having spiral thickening, tracheids with reticulate thickening; xylem parenchyma cells usually rectangular; phloem consisting of sieve tubes, companion cells and phloem parenchyma; phloem parenchyma cells very small and thin-walled.

**Powder** - Brown; shows fragments of parenchyma cells, simple starch grains, round to oblong or polyhedral measuring 8-33  $\mu$  dia. showing clear hilum and concentric striations, occasionally compound with 2-3 components, measuring 24-36  $\mu$  in dia., sclerenchymatous cells, a few xylem vessels and tracheids.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9

: 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.24 (blue), 0.88 and 0.94 (both black). On exposure to Iodine vapour eight spots appear at Rf. 0.09, 0.16, 0.24, 0.38, 0.59, 0.75, 0.88 and 0.94 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid two spots appear at Rf. 0.88 and 0.94 (both orange).

CONSTITUENTS - Alkaloids and Resins.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya, Kaṭu
Guṇa	:	Sara, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Pittahara, Kaphahara, Garbhapātana

IMPORTANT FORMULATIONS - Nirguṇḍī Taila, Kāsisādī Taila, Mahā Viṣagarbha Taila

THERAPEUTIC USES - Kuṣṭha, Śopha, Arśa, Vraṇa, Śūla, Kṛmi, Bastiśūla, Garbha, Śalya, Vātavyādhi

DOSE - 125-250 mg of purified drug.

## LAŚUNA (Bulb)

Laśuna consists of bulb of *Allium sativum* Linn. (Fam. Liliaceae); a perennial bulbous plant, cultivated as an important condiment crop in the country.

### SYNONYMS

Sanskrit	:	Rasona, Yavaneṣṭa
Assamese	:	Maharu
Bengali	:	Lasun
English	:	Garlic
Gujrati	:	Lasan, Lassun
Hindi	:	Lahasun
Kannada	:	Bulluci
Kashmiri	:	--
Malayalam	:	Vellulli, Nelluthulli
Marathi	:	Lasun
Oriya	:	--
Punjabi	:	Lasan
Tamil	:	Vellaipoondu
Telugu	:	Vellulli, Tellapya, Tellagadda
Urdu	:	Lahsan, Seer

### DESCRIPTION

#### a) Macroscopic

Drug occurs as entire bulb or isolated cloves (bulblets); bulb sub-globular, 4-6 cm in diameter, consisting of 8-20 cloves, surrounded by 3-5 whitish papery membranous scales attached to a short, disc-like woody stem having numerous, wiry rootlets on the under side; each clove is irregularly ovoid, tapering at upper end with dorsal convex surface, 2-3 cm long, 0.5 - 0.8 cm wide, each surrounded by two very thin papery whitish and brittle scales having 2-3 yellowishgreen folded leaves contained within two white fleshy, modified leaf

bases or scales; odour, peculiarly pungent and disagreeable; taste, acrid gives warmth to the tongue.

#### b) Microscopic

A clove of bulb shows tri to tetragonal appearance in outline; outer scale consists of an outer epidermis, followed by hypodermal crystal layer, mesophyll made of parenchyma cells and an inner epidermis; both outer and inner epidermis consists of sub rectangular cells; hypodermis consists of compressed, irregular, tangentially elongated cells, each cell having large prismatic crystals of calcium oxalate, while many cells contain small prismatic crystals also, mesophyll several layers of parenchymatous cells having a few vascular tissues with spiral vessels; inner epidermis similar to outer one; inner scale similar to outer scale but outer epidermis composed of sclerenchymatous cells; prismatic crystals in hypodermis slightly smaller.

In surface view cells of outer epidermis elongated, narrow with thin porous wall while those of inner epidermis similar to outer one but non-porous; cells of hypodermal crystals layer ellipsoidal with thick porous walls, each cell having large prismatic crystals of calcium oxalate, many cells also contain small prismatic crystals in addition to bigger ones; inner scale shows markedly sclerenchymatous cells with greatly thickened walls and very narrow lumen; cells of hypodermal crystal layer somewhat smaller with walls more frequently pitted, size of crystals also smaller.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	60	per cent, Appendix	2.2.7.
Volatile Oil	Not less than	0.1	per cent, Appendix	2.2.10.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Isopropanol Acetic acid: Water (3 : 1: 1 : 1) shows under UV (366 nm) two fluorescent zones at Rf. 0.58 and 0.72 (both light blue). On exposure to Iodine vapour nine spots appear at Rf. 0.18, 0.26, 0.34, 0.38, 0.46, 0.58, 0.72, 0.77 and 0.93 (all yellow): On spraying with Ninhydrin reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.26, 0.38, 0.46, 0.58, 0.67, 0.72 and 0.93 (all pink). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.26, 0.38, 0.46, 0.58, 0.67, 0.72 and 0.93 (all gery).

**CONSTITUENTS** - Volatile Oil containing Allyl Disulphide and Diallyl Disulphide. It also contains Allin, Allicin, Mucilage and Albumin.

#### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Madhura  
**Guṇa** : Guru, Snigdha, Tīkṣṇa, Sara, Picchila  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Pitta dūṣanakara, Raktadoṣahara, Bhagnasandhānakara, Dīpana, Rasāyana, Balya, Hṛdya, Vṛṣya, Varṇya, Medhya, Jantughna, Kaṇṭhya, Asthi Māmsa Sandhānakara, Cakṣuṣya

**IMPORTANT FORMULATIONS** - Laśunādi Vaṭī, Laśunādi Ghr̥ta, Vacā Laśunādi Taila

**THERAPEUTIC USES** - Jīrṇa, Jvara, Kṛmiroga, Gulma, Kuṣṭha, Arśa, Kāsa, Śvāsa, Pīnasa, Śūla, Karṇaśūla, Vātavyādi, Hikkā, Medoroga, Yoni Vyāpat, Visucikā, Plīhā Vṛddhi, Kṣaya, Viṣama Jvara, Apasmāra, Unmāda, Śvāsa, Śopha, Hṛdroga, Vātaśūla, Trikaśūla, Vraṇa Kṛmi

**DOSE** - 3 g of the drug.

## MAHĀBALĀ (Root)

Mahābalā consists of dried roots of *Sida rhombifolia* Linn. (Fam. Malvaceae), an erect annual or perennial undershrub, 1.5 m high, distributed throughout the country especially in moist regions, ascending to an altitude of 1800 m in the Himalayas.

### SYNONYMS

Sanskrit	:	Atibalā, Pītapuṣpi
Assamese	:	--
Bengali	:	Pitabedala, Kheriti
English	:	Country Mallow
Gujrati	:	Mahabala
Hindi	:	Pitabala, Pitabariyar
Kannada	:	Kisangihettutti-gida
Kashmiri	:	--
Malayalam	:	Anakkuruntotti
Marathi	:	Mahbala
Oriya	:	--
Punjabi	:	Khurunti
Tamil	:	Kurunthotti
Telugu	:	Gubatada, Pedda Mutheera Pulagum
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Drug occurs as entire root or cut pieces of varying lengths, 7-8 mm in thickness, with wavy lateral roots comparatively thinner than main roots having numerous rootlets, brownish-yellow, surface, rough due to scars of small rootlets and lenticels; fracture, hard and splintery.

## b) Microscopic

Mature root shows cork consisting of 3-10 rows of narrow, rectangular, tangentially elongated, thin-walled, parenchymatous cells, a few containing rosette crystals of calcium oxalate; secondary phloem composed of phloem fibres in wedged shaped patches with thin-walled parenchyma in between; phloem rays thin-walled, tangentially elongated towards secondary cortex; a few rosette crystals of calcium oxalate found scattered in phloem parenchyma; secondary xylem composed of vessels, fibre, parenchyma and rays; vessels arranged in radial rows, fibres moderately long, thick-walled, lignified with wide lumen and pointed apex; xylem rays 2-3 cells wide, a few containing rosette crystals of calcium oxalate; in Bala (*S. cordifolia* Linn.) 1-3 cells wide with rosette crystals of calcium oxalate; 1 or 2 cells wide with rhomboidal crystals of calcium oxalate in Atibala (*Abutilon indicum* Sw.), and rosette crystals of calcium oxalate present in secondary cortex and absent in xylem rays in Nagabala (*S. veronicaefolia* Lam.).

**Powder** - Creamish-grey; shows moderately large, thick-walled, lignified fibres, with wide lumen and pointed tips, fragments of cork cells simple, pitted vessels and a few rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (8 : 2) shows under U.V. (366 nm) five fluorescent zones at Rf. 0.08 (blue), 0.35 (blue), 0.46 (blue), 0.78 (blue) and 0.95 (pink). On exposure to Iodine vapour eight spots appear at Rf. 0.08, 0.15, 0.39, 0.50, 0.66, 0.81, 0.89 and 0.99 (all yellow). On spraying with Dragendorff

reagent followed by 5% Methanolic-Sulphuric acid reagent two spots appear at Rf. 0.04 and 0.74 (both orange).

CONSTITUENTS - Alkaloids (Vasicinone and Vasicine).

#### PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Guru, Snigdha, Picchila
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātaghna, Pittaghna, Grāhī, Śukravṛddhikara, Ojovardhaka, Kāntivardhaka, Balya

IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila, Navratnarājamṛgāṅka Rasa

THERAPEUTIC USES - Śukrakṣaya, Kṣata, Kṣaya, Viṣamajvara, Daurbalya, Vātavyādhi, Vātarakta, Raktapitta, Śopha

DOSE - 3-6 g of the drug in powder form.

## MAÑJIṢṬHĀ (Stem)

Mañjiṣṭhā consists of dried stem of *Rubia cordifolia* Linn. (Fam. Rubiaceae); a perennial herbaceous prickly creeper or climber upto 10m long, found throughout the country ascending to 3750 m.

### SYNONYMS

Sanskrit	:	Yojnavallī, Vastrarajinī, Rakta
Assamese	:	Phuvva
Bengali	:	Manjistha, Manjith
English	:	Indian Maddar
Gujrati	:	Manjitha
Hindi	:	Manjitha, Manjit
Kannada	:	Manjustha
Kashmiri	:	--
Malayalam	:	Manjatti
Marathi	:	Manjihtha
Oriya	:	--
Punjabi	:	Manjistha, Manjit
Tamil	:	Manjitte
Telugu	:	Manjishtha
Urdu	:	Majeeth

### DESCRIPTION

#### a) Macroscopic

Stem slender, more or less cylindrical, slightly flattened, wiry, about 0.5 cm thick, brown to purple coloured; surface scabrous, stiff and grooved with longitudinal cracks; prickles present in the immature stem; nodes distinct having two leaf scars, one on either side; fracture, short.

## b) Microscopic

Mature stem shows exfoliating cork, ruptured at places, forming dome-shaped structure, consisting of 3-12 or more layered radially arranged, squarish and tangentially elongated, thin-walled cells, appearing polygonal in surface view; secondary cortex 3-5 layered consisting of tangentially elongated, thin-walled cells, some of which contain acicular crystals of calcium oxalate as isolated or in bundles; a few cells contain sandy crystals as black granular masses; secondary phloem, a wide zone of reddish colour, composed of sieve elements and phloem parenchyma, fibres absent; phloem parenchyma smaller towards inner side gradually becoming larger and tangentially elongated towards periphery, a few cells contain sandy crystals of calcium oxalate; secondary xylem forms a continuous cylinder of reddish colour, composed of vessels, tracheids, fibres and xylem parenchyma; vessels numerous, distributed uniformly throughout xylem, larger towards outer side and smaller towards centre; in macerated preparation, vessels show great variation in shape and size having lignified walls and pitted thickening; xylem fibres thick-walled, long and short, longer ones have narrow lumen while shorter ones have wide lumen with pitted thickenings; xylem parenchyma also vary in shape and size having pitted or reticulate thickening; centre occupied by narrow pith consisting of thinwalled, parenchymatous cells, a few cells contain sandy crystals of calcium oxalate.

**Powder - Pink;** shows numerous fragments of cork, lignified xylem vessels, tracheids, and fibres with pitted and reticulate xylem parenchyma having red coloured contents; acicular and sandy crystals as black granular masses.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid : Water (4: 1 :5) shows in visible light two spots at Rf. 0.92 (grey) and 0.98 (green). Under UV (366 urn) two fluorescent zones are visible at Rf. 0.92 (grey) and 0.98 (pink). On exposure to Iodine vapour six spots appear at Rf. 0.28, 0.37, 0.53, 0.72, 0.92 and 0.98 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C six spots appear at Rf. 0.28, 0.37 (both grey), 0.53 (bluish grey), 0.72 (grey), 0.92 (grey) and 0.98 (violet)

CONSTITUENTS - Glycosides

#### PROPERTIES AND ACTION

Rasa : Kaṣāya, Tikta, Madhura  
Guṇa : Guru  
Vīrya : Uṣṇa  
Vipāka : Kaṭu  
Karma : Kaphapittaśāmaka, Varṇya, Svarya, Viṣa, Śoṭhaghna, Kuṣṭhaghna, Pramehaghna, Vṛṣya, Kṛmighna, Stambhana, Ārtavajanana, Rasāyana, Śoṇitasthāpana

IMPORTANT FORMULATIONS - Aravindāsava, Aśvagandhāriṣṭa, Uśīrāsava, Candanāsava, Bṛhanmanjiṣṭhādi Kvātha, Mañjiṣṭhādi Taila, Khadirādi Guṭikā (Mukha)

THERAPEUTIC USES - Yoni Roga, Akṣi Roga, Śleṣmaja Śoṭha, Karṇa Roga, Mañjiṣṭhā Meha, Raktātisāra, Kuṣṭha, Visarpa, Prameha, Sarpaviṣa, Bhagna, Arśa, Vyāṅga

DOSE - 2-4 g of the drug.

## MARICA (Fruit)

Marica consists of fully mature dried fruit of *Piper nigrum* Linn. (Fam. Piperaceae); a climber, cultivated from Konkan Southwards, especially in North Konkan Kerala, and also in Assam; fruits ripen from December to March, depending upon climatic conditions; fruits harvested from December to April.

### SYNONYMS

Sanskrit	:	Vellaja, Kṛṣṇa, Uṣaṇa
Assamese	:	--
Bengali	:	Golmorich, Kalamorich, Morich
English	:	Black Pepper
Gujrati	:	Kalimori
Hindi	:	Kalimirch
Kannada	:	Karimonaru, Menaru
Kashmiri	:	--
Malayalam	:	Kurumulaku
Marathi	:	Kalamiri
Oriya	:	--
Punjabi	:	Galmirich, Kalimirch
Tamil	:	Milagu
Telugu	:	Miriyalu, Marichamu
Urdu	:	Filfil Siyah, Kalimirich

### DESCRIPTION

#### a) Macroscopic

Fruits greyish-black to black, hard, wrinkled, 0.4-0.5 cm in dia.; odour, aromatic; taste, pungent.

## b) Microscopic

Fruit consists of a thick pericarp for about one third of fruit and an inner mass of perisperm, enclosing a small embryo; pericarp consists of epicarp, mesocarp and endocarp; epicarp composed of single layered, slightly sinuous, tabular cells forming epidermis, below which, are present 1 or 2 layers of radially elongated, lignified stone cells adjacent to group of cells of parenchyma; mesocarp wide, composed of band of tangentially elongated parenchymatous cells having a few isolated, tangentially elongated oil cells present in outer region and a few fibro-vascular bundles, a single row of oil cells in the inner region of mesocarp; endocarp composed of a row of beakershaped stone cells; testa single layered, yellow coloured, thick-walled sclerenchymatous cells; perisperm contains parenchymatous cells having a few oil globules and packed with abundant, oval to round, simple and compound starch grains measuring 5.5-11.0  $\mu$  in dia.; having 2-3 components and a few minute aleurone grains.

**Powder** - Blackish-grey; shows debris with a characteristic, in groups, more or less isodiametric or slightly elongated stone cells, interspersed with thin-walled, polygonal hypodermal cells; beaker-shaped stone cells from endocarp and abundant polyhedral, elongated cells from peri sperm, packed tightly with masses of minute compound and single, oval to round, starch grains measuring 5.5-11.0  $\mu$  in dia.; having 2-3 component and a few aleurone grains and oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (7 :



Rf. of Piperine: Approximately 0.5 in case of hand made plates

CONSTITUENTS - Alkaloids (Piperine, Chavicine, Piperidine, Piperetine) and essential Oil.

#### PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta  
Guṇa : Laghu, Rūkṣa, Tīkṣṇa  
Vīrya : Uṣṇa  
Vipāka : Kaṭu  
Karma : Śleṣmahara, Pittakara, Kaphavātajit, Vātahara, Chedana, Dīpana, Rucya, Jantunāśana, Medohara, Chedi, Hṛdroga, Vātaroga

IMPORTANT FORMULATIONS - Maricādi Guṭikā, Maricādi Taila, Trikaṭu Cūrṇa

THERAPEUTIC USES - Śvāsa, Śūla, Kṛmiroga, Tvagroga

DOSE - 250 mg - 1 g of the drug in powder form.

## MĀṢAPARNĪ (Whole Plant)

Māṣaparnī consists of dried whole plant of *Teramnus labialis Spreng.* (Fam. Fabaceae), a very variable climbing or spreading hairy herb, found throughout the country.

### SYNONYMS

Sanskrit	:	Mahāsahā, Sūryasani, Kāmboj, Paṇḍutomaśa Paṣṇī
Assamese	:	--
Bengali	:	Mashance, Bankalaai, Mashani
English	:	Vogel-Tephrosis
Gujrati	:	Banudad, Janglee Adad
Hindi	:	Mashvan, Banvdad, Mashoni
Kannada	:	Kadu Uddu
Kashmiri	:	--
Malayalam	:	Katu Ulandu
Marathi	:	Ran Udid
Oriya	:	--
Punjabi	:	Jangali Urad
Tamil	:	Kattu-Ulandu
Telugu	:	Karuminum, Mashperni
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap root with lateral roots occurs in cylindrical, branched pieces, 3-5 cm long, and upto 1cm in dia., light brown to dark brown, with longitudinal and transverse cracks; lateral roots thin, smooth, moderately woody; fracture, laminated and short.

**Stem** - Cut pieces 5-8 cm long, upto 0.8 cm in dia, somewhat twisted and branched, or cylindrical, slender, rough due to cracks and longitudinal ridges and furrows, brownishgrey;

fracture, short and fibrous.

**Leaf** - Trifoliolate, leaflet ovate-oblong, 6-12 cm long, base round or acute, light brownish-yellow.

**Flower** - Lax axillary racemes, 5-15 cm long, flowers red, pink, purple or white, slender, more or less hairy rachis.

**Fruit** - Pod upto 5 cm long, straight or sometimes slightly recurved, brownish-black to dark brown, having 6-8 or 12 seeds.

**Seed** - Oblong, cylindrical, slightly rounded at the ends; 2-3 mm long upto 2 mm in dia.; dark brown.

#### b) Microscopic

**Root** - Poorly developed cork, 4-10 layered, consisting of tangentially elongated cells with brown walls, exfoliating strips of crushed cork cells occasionally present; secondary cortex consisting of 3-8 rows of tangentially elongated, thin-walled cells; secondary phloem appearing dome-shaped, composed of sieve tubes, companion cells, parenchyma, fibres, and crystal fibres, the whole being traversed by phloem rays that funnel out beyond phloem; phloem parenchyma thin-walled, polygonal; phloem fibres numerous, lignified, thick-walled, septate, occur mostly in groups, among phloem parenchyma; crystal fibres present containing a prismatic crystal of calcium oxalate; cambium not distinct; secondary xylem consisting of vessels, fibres and crystal fibres all traversed by xylem rays; vessels solitary or in groups of 2-3 with pitted thickenings; tracheids present, fibres septate with thick-walls and pointed; xylem parenchyma non-lignified, thick-walled elongated cells; crystal fibres, elongated, thick-walled, divided by transverse partitions into chambers, each chamber containing a prismatic crystal of calcium oxalate; xylem rays, 1 to 6 cells wide, thin-walled radially elongated; prismatic crystals of calcium oxalate, and starch grains present in secondary cortex, phloem fibres, phloem parenchyma and medullary rays; starch grains, numerous, mostly simple, rarely compound, oval to rounded with central hilum measuring 3-14  $\mu$  in dia.

**Stem** - Shows 6-11 layers, thin-walled, rectangular, exfoliated cork cells; secondary cortex consisting of thin-walled, oval to rectangular, parenchymatous cells having numerous groups of cortical fibres, arranged in radial rows; pericycle composed of isolated strands of fibres, occasionally with stone cells between them; secondary phloem composed of usual elements along with secretory cells; secondary xylem composed of usual elements; xylem

fibres long, lignified; vessels simple pitted; ray 1 or 2 cells wide, pith composed of oval to polygonal, thin-walled, parenchymatous cells containing secretory cells.

**Leaf -**

*Midrib* - single layered epidermis covered by thick cuticle, and having a few unicellular hairs on both surfaces; this is followed by 4 or 5 layered, thick-walled polygonal, collenchymatous cells on both lower and upper surfaces; 2 or 3 layers of oval to polygonal, thin-walled parenchymatous cells present on both surfaces; 'U' shaped vascular bundles having usual elements.

*Lamina* - single layered epidermis covered by thick striated cuticle and having a few unicellular hairs on both surfaces; single layered palisade cell; 1 or 2 layers of thinwalled, polygonal parenchymatous cells containing chlorophyll on lower surface, a few small vascular bundles having usual elements scattered in central regions; stomata paracytic on both surfaces; stomatal index 28-34 on lower surfaces and 18-24 on upper surfaces; palisade ratio not more than 5; vein-islet number 6-8; veinlet termination number not more than 4.

**Fruit** - Single layered, thick-walled, radially elongated, epidermal cells, followed by one row of thick-walled, rounded to rectangular, stone cells of various sizes having narrow, lumen and centric striations, 3 or 4 layers of thin-walled radially elongated, parenchymatous cells and several layers of thick-walled, lignified sclerenchymatous cells of mesocarp.

**Seed** - Testa containing thick-walled, tangentially elongated, lignified, sclerenchymatous cells, followed by 2 layers of thin-walled, palisade-like cells, palisade internally supported by a single layered bearer cells; cotyledons consist of oval to polygonal, thin walled parenchymatous cells.

**Powder** - Light yellowish-cream; shows fragments of cork, parenchyma, tracheids, unicellular hairs, thick-walled, elongated, polygonal cells of testa, simple pitted vessel, septate, thick-walled and pointed fibres; prismatic crystals of calcium oxalate, simple, oval to rounded starch grains measuring 3 -14  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) seven fluorescent zones at Rf. 0.05, 0.10, 0.15 (all blue), 0.26 (light blue), 0.49, 0.74 (both blue) and 0.85 (light blue). On exposure to Iodine vapour four spots appear at Rf. 0.05, 0.10, 0.33 and 0.69 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110° C four spots appear at Rf. 0.05, 0.10, 0.33 (all violet) and 0.96 (dark violet).

CONSTITUENTS - Glycosides.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātapittaśāmaka, Kaphavardhaka, Grāhī, Balya, Vṛṣya, Śukrala

IMPORTANT FORMULATIONS - Amṛtaprāśa Ghṛta, Aśoka Ghṛta, Vidāryādi Ghṛta, Dhānavantara Ghṛta, Nārāyaṇa Taila, Bṛhat Māṣa Taila, Balā Taila, Mahā Nārāyaṇa Taila

THERAPEUTIC USES - Atīsāra, Pravāhikā, Vātapitta Jvara, Śukrālpata, Raktapitta, Raktavikāra, Dāha, Śoṭha, Śiraḥśūla

DOSE - 5-10 g of the powder.

## MASŪRA (Seed)

Masūra consists of dried seed of *Lens culinaris* Medic. (Fam. Fabaceae), a small, erect, pubescent herb, 15-75 cm high, cultivated throughout north India, particularly in Uttar Pradesh, Madhya Pradesh, Bihar and West Bengal, and to a smaller extent in Punjab, Rajasthan, Maharashtra and Gujarat.

### SYNONYMS

Sanskrit	:	Supya, Pittabheṣaja
Assamese	:	--
Bengali	:	Masuri
English	:	Lentil
Gujrati	:	Masura, Masoor, Masur
Hindi	:	Masur
Kannada	:	Masura Bele
Kashmiri	:	--
Malayalam	:	Chanam payar, Vattupparupu
Marathi	:	Masur, Massora
Oriya	:	--
Punjabi	:	Masur, Masara
Tamil	:	Masoor Paruppu
Telugu	:	Masura Pappu, Masooralu
Urdu	:	Masur

### DESCRIPTION

#### a) Macroscopic

Seed lens-shaped, smooth, about 4 mm thick, greyish-brown and faintly mottled, cotyledons pink; taste, characteristic.

## b) Microscopic

Seed testa consists of a single layer of epidermis composed of palisade-like cells, columnar and sclerenchymatous, with a tiny projection and shows a light, transparent line; below this, a single layer of hypodermis consisting of beaker or dumbbell shaped cells present; testa followed by cotyledons, consisting of a thin layer of upper and lower epidermis covered with a thin layer of cuticle; epidermis made up of rectangular cells oriented along their long axis; below epidermis, mesophyll consists of thin-walled, rounded or oval shaped, parenchymatous cells, generally filled with simple, round to oval, starch grains many with striations showing a fissured hilum; mostly measuring between 30-40 $\mu$  in dia.

**Powder** - Cream coloured; shows black particles due to pieces of testa; fragments of thick-walled, elongated, oval to polygonal cells of testa and a few sclerenchymatous cells in surface view; irregular, wavy palisade-like cells, and simple, round to oval, starch grains upto 40  $\mu$  in dia., with striations and a fissured hilum.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: water (4:1:5) shows on exposure to Iodine vapour six spots at Rf. 0.11, 0.40, 0.44, 0.50,

0.65 and 0.80 (all yellow). On spraying with Ninhydrin reagent and heating the plate for about ten minutes at 110°C seven spots appear at Rf. 0.11, 0.18, 0.24, 0.33, 0.44, 0.50 and 0.65 (all pink).

CONSTITUENTS - Flavonoids and Vitamins.

#### PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Samgrāhī, Kaphapittaśāma, Vātāmayakara, Varṇya, Balya

THERAPEUTIC USES - Atīsāra, Mūtrakṛcchra, Jvara, Raktapitta

DOSE - 10-20 g

## MUDGA (Seed)

Mudga consists of dried seeds of *Phaseolus radiatus* Linn. (Fam. Fabaceae); an erect or sub-erect, much branched, 0.5 -1.3 m tall, annual herb, extensively cultivated all over the country as a pulse crop.

### SYNONYMS

Sanskrit	:	Mungalya
Assamese	:	--
Bengali	:	Moong
English	:	Green Gram
Gujrati	:	Mug, Mag
Hindi	:	Munga
Kannada	:	Hesara, Hesoruballi
Kashmiri	:	--
Malayalam	:	Cherupayar
Marathi	:	Mung
Oriya	:	Muga, Jaimuga
Punjabi	:	Mungi, Munga
Tamil	:	Pattchai Payaru, Pasi Payaru, Siru Murg
Telugu	:	Pesalu, Pachha Pesalu
Urdu	:	Moong

### DESCRIPTION

#### a) Macroscopic

Seed small, globular, about 0.4 cm long roughly square, smooth with white lateral hilum; usually green but some times yellowish-green; odour, not distinct; taste, slightly sweet

## b) Microscopic

Seed coat shows a single layered, radially elongated, palisade-like cells, covered with a striated cuticle and supported internally by a single layered, thinwalled bearer cells, followed by 4-6 layered, thin-walled, tangentially elongated, elliptical, parenchymatous cells; cotyledons consist of oval or polygonal, thin-walled, parenchymatous cells having round to oval, simple, starch grains measuring 8-33  $\mu$  in dia. and rarely, oil globules.

**Powder** - Cream coloured; shows palisade-like cells, oval to polygonal, thin-walled, parenchymatous cells; round to oval, simple, starch grains measuring 8-33  $\mu$  in dia. and occasional oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10 per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under UV (366 nm ) four fluorescent zones at Rf. 0.56, 0.65, 0.82 and 0.95 (all blue). On exposure to Iodine vapour seven spots appear at Rf. 0.01, 0.34, 0.56, 0.65, 0.78, 0.86 and 0.95 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate for ten minutes at 105°C seven spots appear at Rf. 0.26 (grey), 0.34 (violet), 0.65 (pink), 0.73 (pink), 0.82 (violet), 0.91 (violet) and 0.95 (pink).

CONSTITUENTS - Saponin, Starch, Albuminoids and Oil.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Kaphahara, Grāhī, Balaprada, Varṇya, Netrya

IMPORTANT FORMULATIONS - Balāhaṭhādi Taila, Marma Guṭikā, Kāyasthyādi Varti

THERAPEUTIC USES - Jvara, Netra Roga, Amlapitta

DOSE - 50-100 g for yusa.

## MŪLAKA (Seed)

Mūlaka consists of dried seed of *Raphanus sativus* Linn. (Fam. Brassicaceae); a biennial herb, cultivated throughout India, upto 3000 m in the Himalayas and other hilly regions, for its roots.

### SYNONYMS

Sanskrit	:	Śālāmarkaṭaka, Visra, Śāleya, Marusambhava
Assamese	:	Mulo
Bengali	:	Mula
English	:	Radish
Gujrati	:	Mulo
Hindi	:	Muli
Kannada	:	Mullangi, Mugunigadde, Moolangi, Moolaogi
Kashmiri	:	--
Malayalam	:	Mullanki
Marathi	:	Mula
Oriya	:	Mula, Rakhyasmula
Punjabi	:	Moolak, Moolee, Moola
Tamil	:	Mullangi, Mulakam, Mullangu, Millangi
Telugu	:	Mullangi
Urdu	:	Turb, Mooli

### DESCRIPTION

#### a) Macroscopic

Seed reddish-brown, irregularly globose, sometimes flattened, 2-4 mm long and 2 mm wide; surface generally smooth and sometimes wrinkled and grooved at micropylar end; taste, oily.

#### b) Microscopic

Seed shows testa; consisting of single layer of nearly rectangular cells, covered with thin cuticle, followed by a layer of radially elongated, reddish-brown columnar cells, and integument 2-3 layers of compressed, thin-walled, parenchymatous cells; cotyledons and embryo consist of oval to polygonal, thin-walled, parenchymatous cells containing aleurone grains and oil globules.

**Powder** - Brownish-yellow; shows fragments of testa with hexagonal, thin-walled epidermis cells in surface view; oval to polygonal, thin-walled, parenchymatous cells of embryo and cotyledon; oil globules and aleurone grains present.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	5.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11 per cent, Appendix	2.2.7.

#### ASSAY

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) a fluorescent zone at Rf. 0.95 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.17, 0.31, 0.39, 0.70 and 0.95 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.17, 0.31, 0.39 and 0.95 (all violet).

CONSTITUENTS - Fixed Oil and Volatile Oil.

PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Kaṣāya

Guṇa : Laghu, Tīkṣṇa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Viṣahara, Vātaśleṣmahara, Hṛdya, Vahnidīpana, Kaṇṭhya, Grāhī,  
Kaphavātahara, Garbhāśayasāṅkocaka, Kaphanissāraka, Mūtrala, Pācaka, Vātānulomana, M  
ṛdurecaka

IMPORTANT FORMULATIONS - Sarṣpādi Lepa

THERAPEUTIC USES - Gulma, Hṛdroga, Kaṇṭha Roga, Sidhmakuṣṭha , Jvara, Śvāsa, Nāsikā  
Roga, Akṣi Roga, Anārtava

DOSE - 1-3 g of the drug in powder form.

## MUNḌĪTIKĀ (Leaf)

Munḍītikā consists of dried leaf of *Sphaeranthus indicus* Linn. (Fam. Asteraceae); an aromatic, much branched herb, 30-60 cm high found abundantly in damp and shady places in plains all over the country, ascending to an altitude of 1,500 m in the hills.

### SYNONYMS

Sanskrit	:	Munḍī, Śrāvaṇī, Kadamba, Puṣpikā, Alambusta
Assamese	:	Kamadarus
Bengali	:	Surmuriya, Chhagal Nadi, Mudmudiya
English	:	--
Gujrati	:	Gorakhmundi
Hindi	:	Mundi
Kannada	:	Mundi
Kashmiri	:	--
Malayalam	:	Mirnagnee, Atookamani, Mirangnee
Marathi	:	Mundi, Baras Bondi
Oriya	:	Buikadam
Punjabi	:	Gorakhmundi
Tamil	:	Kotook, Karandai, Kottakarthal
Telugu	:	Bodasaramu, Bodataramu
Urdu	:	Mundi

### DESCRIPTION

#### a) Macroscopic

Leaf sessile, decurrent, 2-7 cm long, 1-1.5 cm wide, obovate-oblong, narrowed to the base, dentate or serrate, hairy, greenish-brown; odour, slightly aromatic, but disappears on long storage; taste, bitter.

## b) Microscopic

### Leaf -

*Midrib* - Shows a single layered epidermis, covered with ordinary trichomes upto 5 cells high and glandular trichomes having unicellular stalk and group of 4-10 cells head, on both surfaces, followed in turn by 4-6 layered collenchyma and 3-4 layered parenchyma cells at both surfaces; vascular bundles 3-4, situated centrally having usual elements, xylem vessels arranged radially.

*Lamina* - Shows a single layered epidermis having numerous trichomes similar to those of midrib on both surfaces; mesophyll not differentiated into palisade and spongy parenchyma cells; stomata anisocytic present on both surfaces, stomatal index 32-38 on lower surface and 20- 29 on upper surface, stomatal number 47-54 on lower surface and 15-22 on upper surface, vein islet number 20-26.

*Powder* - Light greenish-brown; shows fragments of parenchyma, glandular hairs, multicellular trichomes, xylem vessels, polygonal, wavy, thin-walled epidermal cells in surface view, stomata, ordinary trichomes upto 5 cells high and glandular trichomes having unicellular stalk and a head of 4-10 cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	28	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (9 : 1) shows three spots at Rf. 0.27, 0.72 and 0.90 (all yellowish green) in visible light. Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.27, 0.42 (both blue). 0.54 (orange), 0.72 and 0.90 (both blue). On spraying with 5% Vanillin-Sulphuric acid reagent

and heating the plate at 110°C for ten minutes three spots appear at Rf. 0.27, 0.72 (both grey corresponding to Citral) and 0.96 (blue).

CONSTITUENTS - Essential Oil.

#### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Madhura, Tikta, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātakaphahara, Medhya, Arśadoṣa Vināśaka, Viṣaghna, .

IMPORTANT FORMULATIONS - Navaratnarājamṛgāṅka Rasa, Arka Muṇḍī

THERAPEUTIC USES - Gaṇḍamālā, Apacī, Kuṣṭha, Kṛmi, Pāṇḍu, Ślīpada, Medoroga, Apasmāra, Kāsa, Mūtrakṛcchra, Tvak Roga, Stana Śaithilya, Yonirogā, Āmātisāra, Āmaroga, Vātaroga, Gudaroga, Plīhāroga, Chardi, Āmavāta, Gātradaurgandhya, Sūryāvarta, Ardhāvabhedaka

DOSE - 3-6 g of the drug.

## MUSTĀ (Rhizome)

Mustā consists of dried rhizome of *Cyperus rotundus* Linn. (Fam. Cyperaceae); occurring throughout the country, common in waste grounds, gardens and roadsides, upto an elevation of 1800 m.

### SYNONYMS

Sanskrit	:	Mustaka, Vārīda
Assamese	:	Mutha, Somad Koophee
Bengali	:	Mutha, Musta
English	:	Nut Grass
Gujrati	:	Moth, Nagarmoth
Hindi	:	Motha, Nagarmotha
Kannada	:	Konnari Gadde
Kashmiri	:	--
Malayalam	:	Muthanga, Kari Mustan
Marathi	:	Moth, Nagarmoth, Motha, Bimbal
Oriya	:	--
Punjabi	:	Mutha, Motha
Tamil	:	Korai, Korai-Kizhangu
Telugu	:	Tungamustalu
Urdu	:	Sad Kufi

### DESCRIPTION

#### a) Macroscopic

Drug consists of rhizome and stolon having a number of wiry roots, stolon 10-20 cm long having a number of rhizomes, crowded together on the stolons, rhizomes bluntly conical and vary in size and thickness, crowned with the remains of stem and leaves forming a scaly covering, dark brown or black externally, creamish-yellow internally; odour, pleasant.

## b) Microscopic

Rhizome shows single layered epidermis, followed by 2-6 layers, suberised sclerenchymatous cells; epidermis and outer sclerenchymatous layers filled with dark brown content; ground tissue of cortex consists of circular to oval, thin-walled, parenchymatous cells with small intercellular spaces; a few fibro-vascular bundles present in this region; endoderm is distinct and surrounding the stele; wide central zone beneath endodermis, composed of circular to oval, thin-walled, parenchymatous cells with intercellular spaces, numerous collateral, closed, vascular bundles surrounded by bundle sheath, scattered in this region; vessels narrow having simple reticulate, and scalariform thickening and oblique pore; simple round to oval starch grains measuring 6-28  $\mu$  in dia., a number of pigmented cells filled with reddish-brown content, present throughout the cortex and stele.

**Powder** - Creamish-brown; shows reddish-brown cells, reticulate and simple pitted vessels; fibre-like, closely packed sclerified cells, narrow vessels with scalariform thickness and oblique pore from the remnants of leaves simple, round to oval, starch grains, measuring 6-28  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, Appendix	2.2.10.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) a fluorescent zone at Rf. 0.88 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.44, 0.55 and 0.73 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C three spots appear at Rf. 0.44, 0.55 and 0.73 (all violet).

## CONSTITUENTS - Volatile Oil

### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittakaphahara, Sthaulyahara, Śothahara, Dīpana, Pācana, Grāhī, Tṛṣṇānigrahaṇa, Kṛmighna, Tvak doṣahara, Jvaraghna, Viṣaghna

IMPORTANT FORMULATIONS - Mustakāriṣṭa, Mustakādi Kvātha, Aśokāriṣṭa, Mustakādi Cūrṇa, Mustakādi, Mustakādi Lehya, Dhānyapañcaka Kvātha Cūrṇa, Pīyūṣavallī Rasa, Gulma Kālānala Rasa, Mahālākṣādi Taila, Śaḍaṅgapānīya

THERAPEUTIC USES - Agnimāndya, Ajīrṇa, Tṛṣṇā, Jvara, Saṁgrahaṇī, Śvāsa, Kāsa, Mūtrakṛcchra, Vamana, Stanyavikāra, Sutikāroga, Atīsāra, Āmavāta, Kṛmiroga

DOSE - 3-6 g (Powder)

20-30 ml (Kwatha)

## NĀGAVALLĪ (Leaf)

Nāgavallī consists of leaf of *Piper betle* Linn. (Fam. Piperaceae); a dioecious, perennial creeper, climbing by many short adventitious rootlets, widely cultivated in hotter and damper parts of the country.

### SYNONYMS

Sanskrit	:	Tāmbulī
Assamese	:	Pan
Bengali	:	Pan
English	:	Betel Leaf
Gujrati	:	Pan
Hindi	:	Pan
Kannada	:	Veelyadele Ele
Kashmiri	:	--
Malayalam	:	Vettila
Marathi	:	Pan, Nagvel, Vidyachepan
Oriya	:	--
Punjabi	:	Pan
Tamil	:	Vettilai
Telugu	:	Tamulapaku, Tamalapaku
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Leaf varies greatly in size, 7.5-20.0 cm, ovate cordate, entire, glabrous, apex acuminate to acute, lamina membranous, upper surface deep green and lower surface lighter in colour, primary or sub-primary nerves usually 7, sometimes 5-9; odour, aromatic; taste, slightly pungent.

## b) Microscopic

### Leaf -

*Petiole* - Single layered epidermis composed of cubical to slightly tangentially elongated cells covered with thick, striated cuticle; epidermal cells elongate to form uni to bicellular, occasionally multicellular hairs; epidermis followed by a discontinuous collenchymatous zone in the form of arcs, and a multilayered parenchymatous zone; vascular bundles arranged in the arcs, phloem surrounds xylem; vascular bundles usually of two sizes larger ones 7 in number and smaller ones 2 in number.

*Midrib* - Epidermis single layered, composed of colourless cubical cells, covered with wavy cuticle; epidermis followed by 2-3 layers of irregular colourless cells of hypodermis and a few layers of collenchyma, towards lower side collenchyma multilayered; vascular bundle shows phloem surrounding xylem; lower epidermis single layered and covered with wavy cuticle; some epidermal cells elongate to form uni to bicellular-occasionally multicellular hairs.

*Lamina* - Shows dorsal ventral structure; epidermis single layered, tangentially elongated, covered with thick striated cuticle on both sides; hypodermis 2-3 layered; having chloroplasts, occasionally with secretory cells; mesophyll differentiated into palisade and spongy parenchyma; palisade single layered; spongy parenchyma 3-4 layered composed of irregularly round cells, a few secretory cells also present in this region; hairs a few uni to bicellular, occasionally multicellular, all being uniseriate present on both surfaces; stomata anisocytic palisade ratio not over 4; stomatal index 11-13; vein islet number 2-7.

*Powder* - Greyish-green; shows polygonal epidermal cells in surface view, simple pitted vessels and a few uni to tricellular hairs, anisocytic type of stomata, palisade and spongy parenchyma cells and simple pitted vessel.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.

Water-soluble extractive

Not less than 20 per cent, Appendix 2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows in visible light five spots at Rf. 0.11 (green), 0.18 (light green), 0.23 (yellow), 0.34 (grey) and 0.61 (greyish green). Under U.V. (366 nm) seven fluorescent zones are visible at Rf. 0.11, 0.16 (both pink), 0.23 (brown), 0.34 (pink), 0.43 (pink), 0.61 (pink) and 0.76 (grey). On exposure to Iodine vapour seven spots appear at Rf. 0.08, 0.11, 0.18, 0.34, 0.61, 0.76 and 0.88 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.08, 0.11, 0.18 (all the three greenish grey), 0.34 (grey), 0.43 (violet), 0.61 and 0.76 (both light green).

CONSTITUENTS - Essential Oil, Amino Acids, Vitamins and Enzymes.

### PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta, Kaṭu
Guṇa	:	Tīkṣṇa, Sara, Laghu, Viśada
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Rucya, Balya, Śleṣmahara, Mukhadaurgandhyahara, Mukhamalahara, Vātahara, Śramahara, Raktapittakara, Svaryam, Vṛṣya

IMPORTANT FORMULATIONS - Lokanātha Rasa, Puṣpadhanvā Rasa, Bṛhat Sarvajvarahara Lauha, Laghu Sutaśekhara Rasa, Bṛhat Viṣamajvarāntaka Rasa

THERAPEUTIC USES - Kaṇḍū, Hṛllāsa, Agnimāndya, Jvara, Hṛdroga, Svarabheda

DOSE - 10-20 ml of Swarasa.

## NĀRIKELA (Endosperm)

Nārikela consists of dried endosperm of *Cocos nucifera* Linn. (Fam. Areaceae), a tall palm, bearing a crown of large pinnate leaves, cultivated in coastal and deltaic regions of South India.

### SYNONYMS

Sanskrit	:	Nārikela, Tṛṇarāja
Assamese	:	Khopra
Bengali	:	Narkel, Narkel
English	:	Coconut Palm
Gujrati	:	Naliar, Nariyel, Shriphal, Koprūn
Hindi	:	Nariyal, Gola
Kannada	:	Khobbari, Tengnamara, Temgu, Thengu, Thenginamara
Kashmiri	:	--
Malayalam	:	Nalikeram, Ten, Thengu, Keram
Marathi	:	Naral
Oriya	:	Nariyal
Punjabi	:	Narela, Khopra, Garigola
Tamil	:	Tenkai, Kopparai
Telugu	:	Narikelamu, Tenkay, Kobbari
Urdu	:	Narjil, Narial

### DESCRIPTION

#### a) Macroscopic

Drug available whole as well as in broken pieces of endosperm, whole drug 8 -14 cm in size; ovoid, three angled, outer surface brown, somewhat rough due to shallow, reticulated striations; transversely broken; whole drug shows 0.8-1.2 cm thick, white endosperm and a large central cavity; fracture, short; odour, faint; taste, sweetish and oily.

#### b) Microscopic

Endosperm shows testa, consisting of irregularly arranged, brown, compact, parenchymatous cells; beneath testa a very wide zone, consisting of outer 2-3 layers, thin-walled, smaller and angular parenchymatous cells, followed by radially elongated, larger and thin-walled parenchymatous cells, containing numerous aleurone grains, raphides, prismatic crystals of calcium oxalate and oil globules.

Powder - White and oily; shows thin-walled. parenchymatous cells, fragments of polyhedral, thin-walled, testa cells in surface view, aleurone grains, oil globules, raphides, a few prismatic crystals of calcium oxalate and vessels.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Nil	Appendix	2.2.2.
Total Ash	Not more than	2.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	13 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10 per cent, Appendix	2.2.7.
Fixed oil	Not less than	59 per cent, Appendix	2.2.8

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (93 : 7) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.91 and 0.98 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.33, 0.91 and 0.98 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate at 105°C for fifteen minutes three spots appear at Rf. 0.33, 0.91 and 0.98 (all violet).

#### CONSTITUENTS - Fixed Oil.

## PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Guru, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātahara, Pittahara, Kaphakara, Balya, Vṛṣya, Bṛmhāṇa, Hṛdya, Bastiśodhaka, Viṣṭambhi

IMPORTANT FORMULATIONS - Nārikela Khaṇḍa, Nārikela Lavaṇa

THERAPEUTIC USES - Dāha, Kṣata, Kṣaya, Raktapitta, Tṛṣṇā, Śoṣa, Śūla

DOSE - 10-20 g of the drug in powder form.

## NICULA (Fruit)

Nicula consists of dried fruit of *Barringtonia acutangula* (Linn.) Gaertn. (Fam. Lecythidaceae); a moderate sized, evergreen, glabrous tree, fairly common in sub Himalayan tracts Bihar, Orissa, Bengal, Assam, Central and South India. It prefers moist situations but is not found in mangrove forests.

### SYNONYMS

Sanskrit	:	Hijjala, Vidula
Assamese	:	Hindole
Bengali	:	Hijjala
English	:	--
Gujrati	:	Samudraphala
Hindi	:	Hijjala, Samudraphala
Kannada	:	Nerruganegalu, Holegonvamara
Kashmiri	:	--
Malayalam	:	Manjal Kadamba, Manjal Kadam
Marathi	:	Samudraphala
Oriya	:	Kijolo
Punjabi	:	Samuderphal
Tamil	:	Samudrapullarni, Samutrapalam
Telugu	:	Kanapu, Kadaps
Urdu	:	Hijjal

### DESCRIPTION

#### a) Macroscopic

Fruit - A drupe, yellowish-brown, oblong, 2.5-3.3 by 1.00 - 1.3 cm, bluntly quadrangular, broadest in the middle, slightly narrow and truncate at each end, fibrous; no characteristic odour and taste.

Seed - Single, 2-2.5 by 0.7-1.0 cm, wrinkled longitudinally, dark brown in colour.

#### b) Microscopic

Fruit - Epicarp shows several layers of tangentially elongated, thin-walled parenchymatous cells; mesocarp composed of several layers of loosely arranged, thin-walled parenchymatous cells with intercellular spaces forming cavities; vascular bundles found scattered in this region; endocarp not distinct; a few rosette crystals of calcium oxalate in the form of irregular cluster, present in this region.

Seed - Shows two integuments, endosperm and embryo; outer integument consists of single layered epidermis, 2-3 layered sclereids and 7-10 layered closely arranged cells; vascular bundles also found scattered in this region; inner integument consists of 1-2 layered, crushed cells; endosperm and embryo consists of isodiametric cells having small intercellular spaces; abundant, irregular starch grains, single and compound found scattered in cells of endosperm simple, 4-27  $\mu$  in dia., round to oval.

Powder - Whitish-purple; shows a few parenchymatous, brown coloured cells rosettes of calcium oxalate crystals in cluster numerous simple and compound starch grains, measuring 4-27  $\mu$  in dia. a few xylem vessels with spiral thickening.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.56 (blue), 0.81

(black) and 0.94 (blue). On exposure to Iodine vapour eight spots appear at Rf. 0.41, 0.48, 0.56, 0.61, 0.81, 0.87, 0.92 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes eight spots appear at Rf. 0.14 (brown), 0.41, 0.48, 0.56, 0.61 (all violet), 0.87 (blue), 0.92 (violet) and 0.96 (brown).

CONSTITUENTS - Saponins and Sapogenins.

#### PROPERTIES AND ACTION

Rasa : Tikta, Kaṣāya, Kaṭu  
Guṇa : Rūkṣa, Laghu  
Vīrya : Uṣṇa  
Vipāka : Kaṭu  
Karma : Saṃgrāhī, Vraṇaśodhana, Kaphahara, Recaka, Rakśoghna, Viṣaghna, Vāmaka, Vātahara

IMPORTANT FORMULATIONS - Mahā Pañcagavya Ghṛta, Lakṣmī Vilāsa Rasa (Nāradīya), Nyagrodhādi Gaṇa Kvātha

THERAPEUTIC USES - Raktapitta, Āmātisāra, Caṣṣusrāva, Galagaṇḍa, Bhūtabādhā, Grahabādhā, Prameha

DOSE - 1-3 g

## NĪLĪ (Whole Plant)

NĪlĪ consists of dried whole plant of *Indigofera tinctoria* Linn. (Fam. Fabaceae); a shrub, 1.2-1.8 m high, found nearly throughout the country and widely cultivated in many parts of the country.

### SYNONYMS

Sanskrit	:	NĪlinī, NĪlpuṣpa, Kālkeśī
Assamese	:	Nilbam
Bengali	:	Nil
English	:	Indigo Plant
Gujrati	:	Nil, Gali
Hindi	:	Nili
Kannada	:	Kadu Nili, Nili
Kashmiri	:	--
Malayalam	:	Avuri, Amari
Marathi	:	Nili, Neel
Oriya	:	--
Punjabi	:	Neel
Tamil	:	Avuri
Telugu	:	Nili, Kondannili
Urdu	:	Neel

### DESCRIPTION

#### a) Macroscopic

Root - Tap root having lateral roots, pale yellow to light yellowish-brown, hard, woody, cylindrical, nearly smooth except for a few having scattered lenticels; odour, not distinct; taste, slightly bitter.

Stem - Pieces woody, hard, slender, cylindrical, 0.1 to 1.5 cm in dia., surface, smooth,

lenticels present; yellowish-green to greyish-brown in colour; no characteristic odour and taste.

**Leaf** - Compound, imparipinnate; leaflets, 1-5 cm long and 0.3-1.2 cm wide, oblong or oblanceolate with short mucronate tip; pale green to greenish-black; no characteristic odour and taste.

**Flower** - Numerous in nearly sessile spicate racemes, 10.0 cm long; calyx 1.2-1.5 mm long, hairy outside, teeth triangular, acute, as long as tube; corolla pink, papilionaceous, 4 mm long, back of standard petal pubescent, stamen 10, diadelphous; ovary sessile, linear, downy; stigma capitate.

**Fruit** - Pod nearly cylindrical. straight or slightly curved, apiculate, 2-3.2 cm long and 0.15-0.2 cm in dia., having 8-12 seeds; smooth, brown to dark brown.

**Seed** - Somewhat quadrangular with truncate ends, 0.2 cm long and 0.1 cm wide, smooth, yellowish-brown to greenish-brown in colour.

#### b) Microscopic

**Root** - Shows a narrow zone of cork, consisting of 4-10 layers of tangentially elongated, rectangular, thin-walled cells, with lenticels; secondary cortex a narrow zone, consisting of rectangular to polygonal, thin-walled cells containing rhomboidal to hexagonal crystals of calcium oxalate; and groups of fibres; secondary phloem composed of usual elements; secondary xylem consisting of xylem parenchyma, vessels, fibres and rays; fibres large aseptate with pointed end; vessels solitary or 2-4 in groups having simple pits; medullary ray 1-4 cells wide; prismatic crystals of calcium oxalate present in secondary cortex, phloem, xylem parenchyma and rays; oil globules present in cortex and phloem parenchyma; starch grains simple, round to oval, measuring 3-11  $\mu$  in dia. present in cortex, phloem, xylem parenchyma and rays. .

**Stem** - Young stem furrowed and ridged in outline; epidermis single layered, 5-10 layers of collenchymatous cells present in ridges; mature stem shows 5-15 layers of tangentially elongated, rectangular, thin-walled cork cells, broken by lenticels, a few upper rectangular cells filled with reddish-brown contents; secondary cortex consists of 5-7 layers of oval to elliptical, thin-walled, parenchymatous cells, pericycle a discontinuous ring of fibres;

secondary phloem and secondary xylem composed of usual elements; xylem traversed by rays; vessels solitary or 2-7 in radial rows, isolated vessels show spiral thickening and simple pits; fibres having narrow lumen and pointed ends; tracheids pitted; crystal fibres 4-12 chambered; each containing 1 or 2 prismatic crystals of calcium oxalate; pith occupied by isodiametric, thin-walled, parenchymatous cells; a few cells of secondary cortex, phloem and pith contain brown coloured substances; prismatic crystals of calcium oxalate and simple starch grains measuring 3-6  $\mu$  in dia. found in secondary cortex, phloem and xylem parenchyma, pith and rays.

#### Leaf -

*Petiole* - appears nearly circular in outline having two lateral wings; epidermis single layered, covered externally with thin cuticle and followed internally by single layered collenchymatous hypodermis; unicellular hairs scanty to moderate with blunt tip; cortex 4-6 layered, consisting of oval to polygonal, elongated, thin-walled chlorenchymatous cells; pericycle scanty, present in the form of continuous or discontinuous ring; vascular bundle collateral and three in number; large one present in centre and two smaller in lateral wings; pith composed of rounded to oval, thin-walled parenchymatous cells; a few prismatic crystals of calcium oxalate present in phloem and pith region.

*Midrib* - shows a similar structure of epidermis, cuticle and hairs as in petioles; lower and upper epidermis followed by single and 2 or 3 layers of collenchymatous hypodermis respectively; parenchyma 2 or 3 layered, present on both sides; vascular bundle single, collateral, crescent-shaped, present centrally.

*Lamina* - shows a dorsiventral structure; epidermis, cuticle and hairs as in petiole and midrib; palisade 2 layered; spongy parenchyma 2-4 layered; a few patches of veins scattered between palisade and spongy parenchyma; a few prismatic crystals of calcium oxalate present in mesophyll cells; stomata paracytic and unicellular hairs present on both surface but abundant on lower surface; palisade ratio not more than 4; stomatal index 18-40 on lower surface and 10-16 on upper surface; vein islet number 15-18.

**Fruit** - Shows single layered epicarp; mesocarp 7-8 layered, more or less elliptical, tangentially, elongated, thin-walled, parenchymatous cells, a few upper cells contain reddish brown content; vascular bundle present in the mesocarp region towards both ends, covered by sclerenchymatous sheath; endocarp present in the form of 3-5 layers of sclerenchymatous cells.

**Seed** - Shows a single layered, radially elongated, thin-walled, palisade-like cells, covered externally by a thin cuticle and internally, followed by a single layer of bearer cells;

beneath bearer cells 2-4 tangentially elongated elliptical, thin-walled parenchymatous cells present; cotyledons consists of oval to angular, elongated, thin-walled parenchymatous cells.

**Powder** - Yellowish grey; shows aseptate fibres, vessels with spiral thickening and simple pits; groups of mesophyll cells, unicellular hairs; pieces of hexagonal, straight walled, epidermal cells in surface view; prismatic crystals of calcium oxalate, rarely oil globules, and simple, rounded to oval, starch grains measuring 3-11  $\mu$  in dia.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 5.2 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.0 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 2.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 7.5 per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : glacial Acetic acid: Water (5 : 1: 4) in visible light shows three spots at Rf. 0.38, 0.75 and 0.88 (all grey). On exposure to Iodine vapour seven spots appear at Rf. 0.15, 0.38, 0.50, 0.59, 0.67, 0.75 and 0.88 (all yellow). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate at 110°C for ten minutes nine spots appear at Rf. 0.15, 0.25, 0.38, 0.50, 0.59, 0.67, 0.75, 0.84 and 0.88 (all grey).

CONSTITUENTS - Glycoside (Indican).

### PROPERTIES AND ACTION

Rasa : Tikta, Kaṭu

Guṇa	:	Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Recanī, Keśya, Viṣaghna, Jantughna

IMPORTANT FORMULATIONS - Nīlikādyā Taila, Gorocanādi Vaṭī

THERAPEUTIC USES - Vāta Rakta, Udararoga, Plīhāroga, Kṛmiroga, Moha, Bhrama, Udāvarta, Kaṭivāta, Kāsa, Āmaroga, Viṣodara, Jvara, Kṣaya, Kṛmidanta

DOSE - 10-20 g of the drug for decoction.

## NIRGUNDĪ (Leaf)

NirgundĪ consists of dried leaf of *Vitex negundo* Linn. (Fam. Verbenaceae); a large aromatic shrub or a small tree, upto 4.5 m in height, common throughout the country ascending to an altitude of 1500 m in the outer Himalayas. It is common in waste places around villages, river banks, moist localities and in the deciduous forests.

### SYNONYMS

Sanskrit	:	Sinduvāra, Samphālika, Nīla
Assamese	:	Aslak
Bengali	:	Nirgundi, Nishinda
English	:	Five Leaved Chaste tree
Gujrati	:	Nagod
Hindi	:	Nirgundi, Sinduar, Sambhalu
Kannada	:	Lakkigida, Nekkigida
Kashmiri	:	--
Malayalam	:	Indranee, Nirgundi
Marathi	:	Nirgundi
Oriya	:	--
Punjabi	:	Sambhalu, Banna
Tamil	:	Karunochchi, Nocchi
Telugu	:	Nallavavilli, Vavili
Urdu	:	Sambhalu, Panjangusht

### DESCRIPTION

#### a) Macroscopic

Leaves palmately compound, petiole 2.5 - 3.8 cm long; mostly trifoliate, occasionally pentafoliate; in trifoliate leaf, leaflet lanceolate or narrowly lanceolate, middle leaflet 5- 10 cm long and 1.6 -3.2 cm broad, with 1- 1.3 cm long petiolule, remaining two

sub-sessile; in pentafoolate leaf inner three leaflets have petiolule and remaining two sub-sessile; surface glabrous above and tomentose beneath; texture, leathery.

**b) Microscopic**

*Petiole* - shows single layered epidermis having a number of unicellular, bicellular and uniseriate multicellular covering trichomes and also glandular trichomes with uni to tricellular stalk and uni to bicellular head; cortex composed of outer collenchymatous tissue and inner 6 - 8 layers of parenchymatous tissue; collenchyma well developed in basal region and gradually decreases in middle and apical regions; pericyclic fibres absent in basal region of petiole and present in the form of a discontinuous ring in apical region surrounding central horse shoe-shaped vascular bundle; a few smaller vascular bundles present ventrally between arms of central vascular bundle and two, or rarely three, bundles situated outside the arms.

*Lamina* - shows single layered epidermis having mostly unicellular hairs, bi and multicellular and glandular trichomes being rare; hypodermis 1 - 3 layered interrupted at places by 4- 8 palisade layers containing chlorophyll; a large number of veins enclosed by bundle sheath traverse mesophyll; stomata present only on the ventral surface, covered densely with trichomes; vein-islet and vein termination number of leaf are 23-25 and 5-7 respectively.

*Powder* - shows number of pieces or whole, uni-bi and multicellular covering trichomes, glandular trichomes, palisade tissues with hypodermis, and upper and lower epidermis, xylem vessels with pitted walls.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.18 (blue) and 0.47 (red). On exposure to Iodine vapour four spots appear at Rf. 0.16, 0.47, 0.67 and 0.91 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and on heating the plate for ten minutes at 105° C four spots appear at Rf. 0.07, 0.47, 0.58 and 0.67 (all blue).

CONSTITUENTS - Alkaloids and Essential Oil.

## PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphaśāmaka, Vātaśāmaka, Śophahara, Keśya, Cakṣuṣya, Viṣaghna, Smṛtiprada, Anulomana

IMPORTANT FORMULATIONS - Vātagajāṅkuśa Rasa, Mahā Vāta Vidhvaṃsana Rasa, Yakṛtṭīhāri Lauha, Daśamula Taila, Trivikrama Rasa, Nirguṇḍī Taila, Tribhuvanakīrti Rasa, Viṣa Tinduka Taila

THERAPEUTIC USES - Śūla, Śopha, Vātavyādhi, Āmavāta, Kuṣṭha, Kaṇḍū, Kāsa, Pradara, Ādhmāna, Plīhā Roga, Gulma, Aruci, Kṛmi, Vraṇa, Nāḍī Vraṇa, Karṇaśūla, Sūtikā, Jvara

DOSE - 10-20 ml (Swarasa).

## PADMAKA (Heart Wood)

Padmaka consists of heart wood of *Prunus cerasoides*; D. Don (Fam. Rosaceae); a middle or large sized tree, found in temperate Himalayan region from Garhwal to Sikkim upto an elevation of 910-1820 m.

### SYNONYMS

Sanskrit	:	Padmagandhi, Pitarakta
Assamese	:	Diengsoh-iog-Krems
Bengali	:	Padmakastha
English	:	Biyd Cherry
Gujrati	:	Padmakastha, Padmaka
Hindi	:	Padmakha, Padma Kastha, Paja
Kannada	:	Padmaka
Kashmiri	:	--
Malayalam	:	Pathimukam
Marathi	:	Padmakastha, Padmaka
Oriya	:	--
Punjabi	:	Pajja
Tamil	:	Padmakashdham
Telugu	:	Padmakashtham

### DESCRIPTION

#### a) Macroscopic

Drug available in variable pieces, yellowish-brown to orange, to which some whitish portion of sap wood still attached; heavy, dense, moderately hard and very strong, odour, very faint; no taste.

## b) Microscopic

Mature heart wood consisting of vessels, fibres, tracheids and xylem parenchyma traversed by xylem rays; vessels lignified, moderately thick-walled, reticulate thickening, fairly large, with bordered pits having an oval-shaped, lateral perforation at each end, measuring, upto 220  $\mu$  in length and upto 68  $\mu$  in width; fibres occur mostly in groups, usually found associated with other xylem elements, moderately thick-walled, narrow lumen, pointed at both ends, 55-137  $\mu$  long; tracheids usually thick-walled, lignified, elongated cells; xylem parenchyma composed of thick-walled, found associated with vessels and fibres, oval to elongated, polygonal cells; xylem rays uni to multiseriate, uni and biseriate more common, multiseriate, generally 3-6 cells wide, 40-50 cells high; cut materials, when treated with ferric chloride solution turn the yellow pigments blue or black, indicating tannin

Powder - Reddish-brown; shows fragments of abundant groups or single pointed fibres measuring 55-137  $\mu$  in length, moderately thick-walled, fairly large vessels with reticulate thickening and bordered pits, thick-walled, lignified tracheid cells, pieces of ray cells and xylem parenchyma cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) a fluorescent zone at Rf. 0.64 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.15, 0.32, 0.42, 0.53, 0.59, 0.64 and 0.76 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C

four spots appear at Rf. 0.15, 0.32, 0.53 and 0.59 (all violet).

CONSTITUENTS - Flavonoids.

#### PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Garbhasthāpana, Rucya, Vātala

IMPORTANT FORMULATIONS - Khadirādi Guṭikā, Gudūcyādi Kvātha Cūrṇa, Bṛhacchāgalādyā Ghṛta, Śatāvaryādi Ghṛta, Gudūcyādi Taila, Uśīrāsava, Candanāsava, Daśamūlāriṣṭa, Mṛtasañjīvanī Surā, Karpūrādyarka

THERAPEUTIC USES - Visphoṭa, Dāha, Kuṣṭha, Raktapitta, Vami, Tṛṣṇā, Bhrama, Visarpa

DOSE - 1-3 g (Cūrṇa).

## PĀṬALĀ (Root)

Pāṭalā consists of dried root of *Stereospermum suaveolens* DC. (Fam. Bignoniaceae); a large deciduous tree upto 18 m high and 1.8 m in girth with a clear bole of about 9 m, found throughout the moist parts of the country.

### SYNONYMS

Sanskrit	:	Amoghā, Madhudūtī, Kṛṣṇvṛntā, Tāmrapuṣpī
Assamese	:	Parul
Bengali	:	Parul
English	:	Rose Flower Fragrant
Gujrati	:	Podal
Hindi	:	Padal
Kannada	:	Padramora
Kashmiri	:	--
Malayalam	:	Padiri
Marathi	:	Padal
Oriya	:	Boro, Patulee
Punjabi	:	Padal
Tamil	:	Padari
Telugu	:	Kaligottu, Kokkesa, Podira

### DESCRIPTION

#### a) Macroscopic

Root occurs in about 6-9 cm long, 1-1.5 cm thick cut pieces, cylindrical, externally brown to creamy, rough due to vertical fissures, cracks, ridges and transverse fine lenticels, internally dark brown, lamellation or stratification due to presence of concentric bands of fibres; fracture tough and fibrous; odour, not distinct; taste, bitter.

## b) Microscopic

Root cork consists of 25-35 layers of rectangular cells with 3-5 stratified layers, lignification being more prominent where the stratification starts, arranged with 1-3 tangential rows of narrow cells alternating with 3-5 tangential rows of wider cells; cork cambium composed of 1-2 layers of tangentially elongated cells; secondary cortex arranged more or less radially, becomes polyhedral to isodiametric in inner region, a few cells getting converted into stone cells which are regular in shape and show projection; secondary phloem wide, forms ceratenchyma between two obliquely running rays; some rays and phloem cells get converted into irregular, polygonal shaped stone cells, measuring 10- 150  $\mu$  in width, phloem parenchyma being intact; medullary rays multiseriate, being 3-4 cells wide, and 8-11-15 cells high; fibres tapering, pointed or slightly blunt, with a small peg-like projection at both ends; sieve tube gets collapsed in outer region forming strips of ceratenchyma; a few small microsphenoidal crystals of calcium oxalate present in phloem parenchyma and rays; secondary xylem wide having usual elements; vessels simple, pitted, lignified; fibres large, pointed, aseptate; rays multiseriate, 2- 3 cells wide.

**Powder** - Dark brown; shows fragments of rectangular cork and phloem parenchyma cells; groups of single, thick- walled, cubical to rectangular, lignified stone cells having striations and wide lumen; a number of microsphenoidal crystals of calcium oxalate, intact and scattered outside.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows in visible light three spots at Rf. 0.62, 0.85 and 0.92 (all light yellow).

Under UV (366 nm) five fluorescent zones are visible at Rf. 0.47, 0.53 (both light blue), 0.62 (bluish pink), 0.74 (blue) and 0.85 (light green). On exposure to Iodine vapour seven spots appear at Rf. 0.14, 0.28, 0.47, 0.53, 0.74, 0.85 and 0.92 (all yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent and heating the plate for ten minutes at 110°C four spots appear at Rf. 0.47, 0.74, 0.85 and 0.92 (all bluish grey).

CONSTITUENTS - Bitter Substances, Sterols, Glycosides and Glyco-Alkaloids.

#### PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Anuṣṇa
Vipāka	:	Kaṭu
Karma	:	Tridoṣahara, Rucya

IMPORTANT FORMULATIONS - Amṛtāriṣṭa, Daśamūlāriṣṭa, Bhārṅgī Guḍa, Indukānta Ghṛta, Dhānvantara Taila, Daśamūla Kvātha Cūrṇa

THERAPEUTIC USES - Śvāsa, Śoṭha, Arśa, Chardi, Hikkā, Tṛṣṇā, Amlapitta, Rakta Vikāra, Mūtravikāra, Agnidagha, Vraṇa Rujā, Visphoṭa, Medoroga

DOSE - 5-10 g (Powder).

25-50 ml (Decoction).

## PHALGU (Fruit)

Phalgu consists of dried fruits of *Ficus hispida* Linn. f. (Fam. Moraceae); a moderate sized tree or. shrub, distributed throughout the outer Himalayan range from Chenab eastwards to Bengal, Central and South India and Andaman Islands.

### SYNONYMS

Sanskrit	:	Kākodumbur, Malayu, Malpu
Assamese	:	Khoskadumar, Tanvardi, Teenbarree
Bengali	:	Kakdumur, Kathdumur, Kakadumbar
English	:	Wild Fig, Devil Fig
Gujrati	:	Tedumbaro, Dhedadambaro, Dhedhumbro
Hindi	:	Konea-dumbar, Kathumar
Kannada	:	Kadaatti, Arjeeru Hamu, Anjeeru, Onagida, Hanna, Adane
Kashmiri	:	--
Malayalam	:	Peyatti, Kattatti, Erumanakku, Parakasimi
Marathi	:	Rambal, Kalodumbar, Bhuiumbar
Oriya	:	Dimiri, Ani Dambura
Punjabi	:	Rumbal
Tamil	:	Peyatti
Telugu	:	Brahma medi, Kakimedi
Urdu	:	Kath Gular

### DESCRIPTION

#### a) Macroscopic

Dried syconus fruit, ovoid with a central circular hole and short stalk, 1-2 cm in dia., wrinkled; greyish-brown; seeds less than 1 mm in dia. and yellowish-brown in colour, odour and taste not characteristic.

#### b) Microscopic

Fruit shows a single layered epidermis, covered with thick cuticle having a few unicellular trichomes, epidermis, followed by 4-6 layers of hexagonal to polygonal, collenchymatous cells, a few cells contain rosette crystals of calcium oxalate; mesocarp composed of large, oval to polygonal, thick-walled parenchymatous cells, a few vascular vessels showing spiral thickening.

**Powder** - Greyish-brown; shows groups of oval to polygonal, thin-walled cells of mesocarp and endosperm, fragments of polyhedral, thick-walled epidermal cells in surface view, spiral vessels and abundant unicellular trichomes.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic acid: water (4:1:5) shows under U.V. (366 nm) two fluorescent zones at Rf 0.36 and 0.92 (both blue). On exposure to Iodine vapour four spots appear at Rf. 0.20, 0.36, 0.41 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C two spots appear at Rf. 0.20 (grey) and 0.92 (brown).

#### CONSTITUENTS - Tannins and Saponins

## PROPERTIES AND ACTION

Rasa	:	Madhura, Amla, Kaṭu, Tikta, Kaṣāya
Guṇa	:	Snigdha, Guru
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātahara, Pittahara, Kaphahara, Māṃsakara, Śukrakara, Mala Stambhana, Tr̥ptikāra, Grāhī, Bṛṃhaṇa, Viṣṭambhī

## IMPORTANT FORMULATIONS - Citrakādi Taila

THERAPEUTIC USES - Vraṇa, Śveta Kuṣṭha, Pāṇḍu, Arśa, Kāmalā, Atīśāra, Dāha, Kṣata, Viṣaroga, Tvagroga, Raktavikāra, Kaṇḍū, Kuṣṭha, Śopha, Raktapitta, Vātapittajaroga

DOSE - 10-20 g

## PHALGU (Root)

Phalgu consists of dried root of *Ficus hispida* Linn. f. (Fam. Moraceae); a moderate sized tree or shrub, distributed throughout the outer Himalayan range from Chenab eastwards to Bengal, Central and South India and Andaman Islands.

### SYNONYMS

Sanskrit	:	Malpu, Kākodumbur, Malāyu
Assamese	:	Khoskadumar, Tanvardi, Teenbarree
Bengali	:	Kakadumbar, Kakdumur, Kathdumur
English	:	Devil Fig, Wild Fig
Gujrati	:	Dhedhumbro, Tedumbaro, Dhedambaro
Hindi	:	Kathumar, Konea-dumbar
Kannada	:	Adane, Anjeeru, Arjeeru Hamu, Hanna, Onagida, Kadatti
Kashmiri	:	--
Malayalam	:	Erumanakku, Kattatti, Parakasimi, Peyatti
Marathi	:	Bhuiumbar, Kalodumbar, Rambal
Oriya	:	Ani Dambura, Dimiri
Punjabi	:	Rumbal
Tamil	:	Peyatti
Telugu	:	Brahma medi, Kakimedi
Urdu	:	Kath Gular

### DESCRIPTION

#### a) Macroscopic

Roots 4 -17 cm long, 1.0-2.5 cm thick, almost cylindrical, occasionally somewhat compressed at places, external surface brown to dark brown with deep, elliptical cracks and tangentially arranged rows of lenticels; fracture, splintery.

## b) Microscopic

Root shows 5-10 layers of cork, consisting of thin-walled, compressed cells, outer layers exfoliating; secondary cortex a wide zone consisting of irregularly arranged, tangentially elongated, thin-walled, parenchymatous cells, some of which contain rosette crystals of calcium oxalate and dark red coloured contents; secondary phloem consisting of usual elements, comprising of thin-walled cells; cellulosic phloem fibres found scattered throughout secondary phloem in singles and in groups of 2-3; a few phloem parenchyma and phloem ray cells contain rosette crystals of calcium oxalate; secondary xylem situated centrally, consisting of usual elements, all being lignified; xylem vessels numerous, equally distributed throughout secondary xylem region, in singles as well as in groups of 2-6, xylem rays numerous, straight and 1-5 cells wide.

**Powder** - Yellowish-brown; shows cellulosic phloem fibres, xylem vessels in broken pieces with pitted thickenings and rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) on exposure to Iodine vapour shows six spots at Rf. 0.05, 0.15, 0.30, 0.34, 0.92 and 0.98 (all yellow). On spraying with Dragendorff reagent followed by 5% aqueous Sodium Nitrite solution four spots appear at Rf. 0.30, 0.34, 0.92 and 0.98 (all light brown).

**CONSTITUENTS** - Alkaloids.

### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Guru, Śīta
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Kaphahara, Malastambhaka

IMPORTANT FORMULATIONS - Mahā Pañcagavya Ghṛta

THERAPEUTIC USES - Śvitra, Kaṇḍū, Kuṣṭha, Vraṇa, Raktapitta, Śopha, Pāṇḍu, Raktavikāra, Kāmalā, Arśa

DOSE - 1-3 g of the drug in powder form.

## PRAPUNNĀḌA (Seed)

Prapunnāḍa consists of dried seed of *Cassia tora* Linn. (Fam. Fabaceae); a herbaceous annual occurring as a weed throughout the country in plains, ascending 1500 m in the Central Himalayas.

### SYNONYMS

Sanskrit	:	Eḍagaja, Dadrughna
Assamese	:	Kulb
Bengali	:	Chavuka, Chakunda, Panevar
English	:	Ring Worm Plant, Fetid Cassia
Gujrati	:	Kovaraya
Hindi	:	Pavand
Kannada	:	Tagache
Kashmiri	:	--
Malayalam	:	Tagaraa
Marathi	:	Tankala
Oriya	:	--
Punjabi	:	Panwal, Chakunda, Chakwad
Tamil	:	Vshittgarai
Telugu	:	Tagiris
Urdu	:	Panwar

### DESCRIPTION

#### a) Macroscopic

Seed hard, 1 cm long, 3-4 mm thick, oblong or rhombohedral, both ends appear as if cut off obliquely, greenish-brown to brownish-black, smooth and shiny; odourless; taste, bitter.

## b) Microscopic

Seed shows seed coat consisting of longitudinally elongated cells, covered with thick, smooth cuticle, followed by palisade layer composed of closely packed, radially arranged, non-lignified, thickened columnar cells, and by a single layer of dumb-bell shaped, thick-walled, parenchymatous cells; a wide zone of thick-walled, parenchymatous cells forming inner layer of testa present, differentiated into outer 8 - 10 layers of tangentially elongated, parenchymatous cells and a single layer of broad cells which are squarish in shape; a few vascular bundles scattered in this zone; embryo consists of radicle, plumule and two cotyledons; epidermis of cotyledon consists of a single layer, externally covered with cuticle, followed by two layers of palisade-like cells of mesophyll; mesophyll of ventral side composed of rectangular to polygonal cells filled with round to oval starch grain, measuring 8-12  $\mu$  in dia., a few vascular bundles and a few rosette crystals of calcium oxalate upto 49  $\mu$  in dia.; scattered in this region.

**Powder** - Light brown; shows fragments of testa, parenchymatous cells, very small, numerous: simple, round to oval, starch grains measuring 8-12  $\mu$  in dia., and a few rosette crystals of calcium oxalate upto 49  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light three spots at Rf 0.33, 0.47 and 0.57 (all light yellow). Under UV (366 nm) three fluorescent zones are visible at Rf. 0.33 (blue), 0.47 (light pink) and 0.57 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.27, 0.33, 0.47, 0.57, 0.62, 0.71 and 0.82 (all yellow).

CONSTITUENTS - Anthraquinones, Fixed Oil

PROPERTIES AND ACTION

Rasa : Kaṭu  
Guṇa : Laghu, Rūkṣa  
Vīrya : Uṣṇa  
Vipāka : Kaṭu  
Karma : Kaphavātaśāmaka, Kṛmighna, Recana, Lekhana, Kuṣṭhaghna, Viṣaghna,  
Tvak Varṇaprasādakaram, Tvacya

IMPORTANT FORMULATIONS - Nimbādi Cūrṇa, Kāsīsādi Ghr̥ta, Mahā Viṣagarbha Taila,  
Bṛhanmaricādyā Taila

THERAPEUTIC USES - Kaphavātajanya Vikāra, Kuṣṭha, Vraṇa Vikāra, Dadru, Pakṣāghāta,  
Vibandha, Gulma, Kṛmi, Pāmā, Kaṇḍū, Śvāsa, Kāsa

DOSE - 1-3 g of powder.

## RAKTACANDANA (Heart Wood)

Raktacandana consists of heart wood of *Pterocarpus santalinus* Linn. f. (Fam. Fabaceae); a medium sized, deciduous tree upto 10-11 m high and 1.5 m in girth, mostly found in Andhra Pradesh and neighbouring area of Chennai and Karnataka at an altitude of 150-900 m.

### SYNONYMS

Sanskrit	:	Raktāṅga, Kṣudracandana, Raktasāra
Assamese	:	Sandale, Sandal Ahmar
Bengali	:	Raktachandana
English	:	Red Sanders, Red Sandal Wood
Gujrati	:	Ratanjali, Lalchandana
Hindi	:	Raktachandanam, Lalchandana
Kannada	:	Raktha Chandanam
Kashmiri	:	--
Malayalam	:	Rakta Chandanam
Marathi	:	Rakta Chandana
Oriya	:	--
Punjabi	:	Lal Chandan
Tamil	:	Sanchandanam
Telugu	:	Erra Chandanam
Urdu	:	Sandal Surkh

### DESCRIPTION

#### a) Macroscopic

Drug occurs as irregular pieces, deep blood-red to dark purplish-red or almost black, hard, but can be easily split, odourless; taste, slightly astringent.

## b) Microscopic

Heart wood shows alternating bands of darker and lighter zones; vessels large, mostly isolated and connected by fine, bright red rays, consisting of xylem parenchyma; prismatic crystals of calcium oxalate occur in a few cells; red colouring matter present in a number of cells of vessels and other cells; fibres abundant; xylem rays mostly uniseriate.

**Powder** - Red or purplish-red; shows a number of fibres, vessels and xylem parenchyma cells and prismatic crystals of calcium oxalate.

## Identification -

### Fluorescence test on aqueous and alcoholic extracts :-

- i) 5 g. powder extracted in 100 ml of water and filtered shows in day light - pale yellow to brownish-red colour; under U.V. light (366 nm) emerald green, and under U.V. light (254 nm) light green.
- ii) 5 g. powder extracted in 100 ml of alcohol and filtered shows in day light brownish - red colour; under U.V. light (366 nm) reddish -brown, and under U.V. light (254) yellowish-green colour.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate

(9:1) shows in visible light a spot at Rf. 0.37 (light pink). Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.07 (blue), 0.13 (grey), 0.3e (blue), 0.37 (grey), and 0.57 (blue). On exposure to Iodine vapour eight spots appear at Rf. 0.07, 0.13, 0.16, 0.26, 0.37, 0.43, 0.74 and 0.80 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.04 (violet), 0.07, 0.13 (both light violet), 0.37, 0.43 (both violet), 0.74 and 0.80 (both light violet).

CONSTITUENTS - Glycosides, Colouring Matter.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Guru, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara, Netraroga, Viṣaghna, Vṛṣya

IMPORTANT FORMULATIONS - Candana Balā Lakṣādi Taila, Candanādi Lauha

THERAPEUTIC USES - Chardi, Tṛṣṇā, Raktadoṣahara, Jvara, Vraṇa

DOSE - 3-6 g of the drug (powder).

## RAKTAPUNĀRNAVA (Root)

Raktapunarnavā consists of dried root of *Boerhaavia diffusa* Linn. (Fam. Nyctaginaceae); a trailing herb with stout root stock and many diffused, slender, prostrate or ascending branches, occurring throughout the plains of India.

### SYNONYMS

Sanskrit	:	Śoṭhaghñī, Rakta Puspā
Assamese	:	Ronga Punarnabha
Bengali	:	Rakta Punarnava
English	:	Hog Weed
Gujrati	:	Saturdi
Hindi	:	Gadapurna, Lalpunarnava
Kannada	:	Kommeberu
Kashmiri	:	--
Malayalam	:	Chuvanna Tazhutama
Marathi	:	Rakta Punarnava
Oriya	:	Laalapuiruni
Punjabi	:	Iteit (Lal), Khattan
Tamil	:	Mookarattai (Shihappu)
Telugu	:	Atikamamidi, Erragalijeru
Urdu	:	Surkh Punarnava

### DESCRIPTION

#### a) Macroscopic

Root well developed, fairly long, somewhat tortuous, cylindrical, 0.2 - 1.5 cm in dia.; yellowish-brown to brown; surface, rough due to minute longitudinal striations and root scars; fracture, short; odour, not distinct; taste, slightly bitter.

## b) Microscopic

Mature root shows anomalous growth; cork composed of thin-walled, tangentially elongated cells in the outer few layers; cork cambium 1-2 layers of thin-walled cells; secondary cortex consists of 2-3 layers of parenchymatous cells, followed by cortex composed of 5-12 layers of thin-walled, oval to polygonal cells; several concentric bands of xylem tissue, alternating with zone of parenchymatous tissue, present below cortical region; number of bands vary according to thickness of root and consist of vessels, tracheids and fibres; vessels mostly found in groups of 2-8 in radial rows, having simple pits and reticulate thickening; tracheids, thick-walled with simple pits; fibres aseptate, elongated, thick-walled with pointed ends; phloem occurs as hemispherical or crescent patches outside each group of xylem vessels and composed of sieve elements and parenchyma; a broad zone of parenchymatous tissue, in between two successive rings of xylem elements, composed of thin-walled, more or less rectangular cells arranged in radial rows; central region of root occupied by primary vascular bundles; numerous raphides in single or in group present in cortical region and in parenchymatous and xylem tissue; starch grains simple and compound, having 2-4 components, found in abundance in most of the cells of cortex and xylem elements; simple starch grains mostly round in shape, measuring 2.75-11  $\mu$  in dia.

**Powder** - Light yellow; shows vessels with reticulate thickening or simple pits, fibres, fragments of cork cells, raphides of calcium oxalate and simple, rounded, starch grains, measuring 2.75 - 11  $\mu$  in dia., and compound starch grains having 2-4 components.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 10 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.8 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 10 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (8

: 2) shows under UV (366 nm) six fluorescent zones at Rf. 0.11, 0.38 (both blue), 0.70, 0.84 (both light blue), 0.90 (light pink) and 0.94 (light blue). On exposure to Iodine vapour seven spots appear at Rf. 0.05, 0.11, 0.28, 0.38, 0.43, 0.84 and 0.94 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent two spots appear at Rf. 0.08 and 0.94 (both orange).

CONSTITUENTS - Alkaloid, Hentriacontane,  $\beta$ -Sitosterol, Ursolic Acid.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya, Kaṭu, Madhura
Guṇa	:	Laghu, Rūkṣa, Śīta, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śophahara, Kaphaghna, Dīpana, Vātakara, Pittahara

IMPORTANT FORMULATIONS - Kumāryāsava, Dādhika Ghṛta, Dhānvantara Ghṛta, Punarnavādyariṣṭa

THERAPEUTIC USES - Śopha, Pāṇḍu, Hṛdroga, Kāsa, Arśa, Vraṇa, Uraḥkṣataśūla, Śoṭha

DOSE - 1-3 g of powder.

10-20 ml (Fresh Juice).

## RĀMAŚĪTALIKĀ (Whole Plant)

Rāmaśītalikā consists dried whole plant of *Amaranthus tricolor* Linn.; Syn. *A. gangeticus* Linn.; *A. melancholicus* Linn. *A. polygamus* Linn. Hook. F., *A. tristis* Linn.; (Fam. Amaranthaceae), an erect, diffuse, stout, annual herb, found throughout the country.

### SYNONYMS

Sanskrit	:	Māriṣarakta, Ārāmaśītalikā
Assamese	:	--
Bengali	:	Lal Shak
English	:	--
Gujrati	:	Tandaljo (Lal)
Hindi	:	Lal Marsa
Kannada	:	Dantu, Harave Soppu, Dantina Soppu, Chikkarive
Kashmiri	:	--
Malayalam	:	Aramaseetalam
Marathi	:	Mash
Oriya	:	--
Punjabi	:	Lal Marsa Sag
Tamil	:	Mulaikkeerai
Telugu	:	Erra Totakura

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap root, cylindrical, yellowish, 0.3-0.5 cm thick, with a few secondary roots and numerous rootlets.

**Stem** - Stem cylindrical with longitudinal ridges and furrows, branched, light greenish-yellow, 0.2-0.4 cm thick; fracture, short.

**Leaf** - Leaf simple, 5-12 cm long, 2.5-7 cm wide, very variable in shape, rhomboid-ovate, lanceolate or deltoid-ovate, obtuse, petiolate, membranous.

**Flower** - Flowers clustered in the axils and forming a long terminal, more or less interrupted spike; bracteole 3 mm long, lanceolate, membranous, perianth 4 mm long; sepals 3, white with pinkish tinge, stamens three, anthers dorsifixed.

**Seed** - Seed 1.5 mm in dia., biconvex, smooth, shiny black.

#### b) Microscopic

**Root** - Shows cork consisting of 3-6 rows of thin-walled cells, a few outer layers exfoliating; secondary cortex consisting of 6-11 rows of tangentially elongated, tabular, thin-walled parenchymatous cells, a few of them containing microsphenoidal crystals of calcium oxalate; secondary phloem arranged in continuous ring, consisting of thin-walled cells; phloem parenchyma cells containing microsphenoidal crystals of calcium oxalate; secondary xylem arranged in the form of a ring, beneath which there are scattered vascular bundles consisting of xylem and phloem; vascular bundles, situated in the centre are comparatively larger; ground tissue consisting of thin-walled, parenchymatous cells, a few cells containing microsphenoidal crystals of calcium oxalate.

**Stem** - Shows many thick-walled, oval to polygonal, collenchymatous cells present in the ridges seen in outline; epidermis single layered with tabular cells under a thick cuticle; cortex differentiated into 3-9 layered, thick-walled, tangentially elongated, chlorenchyma cells having a few microsphenoidal crystals of calcium oxalate; vascular bundles collateral arranged in a concentric band consisting of phloem and xylem elements; inside the band, in the ground tissue a number of conjoint vascular bundles found scattered; ground tissue consisting of oval or round, thin-walled, parenchymatous cells, these cells are smaller toward periphery and larger towards centre, a few of these cells contain microsphenoidal crystals of calcium oxalate.

#### **Leaf-**

**Petiole** - Shows two notches which are lateral in position, epidermis single layer, followed by, 1 or 2 layers ventrally and 1 to 7 layers dorsally of collenchyma; rest of the cortex consisting of thin-walled parenchymatous cells, a few of them containing microsphenoidal crystals of calcium oxalate; vascular bundles arc-shaped in three separate patches, elongated in the notches central one nearly circular, each consisting of xylem and phloem.

*Midrib* - Shows single layered epidermis on both surfaces, followed by 1-2 layered collenchyma; rest of the cortex consisting of thin-walled, parenchymatous cells a few of them containing microspenoidal crystals of calcium oxalate; vascular bundles 4 in number in basal region and single in number towards apical region.

*Lamina* - Shows single layered epidermis on both surfaces; upper epidermal cells, thin-walled, oval to polygonal, with a few uni-to bicellular pointed hairs, sinuous walls and a few stomata in surface view; lower epidermal cells composed of thin-walled cells oval to polygonal, having a number of rosette crystals of calcium oxalate and a few microspenoidal crystals of calcium oxalate; walls sinuous, stomata both anomocytic and anisocytic type; palisade parenchyma 2 or 3 layered; spongy parenchyma 3 or 4 layered consisting of circular, irregularly arranged cells

**Powder** -Light green; shows lignified vessels with spiral thickening, rosette and microspenoidal crystals of calcium oxalate, fragments of irregular, sinuous, polyhedral, thin-walled, parenchymatous epidermal cells and palisade cells, anomocytic and anisocytic type of stomata.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2.6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows -under U.V. (366nm) four fluorescent zones at Rf. 0.05, 0.17, 0.34 and 0.40 (all pink). On exposure to Iodine vapour five spots appear at Rf. 0.17, 0.34, 0.40, 0.56 and 0.98 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.17, 0.56 and 0.98 (all violet).

CONSTITUENTS - Fatty Oils, Sitosterol, Calcium and Magnesium.

**PROPERTIES AND ACTION**

Rasa	:	Madhura, Tikta
Guṇa	:	Kiñcit Guru, Rūkṣa, Sara
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara

IMPORTANT FORMULATIONS - Candrakalā Rasa

THERAPEUTIC USES - Dāha, Śoṣa, Visphoṭa, Vraṇa

DOSE - 10-20 ml of the drug in juice form.

## RĀSNĀ (Leal)

Rāsnā consists of dried leaf of *Pluchea lanceolata* Oliver & Hiern.(Fam. Asteraceae); an annual, ashy and pubescent, undershrub having spreading roots extending to several metres; it grows abundantly in sandy soils in upper Gangetic plain and Rajasthan. It flowers during cold season.

### SYNONYMS

Sanskrit	:	Suvahā, Sugandhā, Yuktā
Assamese	:	Rasnapat
Bengali	:	Rasna
English	:	--
Gujrati	:	--
Hindi	:	Rayasan, Rayasana, Rasna
Kannada	:	Rasna, Dumme-Rasna
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Rasna, Rayasana
Oriya	:	--
Punjabi	:	Reshae
Tamil	:	--
Telugu	:	Sanna Rashtramu
Urdu	:	Rauasan, Rasna

### DESCRIPTION

#### a) Macroscopic

Leaves simple, 3-5 cm long, 0.6-2 cm broad; sessile, obtuse, lanceolate to ovate-lanceolate; margin entire or toothed around the apex, unequal at base; both surfaces pubescent, distinct small hairs more prominent near veins; texture, brittle, papery; odour,

characteristic; taste, astringent and slightly bitter.

## b) Microscopic

### Leaf-

*Midrib* - shows single layered epidermis covered by thick, striated cuticle; collenchyma 2-5 layered towards xylem, 1-3 layered towards phloem; beneath collenchyma 2-5 layers of parenchyma present on both sides; central portion occupied by a large vascular bundle, xylem facing towards upper and phloem towards lower epidermis; vascular bundle surrounded by sclerenchymatous sheath appearing as a cap above and below; vascular bundle consists of wide phloem, a thin cambium and xylem; phloem consists of phloem parenchyma and a few phloem fibres; xylem consists of tracheids, vessels and xylem parenchyma; vessels arranged radially; parenchyma and palisade cells of leaf contain oil globules, scattered rosette crystals of calcium oxalate are both in lamina and midrib.

*Lamina* - shows isobilateral structure with palisade occurring in upper and lower mesophyll regions; epidermal cells tangentially elongated, covered by thick, striated cuticle; uniseriate, unbranched covering trichomes 2-3 cells long, present on both surfaces, basal cell short and slightly swollen, apical cells long; stomata, anisocytic and anomocytic present on both surfaces but more on lower surface; palisade tissue 2 or 3 layered on both sides, composed of radially elongated, thin-walled cells; spongy parenchyma composed of thin-walled, circular to elliptical, parenchymatous cells containing abundant chloroplasts with prominent intercellular spaces; a number of small veins, surrounded by a sclerenchymatous sheath present in mesophyll; vascular tissue much reduced and represented by a few phloem and xylem elements; average value of stomatal index on upper surface 14-24 and on lower surface 20-24; palisade ratio not more than 5; average value of vein islet number 27.

**Powder** - Light green; shows fragments of parenchyma, palisade cells, pointed 2-5 celled trichomes, a few oil globules and rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	22	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light three spots at Rf. 0.37, 0.71 and 0.82 (all grey). Under U.V. (366 nm) three fluorescent zones are visible at Rf. 0.27, 0.71 and 0.82 (all dark brown). On exposure to Iodine vapour seven spots appear at . Rf. 0.08, 0.37, 0.62, 0.67, 0.71, 0.82 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.08 (greyish brown), 0.17 (violet), 0.37 (brown), 0.62 (violet), 0.67, 0.71, 0.82 (all greyish brown) and 0.92 (violet).

CONSTITUENTS - Flavonoids - Quercetin and Isorhamnetin

#### PROPERTIES AND ACTION

Rasa	:	Tikta
Guṇa	:	Guru
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātahara, Āmapācana

IMPORTANT FORMULATIONS - Daśamūlāriṣṭa, Devadārvāriṣṭa, Kārpāsāsthyādi Taila, Rāsnādi Kvātha Cūrṇa, Rāsnairāṇḍādi Kvātha Cūrṇa

THERAPEUTIC USES - Śoṭha, Vātavyādhi, Śvāsa, Kāsa, Jvara, Udararoga, Sidhma, Āḍhyavāta, Āmavāta, Vātarakta

DOSE - 25-50 g (Decoction).

## SAHACARA (Whole Plant)

Sahacara consists of dried whole plant of *Barleria prionitis* Linn.(Fam. Acanthaceae); a bushy, prickly undershrub, 0.6-1.5 m high, found throughout hotter parts of the country and also cultivated as a hedge plant.

### SYNONYMS

Sanskrit	:	Kuraṅṭaka, Koranḍa, Keranḍaka
Assamese	:	Shinti
Bengali	:	--
English	:	--
Gujrati	:	Kanta-Saerio, Kantasalio
Hindi	:	Sahacara
Kannada	:	Sahacara
Kashmiri	:	--
Malayalam	:	Kirimkurunji, Karim Kurunni
Marathi	:	Koranta, Koranti
Oriya	:	Dasakeranda
Punjabi	:	Sahacar
Tamil	:	Sammulli
Telugu	:	Mulu Gorinta Chettu
Urdu	:	Pila Bansa, Piya Bansa

### DESCRIPTION

#### a) Macroscopic

Root - Well developed, upto 1 cm thick at the top, cylindrical and tapering, bearing lateral branches and numerous rootlets; surface rough due to numerous dot-like lenticels and root scars of fallen roots; external surface greyish-brown, bark thin with smooth internal surface; wood cream coloured; fracture, hard and laminated; odour and taste not characteristic.

**Stem** - Erect, 1-8 mm thick, terete, hard, glabrous, nodes swollen, branching at nodes, young stem grey, slightly four angled, usually with 3-4 divaricate spines at axil of leaf; mature stem cylindrical with longitudinally arranged or scattered dot-like lenticels; externally greyish to light brown; a few mature stem slightly hollow.

**Leaf** - Dorsiventral, variable in size, 6-9.5 cm long, 2.5 - 3.5 cm wide, simple, elliptic, acuminate, entire, acute, reticulate, unicostate, glabrous above, glabrous or pubescent beneath; petiole short.

**Flower** - Sessile, often solitary in the lower axils.. becoming spicate above; bracts foliaceous, 16 by 4.5 mm, oblong or lanceolate, acute, bristle-tipped, nearly glabrous; bracteoles 1.3 cm long, narrowly linear, subulate (almost spinous), bristle-tipped; calyx, divided almost to the base, one of the outer sepals rather more than 1.3 cm long, the opposite sepal rather less than 1.3 cm long, 3.4 mm broad, both oblong-lanceolate, mucronate; the 2 inner sepals 1.5 mm wide and as long as the shorter of the outer ones, linear lanceolate, mucronate; corona, 3.2-4.5 cm long, yellow, slightly pubescent outside, glabrous inside, somewhat 2 lipped; upper lip 2 cm long or more, deeply 4 lobed, the lobes oblong-obovate, round; lower lip oblong-obovate, round, entire; tube 1.9 - 2.2 cm long; stamens 2 fertile and 2 staminodes; filaments of the fertile stamens exerted beyond the corona tube, those of the staminode very short; ovary superior of two fused carpels; style, simple, usually long with two stigma.

**Fruit** - Capsules, 2-2.5 cm long, ovoid with a long tapering solid beak; 2 seeded.

**Seed**- Compressed, 0.8 cm in diameter and clothed with silky appressed hairs.

#### **b) Microscopic**

**Root** - Mature root shows cork of 6-25 layers of thin-walled, tangentially elongated cells; cork cambium single layered; secondary cortex composed of large, tangentially elongated, parenchymatous cells with small intercellular spaces; secondary phloem consists of sieve tubes, companion cells, phloem parenchyma, and traversed by phloem rays, phloem fibres found scattered throughout phloem region in single and groups, single fibres elongate, thick-walled with narrow lumen; secondary xylem wide, vessels, tracheids, parenchyma, xylem fibres present; vessels, pitted, with transverse to oblique articulation; tracheids slightly broader in middle with tapering ends having pitted walls; xylem fibres

thick-walled, lignified and pitted; xylem parenchyma rectangular with lignified walls; xylem rays uni to biseriate, uniseriate rays more common.

**Stem** - Cork 6-24 or more layers of rectangular and radially arranged cells; secondary cortex composed of thin-walled, tangentially elongated, 8-15 layers of parenchymatous cells, filled with brown contents; secondary phloem narrow, consisting of heterogeneous type of cells; phloem fibres found scattered uniformly throughout phloem region in singles or in groups; fibres moderate in length, lignified with pointed tips; secondary xylem consists of vessels, tracheids, fibres, xylem parenchyma traversed by xylem rays; vessels numerous, vary in size, distributed throughout xylem region vessels having tail-like projections at one or both ends and transverse to oblique perforations with spiral or pitted thickenings; tracheids pitted having pointed tips; xylem parenchyma mostly rectangular, thick-walled, lignified with simple pits; xylem rays usually uniseriate, occasionally biseriate; pith isodiametric of parenchymatous cells most of which contain single or group of acicular crystals of calcium oxalate, measuring 19-28  $\mu$  in length and 3  $\mu$  in width.

**Leaf** -

*Petiole* - A single layered upper and lower epidermis covered externally with a thick cuticle, a few epidermal cells elongate to form unicellular hairs, cystolith develops in some epidermal cells; 2-6 layers of collenchymatous cells present in both upper and lower epidermis; parenchyma 3-8 layered in upper surface and 7-10 layered in lower surface towards proximal end and 5-7 layered at distal end, circular to polygonal and thin-walled; some contain raphides of calcium oxalate; vascular bundle semilunar, situated centrally in parenchymatous ground tissue; xylem vessels arranged in radial rows, protoxylem towards centre; two smaller vascular bundles present on either sides of central vascular bundle.

*Midrib* - Single layered epidermis on both surfaces covered externally with thick cuticle; collenchyma 2-5 layered on both surfaces, followed by 3-6 layers, thin-walled, parenchymatous cells; vascular bundle single, crescent-shaped having usual elements.

*Lamina* Single layered epidermis covered with thick cuticle on both surfaces, glandular trichomes present on both surfaces, while the non-glandular, unicellular, elongated with pointed tips, present only on lower surface; palisade single layered; spongy parenchyma thin-walled, irregular in shape; stomata diacytic and present on both surfaces but more abundant on lower surface; a few veins present in this region.

**Powder** - Green; shows fragments of cork, xylem vessels with spiral and pitted thickening, acicular crystals of calcium oxalate, measuring 19-28  $\mu$  in length and 3  $\mu$  in width, fibres, fragments of lamina of leaf with palisade and mesophyll cells; glandular and non-glandular

hairs, epidermal cells with diacytic stomata.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

#### ASSAY

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows four spots at Rf. 0.57, 0.77, 0.91 and 0.94 (all light yellow) in the visible light. Under U.V. (366 nm) four fluorescent zones are visible at Rf. 0.57, 0.77, 0.91 (all blue) and 0.94 (black). On exposure to Iodine vapour six spots appear at Rf. 0.18, 0.43, 0.57, 0.77, 0.88 and 0.94 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105° C for ten minutes five spots appear at Rf. 0.57 (yellow), 0.77, 0.88 (both pink), 0.84 and 0.94 (both violet).

CONSTITUENTS - Alkaloids,  $\beta$ -Sitosterol, Potassium.

#### PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Amla
Guṇa	:	Snigdha
Vīrya	:	Uṣṇa

Vipāka : Kaṭu

Karma : Kaphahara, Keśya, Kāsa, Rañjana, Viṣahara

IMPORTANT FORMULATIONS - Sahacarādi Taila, Nīlikādyā Taila, Aṣṭavarga Kvātha Cūrṇa, Rāsnairaṇḍādi Kvātha Cūrṇa

THERAPEUTIC USES - Kuṣṭha, Kaṇḍū, Vātarakta, Palita

DOSE - 50-100 g of the drug for decoction.

## SAHADEVI (Whole Plant)

Sahadevi consists of dried whole plant of *Vernonia cinerea* Lees. (Fam. Asteraceae); an erect, rarely decumbent, branched herb, 12-75 cm high, found throughout India ascending to an altitude of 1800 m.

### SYNONYMS

Sanskrit	:	Uttamkanyaka, Daṇḍotpalā
Assamese	:	Schdevi
Bengali	:	Kuksim
English	:	Purple Fleabane, Fleabane
Gujrati	:	Sadoree, Sadodee
Hindi	:	Sahadevi
Kannada	:	Sahadevee, Okarchendhi
Kashmiri	:	--
Malayalam	:	Poovan Kuruntala, Mukkuthaipo
Marathi	:	Sadodee, Sahdevee
Oriya	:	--
Punjabi	:	Sehdei
Tamil	:	Naichotte Poonde
Telugu	:	Garita Kammi, Sehaddevi
Urdu	:	Pan

### DESCRIPTION

#### a) Macroscopic

Root - 5-12 cm long, 1-7 mm thick, oblique and gradually tapering, bearing a few rootlets; external surface, dirty brown; fracture, short.

Stem - Glabrous, cylindrical, hairy, slightly branched; 10-17 cm long, 1-8 mm thick, grooved and ribbed; basal region of branches greenish-brown, apical region dark green,

bearing a number of flowers; fracture, short.

**Leaf** - Simple, dark-green, smooth, alternate, opposite, exstipulate, 2.5-5 cm long, 1.8-3.6 cm broad, elliptical, lanceolate, obtuse or acutely toothed; shape and size variable; petiole short; odour, slightly characteristic.

#### b) Microscopic

**Root** - Mature root shows 4-5 layered cork, consisting of tabular, tangentially elongated, thick-walled cells filled with reddish-brown contents; secondary cortex consists of a wide zone of thin-walled, parenchymatous cells having a few resin ducts; secondary phloem, a narrow zone, composed of sieve elements and phloem parenchyma, traversed by phloem rays; xylem well-developed, composed of vessels, tracheids, fibres and xylem parenchyma, traversed by 1-5 seriate xylem rays; xylem vessels usually solitary or 2-4 in groups with reticulate thickening; fibres aseptate and pointed.

**Stem** - Mature stem shows several bulges at places and consists of a single layered epidermis, externally covered with a striated cuticle; a number of epidermal cells elongate to form multicellular covering and T-shaped trichomes with 2-6 celled stalk; cortex 3-5 layers of thin-walled, tangentially elongated parenchymatous cells, a few filled with reddishbrown content, bulges show a few layers of collenchyma between epidermis and parenchymatous cortex; endodermis single layered, composed of barrel-shaped cells; pericycle occurs in the form of groups of pericyclic fibres; phloem consists of strands of sieve tubes, companion cells and phloem parenchyma; xylem consists of vessel, parenchyma and fibres; xylem vessels show reticulate thickening; parenchyma in abundance and paratracheal; fibres thick-walled, aseptate, short, with pointed ends; medullary rays 2-11 cells wide; central portion occupied by pith composed of hexagonal to polygonal, thin-walled parenchymatous cells; a few simple starch grains present in cortical cells; cluster crystals of calcium oxalate occasionally found in pith.

**Leaf** -

**Petiole** - shows a somewhat circular outline with two lateral projections one on each side; epidermis on both surfaces, covered externally with striated cuticle and have both type of trichomes as described in case of stem, followed by 2-3 layers of collenchyma on upper and lower side; stele composed of three collateral vascular bundles located in centre, central one larger and lateral two smaller; ground tissue composed of thin-walled parenchymatous cells, a few having oil globules and rosette crystals of calcium oxalate.

*Midrib* - shows similar structure as described in petiole except for 1 or 2 layers of collenchymatous cells below both epidermis and a single vascular bundle in centre; oil globules and rosette crystals of calcium oxalate present in a few cells of ground tissue.

*Lamina* - shows dorsiventral structure; epidermis single layered on either surface, composed of thin-walled, tangentially elongated cells, covered externally with striated cuticle; trichomes similar to those of stem; palisade single layered; spongy parenchyma 4-5 layered, loosely arranged cells; vascular bundles embedded in spongy parenchyma; rosette crystals of calcium oxalate and oil globules present in this region; anomocytic stomata present on both surfaces.

**Powder** - Greenish-brown; shows reticulate vessels, thick-walled fibres, a few rosette crystals of calcium oxalate, multicellular covering and T-shaped trichomes with 2-6 celled stalk, and epidermal cells irregular in shape in surface view, showing anomocytic stomata.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (95 : 5) shows on exposure to Iodine vapour two spots at Rf. 0.55 and 0.96 (both yellowish brown), On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.40, 0.55 and 0.96 (all violet).

**CONSTITUENTS** - Saponins, Sapogenins, Flavonoids.

## PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmakā, Śothahara, Śvaraghna, Nidrākara

IMPORTANT FORMULATIONS - Candrakalā Rasa, Almottādi Kaṣāyam (S.Y.)

THERAPEUTIC USES - Jvara, Viṣamajvara, Sidhma, Visphoṭa, Bhūtabādhā, Grahābādhā, Sphoṭaka, Pradara, Ślīpada

DOSE - 10-20 ml (Swarasa).

5-10 g (Powder for external use only).

## ŚAILEYA (Lichen)

Śaileya consists of the whole thallus of *Parmelia perlata* (Huds.) Ach. (Fam. Parmeliaceae), a perennial lichen found on rocks or dead wood in temperate Himalayas.

### SYNONYMS

Sanskrit	:	Śītaśiva, Śīlāpuṣpa
Assamese	:	--
Bengali	:	Shailaj
English	:	Stone Flower, Rock Moss
Gujrati	:	Patthar Phool, Chhadilo
Hindi	:	Charela, Chharila, Chhadila
Kannada	:	Shilapushpa, Kalluhoo
Kashmiri	:	--
Malayalam	:	Sheleyam, Kalppuvu
Marathi	:	Dagad phool
Oriya	:	--
Punjabi	:	Ausneh, Chhadila
Tamil	:	Kalpashee
Telugu	:	Ratipuvvu
Urdu	:	Chhadila

### DESCRIPTION

#### a) Macroscopic

Thallus consists of a flattened, foliose structure with a more or less deeply incised upper surface, yellowish-white on top and black on the lower surface, leathery to touch; delicate rhizoids arise from lower surface; odour and taste not distinct; bud-like bodies known as soredia are also present on the upper surface of the thallus.

## b) Microscopic

Thallus shows upper cortex consisting of compact hyphae of fungus, followed by gonidial layers with algal cells; medulla consisting of loosely arranged mass of fungal hyphal tissue; lower cortex black, consisting of compact mass of fungal hyphae; a few asci with ascospores embedded in the upper portion of the thallus; thallus on soaking in water gives orange colour.

**Powder** - Brown, shows fungal hyphae, gonidia, compact mass of cortex and spores, and algal cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 : 5) shows in visible light four spots at Rf. 0.11, 0.28, 0.40, 0.91. (all grey). Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.11(dark blue), 0.28 (dark blue), 0.40, 0.61 (both blue), 0.83 (dirty yellow) and 0.91 (light yellow). On exposure to Iodine vapour six appear at Rf. 0.11, 0.28, 0.40, 0.61, 0.83 and 0.91 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and on heating the plate for ten minutes at 105°C six spots appear at Rf. 0.11, 0.28, 0.40, 0.61, 0.83 and 0.91 (all grey)

CONSTITUENTS - Lichen acids - Atranorin and Lecanoric acid.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu, Snigdha
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Hṛdya, Kaphapitthara, Rucya, Stambhaka, Pittahara

IMPORTANT FORMULATIONS - Vāsācandanādi Taila, Jīrakādi Modaka, Saubhāgya Śuṅṭhī, Candanādi Taila, Dhānvantara Taila, Nārāyaṇa Taila, Mahā Nārāyaṇa Taila, Tārksya Guḍa, Āgarvadhya Taila, Śaileyādi Taila, Mṛtasañjīvanī Surā, Añjana Vaṭī

THERAPEUTIC USES - Kaṇḍū, Kuṣṭha, Aśmarī, Dāha, Viṣa, Hṛllāsa, Tṛṣṇā, Vraṇa, Hṛdaya Roga, Rakta Vikāra, Śvāsa, Jvara, Mūtrakṛcchra, Mūtrāghāta, Śiraḥśūla

DOSE - 1-3 g

## ŚĀKA (Heart Wood)

Śāka consists of dried heart wood of *Tectona grandis* Linn. f. (Fam Verbenaceae); a large deciduous tree found in peninsular region and Madhya Pradesh extending to parts of Rajasthan, Southern Uttar Pradesh and Orissa, and also in plantations.

### SYNONYMS

Sanskrit	:	Bhūmisaha, Dwāradāru, Kharacchada
Assamese	:	Chingjagu Sagun
Bengali	:	Segunagachh
English	:	Indian Teak
Gujrati	:	Sagwan, Sag, Saga
Hindi	:	Sagwan, Sagauna, Sagu
Kannada	:	Tegu, Sagawani, Thega
Kashmiri	:	--
Malayalam	:	Thekku
Marathi	:	Sagwan
Oriya	:	Saguana, Sagan, Sagun
Punjabi	:	Sagwan
Tamil	:	Tekku
Telugu	:	Teku, Pedda
Urdu	:	Sagwan

### DESCRIPTION

#### a) Macroscopic

Drug available in pieces of varying length and thickness, moderately hard, ring porous, texture, coarse, light brown to golden brown in colour; odour, characteristic.

## b) Microscopic

Heart wood shows well developed xylem, consisting of vessels, parenchyma, fibres and medullary rays; vessels solitary or 2-4 in groups, arranged in radial rows, a few having tyloses; medullary rays multiseriate, thin-walled, oval to elongated, 2-4 celled wide.

**Powder** - Light brown; shows simple pitted vessels, a few with tyloses, aseptate fibres with pointed ends and parenchymatous cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows in visible light five spots at Rf. 0.08 (pink), 0.31 (pink), 0.37 (pink) 0.81 (light yellow), and 0.92 (light yellow). Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.08, 0.31, 0.71, 0.81 and 0.92 (all grey). On exposure to Iodine vapour ten spots appear at Rf. 0.03, 0.05, 0.08, 0.31, 0.37, 0.48, 0.64, 0.71, 0.81 and 0.92 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C seven spots appear at Rf. 0.03, 0.05, 0.08, 0.31, 0.48, 0.71 and 0.92 (all violet).

**CONSTITUENTS** - Resin, Essential Oil, Fatty Oil and Tectoquinone

## PROPERTIES AND ACTION

**Rasa** : Kaṣāya

Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara, Kaphahara, Raktaprasādana, Garbhasthairyakara

IMPORTANT FORMULATIONS - Ayaskṛti

THERAPEUTIC USES - Kuṣṭha, Raktapitta, Mūtraroga, Pāṇḍu, Prameha, Medoroga, Dāha, Śrama, Tṛṣṇā, Kṛmiroga, Garbhasrāva, Garbhapātana

DOSE - 3 - 6 g of the drug in powder form

30 - 60 g of the drug for decoction.

## ŚĀKHOTĀKA (Stem Bark)

Śākhoṭaka consists of stem bark of *Streblus asper* Lour. (Fam. Moraceae); an evergreen, rigid gnarled tree upto 15 m high and 1.5 m in girth, having a bole of 4-7 m distributed in the Himalayas from Himachal Pradesh to West Bengal and in hills and plains of Assam and Tripura, ascending to an altitude of 450 m; also occurs both in the peninsular India upto 600 m, especially in drier parts, and in Andamans.

### SYNONYMS

Sanskrit	:	Kharacchada, Śākhoṭa, Pīṭaphalaka, Bhūtāvāsa
Assamese	:	--
Bengali	:	Sheoda
English	:	Sand Paper Mulberry
Gujrati	:	Sahoda
Hindi	:	Sahora, Sihoda, Sihar
Kannada	:	Mittlamara
Kashmiri	:	--
Malayalam	:	Pirayan, Pirai
Marathi	:	Sahod, Karvatee
Oriya	:	Sahod
Punjabi	:	Shebda
Tamil	:	Pirayan pirai
Telugu	:	Berrenka, Barninka
Urdu	:	Sehoda

### DESCRIPTION

#### a) Macroscopic

Mature stem bark occurs in channelled pieces; thickness varies from 0.3-1 cm; outer surface light grey to silvery brown with faint ridges and a number of lenticels making the

surface quite rough; inner surface smooth and brownish in colour; fracture, tough, brittle on the outer portion and fibrous in the inner portion; no taste and odour.

#### b) Microscopic

Shows a cork consisting of 4-10 layers of thin-walled, rectangular and tangentially arranged cells; cork cambium single layered; secondary cortex Consists of 3-4 layers of thin-walled, somewhat rectangular or circular to polygonal cells; a number of stone cells present either in singles or in groups in tangential bands; stone cells of two types, one having thick-walled and narrow lumen while the other having comparatively thinner wall and wider lumen; they vary in shape, being rectangular, oval, circular to conical, each with simple pits on their walls and radiating canals; secondary phloem consists of sieve elements, parenchyma, phloem fibres and stone cells, traversed by phloem rays; phloem parenchyma thin-walled, circular to oval in shape, phloem fibres moderately thick-walled and lignified with wide lumen, occurring in singles or in groups and radially arranged; stone cells similar to those present in cortical region, occur throughout the phloem; phloem rays thin-walled, rectangular and radially elongated in transverse section, a few ray cells also converted into stone cells; prismatic crystals of calcium oxalate occur throughout the tissues of bark.

**Powder** - Light-grey; shows, phloem fibres, thick and thin-walled stone cells and a large number of oblique, rectangular, prismatic crystals of calcium oxalate.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:

1) shows under UV (366 nm) six fluorescent zones at Rf. 0.11, 0.18 (both light blue), 0.28 (pink), 0.36 (blue), 0.41 (pink) and 0.93 (blue). On exposure to Iodine vapour eight spots appear at Rf. 0.11, 0.28, 0.41, 0.52, 0.60, 0.76, 0.86 and 0.93 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.11, 0.28 (both light brown), 0.36, 0.41, 0.52, 0.76 (all light violet) and 0.93 (dark brown).

**CONSTITUENTS** - Glycosides, Saponins and Sapogenins.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātaśleṣmahara, Medohara, Śothahara

**IMPORTANT FORMULATIONS** - Bṛhanmanjiṣṭhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Arśa, Ślīpada, Apacī, Prameha, Kuṣṭha, Gaṇḍamālā

**DOSE** - 1-3 g (Powder).

10-20 g (for decoction).

## ŚĀLAPARNĪ (Root)

Śālaparnī consists of dried root of *Desmodium gangeticum* DC. (Fam. Fabaceae), a nearly erect under shrub, 0.6 -1.2 m high, growing wild almost throughout India in the plains and Western Ghats, and upto 1500 m in the north upto Sikkim.

### SYNONYMS

Sanskrit	:	Sthirā, Vidārigandhā, Aṃśumatī
Assamese	:	--
Bengali	:	Salparni
English	:	--
Gujrati	:	Salwan
Hindi	:	Sarivan, Salaparni
Kannada	:	Murelchonne
Kashmiri	:	--
Malayalam	:	Moovila
Marathi	:	Salparni, Salwan
Oriya	:	Saloporni
Punjabi	:	Shalpurni
Tamil	:	Moovilai
Telugu	:	Nakkotokaponna, Kolaponna, Kolakuponna

### DESCRIPTION

#### a) Macroscopic

Tap root, poorly developed, but lateral roots 15-30 cm long, and 0.1-0.8 cm thick, uniformly cylindrical with a number of branches; surface smooth bearing a number of transverse, light brown lenticels, bacterial nodules frequently present; light yellow; fracture fibrous; odour not characteristic; taste, sweetish and mucilaginous.

## b) Microscopic

Mature root shows cork, 3-7 layers of thin-walled, tangentially elongated cells, having a few prismatic crystals of calcium oxalate; cork cambium single layered; secondary cortex 4-10 layers of thin-walled, tangentially elongated cells having a few isolated cortical fibres; secondary phloem composed of parenchyma, sieve tubes, companion cells and fibres, traversed by phloem rays; sieve tubes collapsed in outer region, but intact in inner region; phloem fibres slightly elongated, lignified; phloem rays uni to multiseriate, 1-4 cells wide and 4-15 cells high; outer phloem region having occasionally prismatic crystals of calcium oxalate; cambium 2-3 layers; secondary xylem having 1-2 growth rings, consisting of vessels, tracheids, xylem parenchyma, and xylem fibres, traversed by xylem rays; vessels, lignified, large, narrow, with both reticulate thickening or bordered pits; xylem parenchyma with rectangular or slightly elongated cells, resembling those of phloem parenchyma in shape but larger in size and xylem fibres resemble those of phloem fibres in shape but larger in size; xylem rays thick-walled possessing simple pits, 1-5 cells wide and 4-12 cells high; simple, round to oval starch grains measuring 7-25  $\mu$  in dia. and prismatic crystals of calcium oxalate present in secondary phloem and secondary xylem.

**Powder** -Light brown; shows fragments of rectangular cork cells, vessels having reticulate thickening and bordered pits, xylem fibres, ray cells, prismatic crystals of calcium oxalate and simple round to oval starch grains, measuring 7-25  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9: 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.40, 0.85 and 0.96 (all

blue). On exposure to Iodine vapour three spots appear at Rf. 0.40, 0.85 and 0.96 (all yellow).

CONSTITUENTS - Alkaloids.

#### PROPERTIES AND ACTION

Rasa : Tikta, Madhura  
Gūṇa : Guru  
Vīrya : Uṣṇa  
Vipāka : Madhura  
Karma : Tridoṣahara, Balya, Aṅgamardapraśamana, Vṛṣya, Sukhaprasavakara, Sarvadoṣahara, Vātadoṣajit, Rasāyanī, Bhramahara, Viṣahara, Santāpanāśinī

IMPORTANT FORMULATIONS - Daśamūlāriṣṭa, Indukānta Ghr̥ta, Amṛtaprāśa Ghr̥ta, Daśamūlaṣaṭpalaka Ghr̥ta, Dhānvantara Taila, Nārāyaṇa Taila, Mahā Viṣagarbha Taila, Mahā Nārāyaṇa Taila

THERAPEUTIC USES - Jvara, Meha, Arśa, Chardi, Śopha, Śvāsa, Kāсахara, Kṛmi, Rājayakṣmā, Netra Roga, Hṛdaya Roga, Raktagata Vāta, Vāta Ardhvābhedaka, Mūḍha Garbha

DOSE - 5 -10g of the drug in powder form.

10-20 g for decoction.

## ŚĀLĪ (Fruit)

Śālī consists of dried fruit of *Oryza sativa* Linn.(Fam. Poaceae); an annual herb, cultivated throughout India.

### SYNONYMS

Sanskrit	:	Taṇḍulama, Dhānya
Assamese	:	--
Bengali	:	Dhan, Chaval, Chanval
English	:	Rice, Paddy
Gujrati	:	Bhat, Chorya, Chokha
Hindi	:	Chaval, Dhan
Kannada	:	Akkiege, Nellu
Kashmiri	:	--
Malayalam	:	Ari
Marathi	:	Tandul, Sali Bhat
Oriya	:	--
Punjabi	:	--
Tamil	:	Arshee, Nellu, Arisi
Telugu	:	Dhanyamu, Vadlu, Biyyamu

### DESCRIPTION

#### a) Macroscopic

Fruit small, one seeded, caryopsis, about 0.6-1 cm long and 0.2-0.3 cm wide, oblong to ovoid, somewhat angular, blunt, sometimes pointed; surface rough due to minutes trichomes, faintly longitudinal ridges and furrows, mostly 6 rows, somewhat compressed, flattened and tightly enclosed by lemma and palea; yellowish-brown; seed, smooth upto 0.6 cm long, oval to oblong, slightly flattened; blunt, oblique, slightly angled in embryo region; light creamy to white; odour not characteristic; taste, sweet.

## b) Microscopic

Fruit shows wavy irregular outline; pericarp and testa fused together; pericarp consists of single layered, thick, lignified sclerenchymatous outer epidermis with clear pits, covered by a few thick, blunt, sometimes pointed trichomes and 2-3 layered circular to oval fibre, followed by 3-5 layered, tangentially elongated, thick-walled, tabular parenchymatous cells, having a few scattered fibro vascular. bundles and single layered, thin, elongated, slightly wavy inner epidermal cells; testa consists of thinwalled, elongated, 2-3 layered parenchymatous cells with a interrupted tube cells followed by single layered, oval to rectangular, parenchymatous layer containing aleurone grains; endosperm albuminous, consisting of wide, thin-walled, elongated to polygonal, parenchymatous cells packed with numerous, minute, single polyhedral starch grains, having, hilum without concentric striations, measuring 3-12  $\mu$  in dia., compound starch grains 2-150 components; empyro small, lying in a groove at one end of the endosperm, separated by a layer of epithelium; empyro consists of a shieldshaped cotyledon known as scutellum.

**Powder** - Light cream; fragments of elongated thick-walled, lignified sclerenchymatous cells, endosperms cells filled with starch grains, parenchymatous cells of endosperm filled with granules, small pieces of blunt trichomes; minute, single, polyhedral with starch granules having hilum without concentric striations, measuring 3-12  $\mu$  in dia., and compound starch granules with 2-150 components.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) eight fluorescent zones at Rf. 0.11, 0.15, 0.17 (all blue),

0.21 (green), 0.27 (blue), 0.30 (blue), 0.35 (green) and 0.94 (blue). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.21,0.30 and 0.94 (all blue).

CONSTITUENTS - Carbohydrate -Starch.

#### PROPERTIES AND ACTION

Rasa : Madhura, Anurasa-Kaṣāya, Kaṣāya  
Guṇa : Snigdha, Laghu  
Vīrya : Śīta  
Vipāka : Madhura  
Karma : Svalpa Vātakara, Svalpa Kapha Kara, Pittahara, Hṛdya, Rucikara, Vṛṣya, Mūtrala, Bṛmhaṇa, Viṣaghna, Baddhavarcaśaka, Svarya

IMPORTANT FORMULATIONS - Laśunādi Ghṛta, Dādhika Ghṛta, Taṇḍulodakam

THERAPEUTIC USES - Jvara, Tṛṣṇā, Vraṇa, Atīśāra, Bālātīśāra, Pradara

DOSE - 100 ml Tandulodaka.

## ŚĀLMALI (Stem Bark)

Śālmālī consists of the mature stem bark of *Bombax ceiba* Linn. Syn. *B. malabaricum* DC., *Salmalia malabarica* Schott. & Endl. (Fam. Bombacaceae), a deciduous tree attaining a height upto 40 m and a girth upto 6 m or more and distributed throughout the hotter parts of the country upto 1500 m or more.

### SYNONYMS

Sanskrit	:	Moca, Picchila, Raktapuṣpa, Kaṇṭakādhyā, Tūlinī
Assamese	:	Semul
Bengali	:	Shimul, Simul
English	:	Silk-Cotton Tree
Gujrati	:	Shemalo
Hindi	:	Semal, Semar
Kannada	:	Kempuburunga
Kashmiri	:	---
Malayalam	:	Mullilavu
Marathi	:	Sanvar, Katesavar
Oriya	:	--
Punjabi	:	Simble
Tamil	:	Elavam
Telugu	:	Buruga
Urdu	:	Sembhal

### DESCRIPTION

#### a) Macroscopic

Bark 0.5-1 cm thick, pale-ashy to silvery-grey externally, brownish internally, external surface rough with vertical and transverse cracks, mucilaginous on chewing; fracture, fibrous.

## b) Microscopic

Stem bark shows 10-15 layered, transversely elongated, radially arranged, thin-walled, cork cells with a few outer layers having brown coloured contents; rhytidoma present at certain places interrupting the cork; secondary cortex consists of moderately thick-walled, parenchymatous cells containing orange brown contents; stone cells in singles or in groups, thick-walled, oval to irregular, and tangential bands of stone cells having striations with narrow lumen, measuring 13-33  $\mu$  in dia., occur throughout the secondary cortex; secondary phloem consists of usual elements traversed by phloem rays, elements in the outer region form tangential bands of ceratenchyma; a number of concentric bands of fibres alternating with groups of sieve elements also present; fibres lignified having narrow lumen and pointed tips; phloem rays numerous and wavy, 1-6 seriate, cells being radially elongated and moderately thick-walled; rosette crystals of calcium oxalate scattered throughout the secondary cortex, phloem parenchyma and ray cells; mucilage canals and tannin cells present in the parenchymatous cells of cortex.

**Powder** - Reddish-brown; shows fragments of cork cells, parenchymatous cells, single or groups of thick-walled, oval to irregular, stone cells having striations with narrow lumen, measuring 13-33  $\mu$  in dia., rosette crystals of calcium oxalate, phloem fibres and numerous reddish-brown coloured masses and tannin cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) one fluorescent zone at Rf. 0.59 (blue). On exposure to

Iodine vapour four spots appear at Rf. 0.11, 0.44, 0.59 and 0.92 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.44, 0.59 and 0.92 (all violet).

CONSTITUENTS - Saponins, Tannins and Gums

#### PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu, Snigdha, Picchila
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Śothahara, Dāhpraśamana, Pittahara, Vātahara, Kaphavardhaka

THERAPEUTIC USES - Raktapitta, Vraṇa, Dāha, Yuvānapīḍikā

DOSE - 5-10 g (Powder).

## ŚAṆA (Seed)

Śaṇa consists of dried seed of *Crotolaria juncea* Linn. (Fam. Fabaceae), an erect shrubby annual, cultivated nearly throughout the country, and also found wild as an escape.

### SYNONYMS

Sanskrit	:	Śaṇa, Malya Puṣpa
Assamese	:	Ausa, Suila
Bengali	:	Shanpat
English	:	Sunnhemp
Gujrati	:	Sun, Hemp
Hindi	:	Sunn, San
Kannada	:	Senabu
Kashmiri	:	--
Malayalam	:	Chanampayaru, Pulivanji
Marathi	:	Sanavu
Oriya	:	Champal Beeja
Punjabi	:	Sann
Tamil	:	Sanal
Telugu	:	Giliginta
Urdu	:	San

### DESCRIPTION

#### a) Macroscopic

Seed 0.5-0.7 cm long, 0.3-0.4 cm wide, flat and compressed, asymmetrically reniform; surface, glossy; colour, olive- green to grey; taste, mucilaginous.

## b) Microscopic

Seed shows testa, consisting of palisade like macrosclereids, covered externally by smooth, thick cuticle, followed by single layer of lignified flask shaped cells with intercellular spaces; the tissue beneath, consisting of tangentially elongated, thin-walled, crushed parenchymatous cells; endosperm consisting of an aleurone layer containing aleurone grains and associated parenchymatous cells; cotyledons two, consisting of many layered, thin-walled, compactly arranged parenchymatous cells containing abundant aleurone grains.

**Powder** - Greyish-yellow; shows polygonal, slightly thick-walled cells of the testa in surface view, beaker or flask shaped cells, palisade like macrosclereids, oval to polygonal, thin walled parenchymatous cells and aleurone grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 16 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.05 (blue), 0.32 (faint sky blue) and 0.94 (sky blue). On exposure to Iodine vapour eight spots appear at Rf. 0.05, 0.20, 0.26, 0.39, 0.67, 0.74, 0.94 and 0.98 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for about ten minutes at 105°C eight spots appear at Rf. 0.05, 0.20, 0.26, 0.39, 0.67, 0.74 (all grey), 0.94 and 0.98 (both blue).

**CONSTITUENTS** - A bitter principle 'Corchorin'

## PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Amla, Kaṣāya
Guṇa	:	Rūkṣa, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Pittahara, Garbha Anulomaka, Vāntikṛt, Rakta Pravartaka

IMPORTANT FORMULATIONS - Sarsapādi Pralepa, Daśamūlādyā Ghṛta, Mukṭādyā Cūrṇa, Kulatthādyā Ghṛta

THERAPEUTIC USES - Agnimāndya, Jvara, Hṛdroga, Mukharoga, Raktadoṣa, Carma Roga, Timira, Aṅgamarda, Garbhasrāvakara

DOSE - 1-3 g of the drug in powder form.

## ŚARA (Root)

Śāra consists of dried roots of *Saccharum bengalense* Retz. Syn. *S. sara* Roxb.; *S. munja* Roxb. (Fam. Poaceae); an erect grass attaining a height of 5.5 m, found mainly in Punjab, Uttar Pradesh, Bihar, Bengal and Orissa.

### SYNONYMS

Sanskrit	:	Bhadrā, Mūnjā
Assamese	:	--
Bengali	:	Sara
English	:	--
Gujrati	:	Sarkat
Hindi	:	Sarkand, Moonja
Kannada	:	Munji Hullu, Hodake Hullu
Kashmiri	:	--
Malayalam	:	Ama, Amaveru, Sara, Munjappullu
Marathi	:	Munja, Trikande
Oriya	:	Sara
Punjabi	:	Moonja, Sarkanda
Tamil	:	Munjipul, Munjappullu
Telugu	:	Munja
Urdu	:	Munja, Sarkanda

### DESCRIPTION

#### a) Macroscopic

Roots numerous, arising from a common root stock, cylindrical, 5-30 cm long, 0.1-0.5 cm in dia., pale straw coloured with attached rootlets, bark papery; fracture splintery.

## b) Microscopic

Root shows single layered epidermis consisting of cubicular to rectangular, thin-walled cells; hypodermis single layered composed of parenchymatous cells; beneath hypodermis continuous ring of 2-5 layered, thick-walled, lignified, sclerenchymatous cells found scattered; cortex consisting of oval to round, thinwalled parenchymatous cells, those of inner layers becoming smaller in size and rectangular in shape; endoderm is single layered forming a ring around stele, consisting of tangentially elongated cells; pericycle single layered composed of thinwalled cells; xylem and phloem form equal number of bundles, arranged alternately in rings consisting of usual elements; metaxylem elements much bigger than protoxylem; pith distinct consisting of thin-walled, polygonal, parenchymatous cells having intercellular spaces.

**Powder** - Light greyish-brown; shows lignified, thick-walled, sclerenchymatous cells, and vessels with reticulate thickenings.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3.5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic Acid: Water (4:1:5) shows in visible light two spots at Rf. 0.69 and 0.97 (both grey). Under UV (366 nm) five blue fluorescent zones appear at Rf. 0.10, 0.19, 0.35, 0.69 and 0.97. On exposure to Iodine vapour eight spots appear at Rf. 0.05, 0.10, 0.19, 0.35, 0.44, 0.69, 0.80 and 0.97 (all yellowish brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 110°C for ten minutes eight spots appear at Rf. 0.10, 0.19, 0.35, 0.61 (all grey), 0.80 (violet), 0.92 (grey), 0.95 and 0.97 (both violet).

CONSTITUENTS - Sugars.

**PROPERTIES AND ACTION**

Rasa	:	Madhura, Tikta, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Anuṣṇa
Vipāka	:	Madhura
Karma	:	Kaphahara, Tr̥ṣ doṣahara, Balya, Vṛṣya, Cakṣuṣya, Dāhahara, Tr̥ṣnāhara

IMPORTANT FORMULATIONS - Tr̥ṣapañcamūla Kvātha Cūrṇa, Brāhma Rasāyana, Sukumāra Ghṛta

THERAPEUTIC USES - Dāha, Akṣiroga, Tr̥ṣṇā, Visarpa, Mūtrakṛcchra, Bastiśūla, Mūrccā, Bhrama

DOSE - 20 -50 g of Kvatha Curna for decoction.

6 -10 g (Powder).

## SARALA (Heart Wood)

Sarala consists of dried heart wood of *Pinus roxburghii Sargent* (Fam. Pinaceae), a large tree upto 30 m high and 2.5 m in girth, growing on the Himalayas from 600 m to 1830m.

### SYNONYMS

Sanskrit	:	Surdhiasuka, Pīta Vṛkṣa
Assamese	:	--
Bengali	:	Tarper Telargaach, Sarala Gach
English	:	Long Leaved Pine
Gujrati	:	Saral
Hindi	:	Cheed
Kannada	:	Saral
Kashmiri	:	--
Malayalam	:	Saral, Saralam
Marathi	:	Saral
Oriya	:	--
Punjabi	:	Cheel
Tamil	:	Saral, Shirsal
Telugu	:	Saral
Urdu	:	Cheel, Sanobar

### DESCRIPTION

#### a) Macroscopic

Drug available as chips of heart wood, yellowish-brown when fresh and becoming brown on exposure; surface, smooth; fracture, short; resin canal strands and growth rings seen on fractured surface; taste, not distinct; odour, resinous and aromatic.

## b) Microscopic

Wood non-porous; medullary rays and schizogenous resin ducts present, alternating bands of autumn wood and spring wood present; tracheids of spring wood, large, polygonal in shape and thinner than autumn tracheids; autumn tracheids small and nearly squarish in shape with several bordered pits arranged uniseriately on the radial walls of tracheids; medullary rays mostly uniseriate and upto 6 cells high, biseriate rays, upto 20 cells high, but only occasionally seen; schizogenous resin ducts fairly abundant in autumn wood and spring wood; each duct associated with some thin walled, cellulosic parenchyma.

**Powder** - Yellowish-brown; shows numerous tracheids and pieces of medullary rays, and few resin debris.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (8 : 2) shows under UV (366 nm) four fluorescent zones at Rf. 0.14 (yellow), 0.28, 0.48 and 0.55 (all sky blue). On exposure to Iodine vapour five spots appear at Rf. 0.14, 0.19, 0.24, 0.28 and 0.61 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and on heating the plate at 105°C for ten minutes three spots appear at Rf. 0.28, 0.61 and 0.92 (all violet).

**CONSTITUENTS** - Oleo-resin and Flavonoids.

## PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Kaṭu
Guṇa	:	Laghu, Snigdha, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmakā, Vraṇaśodhaka, Svedahara

IMPORTANT FORMULATIONS - Karpūrādyarka, Rajanyādi Cūrṇa, Sudarśana Cūrṇa

THERAPEUTIC USES - Karṇaroga, Kaṇṭha Roga, Akṣiroga, Dāha, Mūrcchā, Vraṇa, Kāsa, Svarabhramśa, Yūkā

DOSE - 1-3 g in powder form.

## SARALA (Root)

Sarala consists of dried root of *Pinus roxburghii* Sargent. (Fam. Pinaceae); a large tree upto 30 m high and 2.5 m in girth, growing on the Himalayas from 600m to 1830m.

### SYNONYMS

Sanskrit	:	Pīta Vṛkṣa, Surabhidāruka
Assamese	:	--
Bengali	:	Tarpin Telargaach, Sarala Gaach
English	:	Long Leaved Pine
Gujrati	:	Sarala
Hindi	:	Cheel
Kannada	:	Sarala
Kashmiri	:	--
Malayalam	:	Saralam, Sarala
Marathi	:	Sarala
Oriya	:	--
Punjabi	:	Cheel
Tamil	:	Shirsal, Sarala
Telugu	:	Sarala
Urdu	:	Cheer, Sanobar

### DESCRIPTION

#### a) Macroscopic

Root well-developed, 3-3.5 cm thick, hard, woody, cylindrical; reddishbrown; surface rough due to longitudinal and transverse striations; fracture, hard; no smell and taste.

## b) Microscopic

Mature root shows 10-15 layers of thin-walled, tangentially elongated cork cells filled with tannin; secondary cortex consists of a wide zone of thin-walled, rectangular to polygonal elongated cells mostly filled with starch grains, and of embedded resin canals; phloem a narrow strand composed of sieve tubes, parenchyma and phloem rays; tannin and starch grains also present in this region; xylem composed of tracheids, medullary rays and embedded resin ducts; tracheids thickwalled, with bordered pits; xylem rays 1-2 cells wide and filled with starch grains; simple, round to oval, rarely elongated starch grains, measuring 11-25  $\mu$  in dia.

**Powder** - Reddish-brown; shows fragments of cork cells, tracheids with bordered pits, resin canals, simple round to oval, starch grains measuring 11-25  $\mu$  in dia. and fragment of phloem and xylem rays filled with starch grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9:1) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.75, 0.88 and 0.96 (all blue). On exposure to Iodine vapour five spots appear at Rf. 0.17, 0.53, 0.75, 0.88 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.75, 0.88 and 0.96 (all grey).

**CONSTITUENTS** - Resins - Oleo-resin.

### PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Kaṭu
Guṇa	:	Laghu, Snigdha, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmakā, Vraṇaśodhaka, Svedahara

IMPORTANT FORMULATIONS - Karpūrādyarka, Rajanyādi Cūrṇa, Sudarśana Cūrṇa

THERAPEUTIC USES - Karṇa Roga, Kaṇṭha Roga, Akṣi Roga, Dāha, Vraṇa, Kāsa, Svarabhramśa

DOSE - 1-3 g in powder form.

## SARṢAPA (Seed)

Sarṣapa consists of dried seed of *Brassica campestris* Linn. (Fam. Brassicaceae), an erect, stout, simple or branched, glaucous, annual herb, 50 to 60 cm tall with amplexicaul leaves, commonly cultivated in Bengal, Bihar, D.P. and Punjab, and also found occasionally as an escape in waste places and fields.

### SYNONYMS

Sanskrit	:	Kaṭusneha, Siddhārtha
Assamese	:	--
Bengali	:	Sarisa
English	:	Mustard
Gujrati	:	Sarasad, Rai
Hindi	:	Saraso
Kannada	:	Sasuve, Sasuvae, Sasive
Kashmiri	:	--
Malayalam	:	Katuka
Marathi	:	Mohari
Oriya	:	--
Punjabi	:	Sarayo, Sarson
Tamil	:	Kadugu
Telugu	:	Avalu
Urdu	:	Sarson

### DESCRIPTION

#### a) Macroscopic

Seeds small, slightly oblong, pale or reddish-brown, bright, smooth, 1.2- 1.5 mm in dia.; under magnifying glass it is seen to be minutely reticulated; taste, bitter and sharp.

### b) Microscopic

Seed shows single layered colourless testa followed by 3-5 layered, non-lignified, hexagonal, thick-walled cells filled with yellowish-brown contents; embryo and endosperm consists of hexagonal, thin-walled parenchymatous cells containing oil globules.

**Powder** - Yellow in colour with brown particles and oily, slightly bitter and sharp in taste; shows frequently thick-walled, fragments of reddish-brown cells of hypodermis, yellowish hyaline masses.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.
Fixed Oil	Not less than	35	per cent, Appendix	2.2.8

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) two fluorescent zones at Rf. 0.12 and 0.59 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.12, 0.59 and 0.70 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for ten minutes at 105<sup>o</sup> C three spots appear at Rf. 0.12, 0.59 and 0.70 (all violet).

CONSTITUENTS - Fixed Oil.

### PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Tīkṣṇa, Snigdha
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphahara, Vātahara, Pittakara, Dīpana, Vidāha, Hṛdya

IMPORTANT FORMULATIONS - Mahā Yogarāja Guggulu, Kārpāsāsthyādi Taila, Kuṅkumādi Taila, Prabhañjana Vimardana Taila, Vajraka Taila

THERAPEUTIC USES - Kaṇḍū, Kuṣṭha, Koṣṭhakṛmi, Grahabādhā

DOSE - 0.5-1 g in paste form.

## ŚATAPATRIKĀ (Flower)

Śatapatrikā consists of dried flower of *Rosa centifolia* Linn. (Fam. Rosaceae); a small erect shrub, 1-1.8 m high, cultivated in gardens.

### SYNONYMS

Sanskrit	:	Devataruṇī, Karṇikā
Assamese	:	Varde Ahamar
Bengali	:	Golap
English	:	Rose
Gujrati	:	Moshamee Gulab
Hindi	:	Gulab
Kannada	:	Rojahu
Kashmiri	:	-
Malayalam	:	Rosappoovu
Marathi	:	Gulab
Oriya	:	--
Punjabi	:	Gulab
Tamil	:	Rojapoo
Telugu	:	Rojapuvvu, Gulabi
Urdu	:	Gulab, Ward

### DESCRIPTION

#### a) Macroscopic

Flower stalked, pinkish-yellow, consists of sepals, petals and stamens attached to pedicel with thalamus at the base; stalk 0.6-3.5 cm long, light green, slender, covered with numerous prickles and hairs; thalamus 1.0-1.8 cm long, light greenishbrown, covered with numerous prickles and hairs; sepal 5, free, 1.3-2.4 cm long, unequal, leaf-like, upper part

creamish-green and light yellowish-green on lower part, having glandular hairs; petals numerous, pinkish-yellow, 1.5-4.2 cm long, 1.3-2.5 cm wide, smooth obovate to subcordate; stamens numerous, free, unequal, dorsifixed, dark-brown; filament 0.3-0.5 cm long; carpels many free, ovary inferior; styles lateral, hairy, free; stigma terminal; taste, astringent; odour, aromatic.

#### b) Microscopic

**Sepal** - Shows single layered epidermis on both surfaces; numerous long, unicellular hairs present on upper surface, a few glandular hairs on lower surface; both epidermises followed by a wide zone of mesophyll consisting of round to oval, thin-walled, parenchymatous cells; a number of vascular bundles found scattered in this region.

**Petal** - Shows lower epidermis papillose and without cuticle; upper epidermis single layered with thin striated cuticle, followed by mesophyll consisting of oval to polygonal, elliptical, thin-walled, parenchymatous cells; a number of vascular bundles found scattered in this zone.

**Powder** - Light-brown in colour; fragments of petal of epidermis consisting of thinwalled, sinuous cells extended to form papillae; xylem vessel with spiral thickenings long, pointed, uniseriate, unicellular hair and stalked capitate glandular hairs; abundant, smooth, spherical pollen grains, measuring 27- 41  $\mu$  in dia., containing clear intine and exine with three distinct pores.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid: Water (5:1:4) shows in visible light six spots at Rf. 0.42 (violet), 0.50 (pink), 0.66, 0.82, 0.87 and 0.92 (all yellow). Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.42 (blue), 0.50 (pink), 0.82, 0.87 and 0.92 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.42 (grey), 0.50 (pinkish grey), 0.66, 0.82, 0.87 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.19 (greyish black), 0.32 (greyish black), 0.42, 0.50 (both violet), 0.66, 0.82, 0.87 and 0.92 (all brown).

#### CONSTITUENTS - Essential Oil

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vātahara, Pittahara, Kaphahara, Śukrakara, Netrya, Dīpana, Hṛdya, Varnya

IMPORTANT FORMULATIONS - Vasanta Kusumākara Rasa, Taruṇārka (Gulabjala), Pravāla Piṣṭi, Mukta Piṣṭi, Jaharamoharā Piṣṭi, Tṛṇakāntamaṇi Piṣṭi

THERAPEUTIC USES - Kuṣṭha, Dāha, Mukhasphoṭa, Raktapitta, Raktavikāra

DOSE - 3-6 g of the drug in powder form.

## ŚIMŚAPĀ (Heart Wood)

Śimśapā consists of dried heart wood of *Dalbergia sissoo* Roxb. (Fam. Fabaceae), a medium sized, deciduous tree, found in western Himalayas upto 1220 m altitude and from Sikkim to upper Assam, and extensively planted throughout the country.

### SYNONYMS

Sanskrit	:	Kṛṣaṇa Sāra, Śyāmā
Assamese	:	--
Bengali	:	Shishu
English	:	Sissoo Tree
Gujrati	:	Sisam
Hindi	:	Seesam
Kannada	:	Eragundimavu, Bindi
Kashmiri	:	--
Malayalam	:	Irupoola
Marathi	:	Sisu, Shisav
Oriya	:	Sisu, Sinsapa
Punjabi	:	Sheesham
Tamil	:	Irupulai
Telugu	:	Irugudu, Virugudu, Sissoo
Urdu	:	Sheesham

### DESCRIPTION

#### a) Macroscopic

Drug consists of pieces of wood of variable lengths and widths, brown, very hard and strong; close-grained, annual ring not distinct, rays fine, pores uniformly distributed joined by wavy concentric bands; fracture hard and tough.

## b) Microscopic

Heart wood shows well developed xylem, consisting of usual elements, vessels simple pitted, solitary or 2-3 in groups, arranged in radial rings, a few contain reddish-brown content; parenchyma thick walled and paratracheal; medullary rays 1-3 cells wide; fibres abundant in numbers and present in groups alternating with the bands of xylem parenchyma.

Powder - Brown; under microscope shows fibres, tracheids and parenchymatous cells.

## IDENTITY, PURITY AND STRENGTH -

### Identification -

#### Fluorescence test on aqueous and alcoholic extracts

- i) 5 g. extracted in 100 ml of water and filtered shows in day light - light-brown colour; under U.V. light (366 nm) greenish-brown, and under U.V. light (254 nm) yellowish-green.
- ii) 5 g. extracted in 100 ml of alcohol and filtered shows in day light - darkbrown colour; under U.V. light (366 nm) dark-brown, and under U.V. light (254 nm) dark-brown.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract 01 } Silica gel 'G' plate using Toluene: Ethylacetate (7:3) in visible light shows nine spots at Rf. 0.14, 0.19, 0.27 (all grey), 0.52 (yellow), 0.56, 0.62, 0.70, 0.75 and 0.86 (all grey). Under UV (366 nm) five fluorescent zones appear at Rf.

0.19 (yellowish blue), 0.27, 0.42 (both light blue), 0.52 and 0.70 (both blue). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate for ten minutes at 110°C eleven spots appear at Rf. 0.19(orange), 0.27, 0.30 (both grey), 0.36 (yellowish grey), 0.47 (grey), 0.52 (green), 0.56 (grey), 0.62 (light green), 0.70 (grey), 0.86 (green) and 0.88 (grey).

CONSTITUENTS - Fixed Oil, Essential Oil, Tannins and Flavonoids.

#### PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Kaṣāya  
Guṇa : Guru, Picchila  
Vīrya : Uṣṇa  
Vipāka : Kaṭu  
Karma : Vātahara, Pittahara, Kaphahara, Medohara, Kaphaviśoṣaṇa, Medoviśoṣaṇa, Śukradoṣahara, Varṇya, Rucikara, Garbhapātinī Saiya , Śoṣahariṇī, Pipana

IMPORTANT FORMULATIONS - Ayaskṛti, Nārasimha Ghr̥ta, Mahākhadira Ghr̥ta

THERAPEUTIC USES - Kuṣṭha, Kṛmi, Dāha, Śvitra, Vraṇa, Mūtraśarkarā, Basti Roga, Hikkā, Prameha, Arśa, Jvara, Gulma, Aśmarī, Atīsāra, Rakta Vikāra, Śoṣa, Śopha, Pāṇḍu, Chardi, Pīnasa, Duṣṭavraṇa, Vasāmeha, Sarvajvara

DOSE - 5 -10 g of the drug in powder form.

10 -20 g for decoction.

## ŚIMŚAPĀ (Stem Bark)

Śimśapā consists of dried stem bark of *Dalbergia sissoo* Roxb. (Fam. Fabaceae); a medium sized, deciduous tree, found in Western Himalayas upto 1220 m altitude, and from Sikkim to upper Assam, and extensively planted throughout the country.

### SYNONYMS

Sanskrit	:	Śyāmā, Kṛṣṇa Sāra
Assamese	:	--
Bengali	:	Shishu
English	:	Sissoo Tree
Gujrati	:	Sisam
Hindi	:	Seesam
Kannada	:	Bindi, Eragundimavu
Kashmiri	:	--
Malayalam	:	Irupoola
Marathi	:	Shisav, Sisu
Oriya	:	Sinsapa, Sisu
Punjabi	:	Sheesham
Tamil	:	Irupulai
Telugu	:	Irugudu, Sissoo, Virugudu
Urdu	:	Sheesham

### DESCRIPTION

#### a) Macroscopic

Bark 3-5 cm long, curved or flat, fibrous, cut pieces; external surface rough with shallow, broad longitudinal fissures, exfoliating in irregular, woody strips and scales; pale yellow to dark reddish-brown; fracture, fibrous.

## b) Microscopic

Mature stem bark consists of 6-25 or more rows of rectangular, thin-walled, radially arranged cork cells, a few outer layers exfoliating; secondary cortex wide consisting of round or oval, thin-walled, parenchymatous cells, a number of groups of sclerenchymatous cells, found scattered throughout secondary cortex, a few cortical cells contain prismatic crystals of calcium oxalate; secondary phloem very wide consisting of usual elements of thin-walled cells and tangential strips of phloem fibres; collapsed, thin-walled, parenchymatous cells present in tangential strips throughout the secondary phloem; most of phloem fibres and parenchyma cells contain prismatic crystals of calcium oxalate; phloem rays short, uni to triseriate, consisting of radially elongated, thin-walled, parenchymatous cells.

**Powder** - Light brown; shows thin-walled parenchymatous cells, phloem fibres, fragments of cork cells and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) five fluorescent zones at Rf. 0.28, 0.59, 0.71, 0.78 and 0.93 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.34, 0.51, 0.59, 0.71, 0.75 and 0.78 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for fifteen minutes at 105° C six spots appear at Rf. 0.34, 0.51, 0.59, 0.71, 0.75, 0.78 (all violet).

CONSTITUENTS - Flavonoids.

**PROPERTIES AND ACTION**

Rasa : Kaṣāya, Kaṭu, Tikta

Guṇa : Laghu, Rūkṣa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Tridoṣahara, Vraṇaśodhana, Garbhapātakara, Balya, Rucikara, Medohara, Vāmaka

**IMPORTANT FORMULATIONS - Nārasimhaghṛta Rasāyana**

**THERAPEUTIC USES** - Kuṣṭha, Śvitra, Kṛmi, Bastiroga, Duṣṭa, Vraṇa, Dāha, Kaṇḍū, Hikkā, Śopha, Visarpa, Pīnasa

**DOSE** - 3-6 g of the drug in powder form.

50-100 ml of the drug for decoction.

## ŚIRĪṢA (Stem Bark)

Śirīṣa consists of stem bark of *Albizzia lebeck Benth.* (Fam. Fabaceae), a large tree, common throughout the country, ascending to 1200 m on the Himalayas.

### SYNONYMS

Sanskrit	:	Bhaṇḍi, Śītapuṣpa, Śukapriya, Mṛdupuṣpa
Assamese	:	--
Bengali	:	Sirish, Siris
English	:	Siris Tree, Lebeck Tree
Gujrati	:	Shirish
Hindi	:	Siris, Shiris
Kannada	:	Bagey, Bage Mara, Hombage
Kashmiri	:	--
Malayalam	:	Vaka, Nenmenivaka
Marathi	:	Siris
Oriya	:	Sersuan, Sirisha
Punjabi	:	Sirish, Sareehn
Tamil	:	Vakai
Telugu	:	Dirisena
Urdu	:	Siris

### DESCRIPTION

#### a) Macroscopic

Bark 1.5 - 2.5 cm thick, external surface dark brown, rough due to longitudinal fissures and transverse cracks, rhytidoma forming major part of bark and peeling off in flakes exposing buff coloured surface, middle bark brown, inner bark much fibrous. light yellow to grey; fracture, laminated in outer region and fibrous in inner region; taste, very astringent.

## b) Microscopic

Mature bark about 2 cm thick, shows dead tissue of rhytidoma; cork consists of a few layers of thin-walled, transversely elongated and radially arranged cells; secondary cortex wide, composed of radially elongated to squarish, moderately thickwalled cells containing orange to reddish-brown contents; a few of the cells contain prismatic crystals of calcium oxalate; stone cells, variable in shape and size, present in singles or in groups throughout the region; secondary phloem consists of sieve elements, phloem parenchyma, phloem fibres and crystal fibres, traversed by phloem rays; prismatic crystals of calcium oxalate present in most of the phloem parenchyma cells; tangential bands of ceratenchyma present in middle and outer phloem region; phloem fibres. elongated, thick-walled, lignified, present in many concentric strips, mostly enclosed by crystals sheath throughout the middle and inner regions of phloem; crystal fibres having a number of septa, each chamber containing a single prismatic crystal of calcium oxalate; phloem rays numerous, radially elongated, somewhat wavy in outer phloem region and bi to multiseriate in the inner phloem region. being 2 - 5 cells wide and 7 - 25 cells high.

**Powder** - Greyish-brown; shows large number of stone cells, prismatic crystals of calcium oxalate, crystal fibres and phloem fibres.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) a fluorescent zone at Rf. 0.63 (blue). On exposure to Iodine vapour two spots appear at Rf. 0.07 and 0.21 (both yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate at 105°C for ten minutes

two spots appear at Rf. 0.07 and 0.21 (both light blue).

CONSTITUENTS - Saponins and Tannins.

#### PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya, Madhura, Kaṭu
Guṇa	:	Laghu
Vīrya	:	Anuṣṇa
Vipāka	:	Kaṭu
Karma	:	Viṣaghna, Tvagdoṣa, Tridoṣahara, Śothahara, Varṇya

IMPORTANT FORMULATIONS - Vajraka Taila, Daśānga Lepa, Ayaskṛti, Devadārvāriṣṭa, Bṛhanmaricādyā Taila

THERAPEUTIC USES - Pāmā, Kuṣṭha, Kaṇḍū, Visarpa, Kāsa, Vraṇa, Śoṭha, Śvāsa, Mūṣaka Visa, Śīta Pitta, Raktaduṣṭi, Pīnasa, Viṣamajvara, Pratisyāya, Sarpadaṃśa, (Casake), Viṣaduṣṭi, Suryāvarta, Ardhāvabhedaka, Kṛmiroga, Netrābhiṣyanda

DOSE - 25-50 g (Kwatha)

3-6 g (Curna).

## STHAUNEYA (Leaf)

Sthauneya consists of dried leaf of *Taxus baccata* Linn. (Fam. Taxaceae); an evergreen conifer, about 6.5 m high, distributed in the temperate Himalayas at altitudes between 1800-3300 m and in the hills of Meghalaya and Manipur at an altitude of 1500m.

### SYNONYMS

Sanskrit	:	Śukapuṣpa, Vikarṇa
Assamese	:	--
Bengali	:	Birmi, Bhirmie, Talish Patra, Bhada Getela
English	:	Himalayan Yew
Gujrati	:	Gethela Barmi
Hindi	:	Thuner, Talispatra Bhed
Kannada	:	Sthauneyak
Kashmiri	:	--
Malayalam	:	Thuriangam, Tuniyankam
Marathi	:	Sthauney Barmi
Oriya	:	Talisabhed, Chalisa Patra
Punjabi	:	Birmi
Tamil	:	Talisapatri-Bhedam
Telugu	:	Taleesa Patri Bhedamu
Urdu	:	Birmi, Zarnab

### DESCRIPTION

#### a) Macroscopic

Drug occurs as whole or broken leaf pieces, entire leaf flattended, linear with recurved margins, 1.3-4.0 cm long and 0.1-0.3 cm wide, tip sharp pointed and prickly, entire. thick, brown above, but paler below; petiole, very short; odour. pleasant; taste, acrid, bitter and disagreeable.

## b) Microscopic

### Leaf-

*Lamina* - shows dorsal ventral structure, margin slightly turned downward; upper epidermis single layered covered with thick, striated cuticle; lower epidermis single layered with papillate projection; sunken stomata present only on lower surface, overhung by subsidiary cells; palisade two layered; spongy parenchyma 3-5 layered. thin-walled, oval or irregular in shape, containing reddish-brown contents; vascular bundle single, present in the midrib within an endodermis.

**Powder** - Brown; shows fragments of reddish-brown spongy parenchyma cells and very rarely xylem tracheids, polygonal epidermal cells with striated cuticle and a few sunken stomata in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 : 1 : 5) shows under UV (366 nm) three fluorescent zones at Rf. 0.67 (pink), 0.95 (grey) and 0.98 (pink). Under visible light shows three spots at Rf. 0.91 (pink), 0.95 (pink) and 0.98 (greenish yellow). On exposure to Iodine vapour seven spots appear at Rf. 0.08, 0.29, 0.60, 0.70, 0.82, 0.91 and 0.95 (all yellow).

CONSTITUENTS - Alkaloids - Taxine, Ephedrine, Glycoside, Tannins, Resins, Reducing Sugars and Formic Acid.

#### PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Madhura  
Guṇa : Snigdha, Guru  
Vīrya : Śīta  
Vipāka : Madhura  
Karma : Medhya, Śukravardhaka, Kaphahara, Vātahara, Pittaśāmaka, Jantughna, Varṇa Prasādana, Lomasañjanana

IMPORTANT FORMULATIONS - Mahā Nārāyaṇa Taila, Balā Taila

THERAPEUTIC USES - Rakta Vikāra, Trṣṇā, Tila Kālaka, Dāha, Kuṣṭha, Kṛmiroga, Piḍikā, Arbuda (Karkaṭa)

DOSE - 1-3 g of the drug in powder form.

## SŪRAṆA (Corm)

Sūraṇa consists of dried corm of *Amorphophallus campanulatus* (Roxb.) Blume. (Fam. Araceae); a stout, herbaceous plant, cultivated throughout the plains of the country.

### SYNONYMS

Sanskrit	:	Arśoghna, Kandala
Assamese	:	--
Bengali	:	Ole
English	:	Elephant Foot
Gujrati	:	Sooran
Hindi	:	Suranakanda, Zamikanda
Kannada	:	Suranagadde
Kashmiri	:	--
Malayalam	:	Chena, Kattuchena, Kattuchenai, Cena Karana
Marathi	:	Jungli Suran, Suran
Oriya	:	Olooakanda, Suran
Punjabi	:	Gimikanda
Tamil	:	Karunai Kizhangu
Telugu	:	Mancai Kanda Durada Gadda
Urdu	:	Zamin-qand, Zamikand

### DESCRIPTION

#### a) Macroscopic

Drug occurs as cut pieces of different shapes and sizes; external surface of cork blackish-brown, rough due to numerous scars and a few adventitious roots, internal portion creamish white; fracture, short; taste, acrid.

## b) Microscopic

Corm shows a wide zone of cork consisting of 5-25 tangentially elongated, rectangular, thin-walled cells, a few inner layers containing rosette crystals of calcium oxalate, and plenty of simple and compound starch grains; ground tissue very wide consisting of thin-walled, parenchymatous cells; a few cells containing both rosette and acicular crystals of calcium oxalate; starch grains both simple and compound, spherical in shape consisting of 2-4 components, measuring 3-31  $\mu$  in diameter; vascular bundles poorly developed, scattered in ground tissue; vessels arranged in groups of 2-3, having spiral thickenings; a few parenchyma cells of ground tissue containing yellowish cell contents.

**Powder** - Creamish-grey; shows abundant simple and compound starch grains, measuring 3-31  $\mu$  in dia., fragments of cork cells, a few rosette and acicular crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Benzene: Ethylacetate (9:1) on exposure to Iodine vapour shows for four spots at Rf. 0.09, 0.66, 0.74 and 0.85 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.09, 0.66, 0.74 and 0.85 (all grey).

**CONSTITUENTS** - Betulinic Acid,  $\beta$ -Sitosterol, Stigmasterol, Lupeol, Triacotane, Glucose, Galactose, Rhamnose and Xylose.

## PROPERTIES AND ACTION

Rasa	:	Kaṭu, Kaṣāya
Guṇa	:	Laghu, Rūkṣa, Viśada
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātakara, Pittakara, Kaphahara, Dīpana, Viṣṭambhī, Rucya, Gudakīlahṛt, Raktapittakara, Dadrukara, Kuṣṭhakara

IMPORTANT FORMULATIONS - Sūraṇāvāleha, Sūraṇavaṭaka, Sāmudrādyā Cūrṇa

THERAPEUTIC USES - Arśa, Plīhāgulma, Śvāsa, Kāsa, Āṣṭhīlā

DOSE - 2-10 g of the drug in powder form.

## ŚVETACANDANA (Heart Wood)

Śvetacandana consists of dried heart wood of *Santalum album* Linn. (Fam. Santalaceae), an evergreen, semi parasitic tree, 8 to 18 m in height and 2 to 4 m in girth, widely distributed in the country, commonly found in the dry regions of peninsular India from Vindhya mountains southwards, especially in Karnataka and Tamilnadu; it is cultivated for its aromatic wood and oil.

### SYNONYMS

Sanskrit	:	Śrīkhaṇḍa, Śvetacandana
Assamese	:	Sandale Avyaj
Bengali	:	Chandan
English	:	Sandal Wood
Gujrati	:	Sukhad
Hindi	:	Chandan, Safed Chandan
Kannada	:	Shrigandhamara, Shrigandha, Chand
Kashmiri	:	--
Malayalam	:	Chandanam
Marathi	:	Chandan
Oriya	:	--
Punjabi	:	Chandan
Tamil	:	Chandana maram, Sandanam, Ingam
Telugu	:	Gandhapu Chekka, Manchi Gandham, Tella Chandanam , Sriga
Urdu	:	Sandal Safed

### DESCRIPTION

#### a) Macroscopic

Yellowish-brown to pale-reddish orange, heavy, dense, hard but split easily; transversely smooth surface shows alternating light and dark concentric zones with

numerous pores, traversed by very fine medullary rays; odour, persistently aromatic; taste, slightly bitter.

#### b) Microscopic

Wood consists of tracheids, vessels, fibres, xylem parenchyma and traversed by medullary rays; vessels numerous scattered singly throughout the region, rarely two together, barrel-shaped, pitted and with transverse to oblique perforation with tail-like projections, at one or both ends; a few tracheids elongated with tapering ends and possess bordered pits on their walls; fibres many, lignified with pointed tips; xylem parenchyma mostly rectangular, a few of them contain prismatic crystals of calcium oxalate; xylem rays numerous, run straight, uni to triseriate, mostly biseriate, thick-walled, radially elongated having golden yellow to brownish contents and contain a few prismatic crystals of calcium oxalate.

**Powder** - Light-brown and aromatic; shows pitted vessels with tails, isolated or associated with fibres, fragments of fibres, square to rectangular-shaped parenchyma, prismatic crystals of calcium oxalate, and numerous oil globules.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	1 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1 per cent, Appendix	2.2.7.
Volatile Oil	Not less than	1.5 per cent, Appendix	2.2.10.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (93 : 7) shows on exposure to Iodine vapour six spots at Rf 0.05, 0.10, 0.27 (all yellowish brown), 0.60 (dark brown), 0.82 and 0.91 (both yellowish brown). On spraying with Anisaldehyde-Sulphuric acid reagent- and heating the plate for about ten minutes at 110°C

six spots appear at Rf. 0.05, 0.10, 0.27 (all bluish violet), 0.60 (violet). 0.82 and 0.91 (both bluish violet).

CONSTITUENTS - Volatile oil ( $\alpha$ - and  $\beta$ - Santalol)

#### PROPERTIES AND ACTION

Rasa : Tikta, Madhura  
Gūṇa : Laghu, Rūkṣa  
Vīrya : Śīta  
Vipāka : Kaṭu  
Karma : Pittahara, Kaphahara, Durgandhahara, Dāhpraśamana, Varṇya, Hṛdya, T  
rṣṇāhara, Vṛṣya, Kṛmighna, Viṣaghna

IMPORTANT FORMULATIONS - Ayaskṛti, Aśvagandhādyariṣṭa, Sārivādyāsava, Arimedādi  
Taila, Balādhātryādi Taila, Marma Guṭikā, Candanāsava, Candanādi Cūrṇa, Candanādi Taila

THERAPEUTIC USES - Śoṣa, Dāha, Raktapitta, Raktārśa, Hikkā, Vamana, Raktātisāra,  
Pradara, Śukrameha, Netra Roga, Mūtrāghāta, Bhrama, Raktavikāra, Kṛmiroga

DOSE - 3-6 g of the drug in powder form.

## ŚYONĀKA (Root)

Śyonāka consists of dried root of *Oroxylum indicum* Vent. (Fam. Bignoniaceae); a small tree, distributed throughout the country, chiefly in evergreen forest upto 600 m.

### SYNONYMS

Sanskrit	:	Dīrghavṛnta, Kaṭvaṅga, Pṛthsuimba
Assamese	:	Kering
Bengali	:	Sonagachh
English	:	--
Gujrati	:	Tentoo
Hindi	:	Sonapatha, Shyonak, Tentoo
Kannada	:	Tigudu
Kashmiri	:	--
Malayalam	:	Palagripayanni
Marathi	:	Tentoo
Oriya	:	Pamponiya
Punjabi	:	Tatpaling, Talvarphali
Tamil	:	Peruvagai
Telugu	:	Dundilumu, Gumpena, Pampini
Urdu	:	Sonapatha

### DESCRIPTION

#### a) Macroscopic

Drug available in cut pieces, having secondary roots, greyish-brown to light brown, cut surface brownish-cream, cylindrical, ribbed at few places, 5-16 cm long, 1-3 cm thick, external surface rough due to longitudinal and transverse cracks, fracture, short; taste, slightly sweet.

## b) Microscopic

Root mature root shows 10-30 or more layers of tangentially elongated, radially arranged cork cells filled with reddish-brown content; secondary cortex composed of oval to polygonal, parenchymatous cells; stone cells, thick-walled, lignified of various shapes and sizes with narrow lumen, distinct pits and striations; secondary phloem composed of sieve tubes, parenchyma, fibres and groups of stone cells; groups of fibres traversed by 2-8 cells wide phloem rays; secondary xylem consists of usual elements; xylem vessels of various sizes, occur in singles and groups of 2-5 cells arranged radially having reticulate thickening; xylem rays 2-4 cells wide; fibres having wide lumen and pointed tips, and tracheids present.

**Powder** - Brownish-cream; shows groups of stone cells, fragments of cork, phloem fibres with wide lumen and pointed tips and reticulate vessels and tracheids.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	42	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 : 5) shows under UV (366 nm) a fluorescent zone at Rf. 0.10 (blue). On exposure to Iodine vapour six spots appear at Rf. 0.10, 0.30, 0.58, 0.70, 0.85 and 0.95 (all yellow). On spraying with 5% Methanolic-Sulphuric acid and heating the plate for ten minutes at 105°C five spots appear at Rf. 0.25, 0.58, 0.70, 0.85 and 0.95 (all grey).

**CONSTITUENTS** - Flavonoids and Tannins.

## PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Kaphapittaśāmaka, Dīpana, Grāhī

IMPORTANT FORMULATIONS - Amṛtāriṣṭa, Dantyādyariṣṭa, Daśamūlāriṣṭa, Nārāyaṇa Taila, Dhānvantara Ghṛta, Brāhma Rasāyana, Daśamūla Kvātha Cūrṇa, Cyavanaprāśa Avaleha,  
-

THERAPEUTIC USES - Vātātisāra, Kāsa, Aruci, Basti Roga, Āmavāta, Udara Roga, Ūrustambha, Vātavyādhi, Karṇa Roga, Śoṭha

DOSE - 5-10 g in powder form.

25-50 g in decoction.

## TĀLA (Inflorescence)

Tāla consists of dried male inflorescence of *Borassus flabellifer* Linn. (Fam. Araceae); a tall, stout, dioecious palm tree having a height of 11.8-30 m and girth 1-2 m, bearing a terminal crown of 30-40 large fan like leaves, 90 cm - 1.6 m in width, cultivated and also found wild throughout India in the Peninsular coastal areas and in fields.

### SYNONYMS

Sanskrit	:	Lekhyapatra
Assamese	:	--
Bengali	:	Tala
English	:	Palmyra Palm
Gujrati	:	Tada, Tad
Hindi	:	Tal
Kannada	:	Talimera, Oleyagida, Nelatalea Talimara
Kashmiri	:	--
Malayalam	:	Panavirala
Marathi	:	Tada, Toad
Oriya	:	--
Punjabi	:	Tad
Tamil	:	Panaimaram, Panai
Telugu	:	Tadi, Tati
Urdu	:	Taad

### DESCRIPTION

#### a) Macroscopic

Drug available in transversely cut pieces of inflorescence, measuring upto 1 cm thick and 2.5 - 3 cm in dia., transversely cut surface shows a central axis with a number of male flowers arranged around it, external surface yellowish-grey and rough due to scales; flower

unisexual, actinomorphic, sessile, arranged in a close spiral on the inflorescence axis, 3-4 mm long, reddish-brown in colour; perianth consists of 6 sepals, tough, persistent, free, valvate; stamen 6, in two whorls of three each, 1-1.5 mm long, yellowish in colour; filament free, united at base into a ring; anther linear and basifixed; no smell and taste.

#### b) Microscopic

**Powder** -Reddish-brown; shows fragments of thin-walled, slightly wavy, large, oval to polygonal parenchymatous cells of perianth epidermis in surface view; numerous, simple, yellowish-orange, spherical-shaped pollen grains, measuring 16-44  $\mu$  in dia., with distinct exine and intine; large brown pieces of thick-walled, single layered pollen sac, 34 layered, endothelial cells having a few small pollen grains.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8 per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 : 1 : 5) shows under UV (366 nm) a blue fluorescent zone at Rf. 0.93. On spraying with 5% Methanolic-Sulphuric acid and heating the plate for ten minutes at 110°C four spots appear at Rf. 0.44, 0.61, 0.73 (all light brown) and 0.93 (brown).

**CONSTITUENTS** - Kernels contain Galactomannan (Polysacchride)

## PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Śīta, Guru, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Śukrala, Bṛmhaṇa, Vṛṣya, Tarpaka, Śirovirecaka, Vastiśuddhikara, Medhākara, Vātahara, Pittahara, Vraṇanāśaka, Kṛmighna

IMPORTANT FORMULATIONS - Avittolādi Bhasma (Kṣāra), Panaviralādi Bhasma (Tāla Puspodbhava Kṣāra), Guḍa Pippalī

THERAPEUTIC USES - Raktapitta, Uraḥkṣata, Śvāsa, Dāha, Kṛmi, Mūtrakṛcchra, Śophaghna, Vandhyākara

DOSE - 1-3 g

## TRIVṚT (Root)

Trivṛt consists of dried root of *Operculina turpethum* (Linn.) Silva Manso Syn. *Ipomoea turpethum* R. Br. (Fam. Convolvulaceae); a large perennial twiner with milky juice and fleshy roots, found growing wild nearly throughout the country, ascending to 900 m, also occasionally grown in gardens; the roots being fleshy, care is taken in drying as they decay easily; roots therefore cut into pieces and the cut portions are exposed to sun for a day or so, after which it is finally dried in shade.

### SYNONYMS

Sanskrit	:	Śyāmā, Tribhaṇḍī
Assamese	:	--
Bengali	:	Teudi, Tvuri, Dhakalami
English	:	Terpeth Root, Indian Jalap
Gujrati	:	Kala Nasottara
Hindi	:	Nishothra
Kannada	:	Vili Tigade
Kashmiri	:	--
Malayalam	:	Trikolpokanna
Marathi	:	Nisottar
Oriya	:	Dudholomo
Punjabi	:	Nisoth
Tamil	:	Karum Sivadai
Telugu	:	Tella, Tegada
Urdu	:	Turbud, Nishoth

### DESCRIPTION

#### a) Macroscopic

Roots occur in pieces, 1.5-15 cm long, 1-5 cm dia., usually unbranched, cylindrical,

elongated, bearing thin rootlets; thicker pieces, occasionally split and show central wood portion; surface dull grey, reddish-grey to light brown, showing deep furrows or longitudinal wrinkles giving a rope-like or columnar appearance; transversely cut surface shows thick, whitish bark and light yellow centre; fracture in bark, short; in wood, fibrous; odour, indistinct; taste, slightly acrid and nauseating when kept in mouth for some time

**b) Microscopic**

Mature root shows thin cork, consisting of 3-5 rows of brown cells; secondary cortex 4-6 layered, composed of tangential elongated, thin-walled cells; some of the cortical cells become thick-walled appearing as isolated, oval to subrectangular sclerenchymatous cells having wide lumen; secretory cavities surrounded by subsidiary cells and resin canals found scattered in secondary cortex; secondary phloem, a wide zone, consisting of sieve elements and phloem parenchyma; vascular bundles arranged in a continuous and a discontinuous ring, traversed by uni and biseriate medullary rays; numerous resin cells also seen in phloem in longitudinal rows; xylem shows 3-5 radiating arms; small patches of intraxylary phloem often formed; xylem vessels in singles or 2-3 in groups, having simple pits on their walls; calcium oxalate crystals as prisms and rosettes found scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells; starch grains, both simple and compound, simple ones elliptical to spherical with central cleft hilum, compound grains consisting of 2-4 components, size vary from 5-44  $\mu$  in dia., found scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells.

**Powder** - Greyish to light brown; shows parenchymatous cells, cellulosic fibres with pointed tips, vessels with simple pits, simple and compound starch grains elliptical to spherical with central cleft, measuring 5-44  $\mu$  in dia., having 2-4 components, rosette and prismatic crystals of calcium oxalate.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene : Ethylacetate (9:1) shows under UV (366 nm) three fluorescent zones at Rf. 0.08, 0.21 (both light blue) and 0.58 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.21, 0.41, 0.49, 0.58, 0.71, 0.90 and 0.97 (all yellow). On spraying with VanillinSulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.21, 0.41, 0.49 (all light violet), 0.58, 0.70, 0.90 and 0.97 (all violet).

CONSTITUENTS - Resinous Glycosides.

## PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṭu, Tikta, Kaṣāya
Guṇa	:	Rūkṣa, Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātala, Virecana, Kaphapittahara, Sukhavirecaka, Pittahara, Jvarahara

IMPORTANT FORMULATIONS - Hṛdyavirecana Leha, Aśvagandhāriṣṭa, Avipattikara Cūrṇa, Māñibhadra Guḍa

THERAPEUTIC USES - Malabandha, Gulma, Udara Roga, Jvara, Śopha, Pāṇḍu, Plīhā, Vraṇa, Kṛmi, Kuṣṭha, Kaṇḍū

DOSE - 1-3 g of the drug in powder form.

## TUMBINĪ (Fresh Fruit)

TumbinĪ consists of fresh fruit (devoid of stalk) of *Lagenaria siceraria* (Mol.) Standl. Syn. *L. leucantha* Rusby., *L. vulgaris* Ser. (Fam. Cucurbitaceae); a large, pubescent, climbing or trailing herb, cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Alābu, Tumbī
Assamese	:	--
Bengali	:	Laus, Loki
English	:	Bottle Gour:d
Gujrati	:	Dudi, Tumbadi
Hindi	:	Lauki, Ghia
Kannada	:	Isugumbala, Tumbi
Kashmiri	:	--
Malayalam	:	Chorakka, Churan, Choraikka, Piccura, Tumburini, Cura, Tumburu
Marathi	:	Phopla
Oriya	:	--
Punjabi	:	Tumbi, Dani
Tamil	:	Shorakkai, Surai, Suraikkai
Telugu	:	Sorakaya, Anapakaya
Urdu	:	Ghiya, Lauki

### DESCRIPTION

#### a) Macroscopic

Fruit a pepo, 30 - 60 cm long, bottle, mace or club-shaped, hard when ripe; external surface, smooth; pale green in colour.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter		Nil	Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (85 : 15) shows under UV (366 nm) three fluorescent zones at Rf. 0.13 (light blue), 0.66 (pink) and 0.88 (light pink). On exposure to Iodine vapour three spots appear at Rf. 0.13, 0.33 and 0.57 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.13 and 0.57 (both light brown).

### CONSTITUENTS - Saponin and Fatty Oil

### PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Snigdha
Vīrya	:	Śīta

Vipāka : Madhura

Karma : Pittahara, Kaphahara, Bhedaka, Rucikara, Hṛdya, Vṛṣya

IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila

THERAPEUTIC USES - Jvara, Kāsa, Śvāsa, Viṣa Roga, Śopha, Vraṇa, Śūla

DOSE - 10-20 ml of fresh drug in juice form.

## UDUMBARA (Fruit)

Udumbara consists of dried fruit of *Ficus glomerata* Roxb. Syn. *F. racemosa* Linn. (Fam. Moraceae); a large deciduous tree distributed throughout ever green forests in India, upto an elevation of 1800 m, in moist localities and bank of streams, and also often planted in villages for shade and its edible fruits.

### SYNONYMS

Sanskrit	:	Jantuphala, Hemadugdha
Assamese	:	Jambhaij, Jamij
Bengali	:	Jogmadumur
English	:	Cluster Fig
Gujrati	:	Umardo
Hindi	:	Gullar, Gular, Umar
Kannada	:	Athimaro
Kashmiri	:	--
Malayalam	:	Atti
Marathi	:	Umbar
Oriya	:	Dumburi, Dumuri
Punjabi	:	Gullar, Umbra, Rumbn
Tamil	:	Atti
Telugu	:	Atti, Medi
Urdu	:	Goolar, Gular

### DESCRIPTION

#### a) Macroscopic

Dried syconus fruit, sub-globose with persistent peduncle; 1.0 -2.3 cm long, 0.7 - 1.8 cm in dia., brownish-grey, wrinkled ostiole in apex region, inner hollow receptacle, a few insect debris also found in inner walls of syconus; odour, not distinct; taste, astringent or

acid in unripe fruit.

#### b) Microscopic

Fruit shows single layered epidermis covered with thick -cuticle having numerous unicellular hooked hairs and reddish-brown content; epidermis followed by 5-8 layers oval to polygonal, collenchymatous cells and oval to polygonal, thinwalled parenchymatous cells respectively; a few rosette crystals of calcium oxalate and reddish content found in collenchymatous cells; vascular traces, laticiferous cavities and pitted, round to oval lignified stone cells, with wide lumen present in parenchymatous zone.

Powder - Brown; shows unicellular hooked hairs, epidermal cells and stone cells.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

#### T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) eight fluorescent zones at Rf. 0.05 (light blue), 0.14 (blue), 0.24 (light blue), 0.38 (light blue), 0.45 (light blue), 0.55 (blue), 0.93 (blue) and 0.96 (blue). On exposure to Iodine vapour nine spots appear at Rf. 0.05, 0.24, 0.38, 0.45, 0.51, 0.55, 0.65, 0.93 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C nine spots appear at Rf. 0.05, 0.24, 0.38, 0.45, 0.51, 0.55, 0.63, 0.93 and 0.96 (all grey).

CONSTITUENTS -  $\beta$ - Sitosterol, Lupeol Acetate and Carbohydrates

PROPERTIES AND ACTION

Rasa : Madhura, Kaṣāya

Guṇa : Rūkṣa, Guru

Vīrya : Śīta

Vipāka : Madhura

Karma : Pittahara, Kaphahara, Varṇya Vraṇa Ropaṇa, Vraṇa Śodhana, Bhagna Sandhānaka, Raktadoṣahara

IMPORTANT FORMULATIONS - Marma Guṭikā

THERAPEUTIC USES - Raktapitta, Mūrccā, Dāha, Tṛṣṇā, Pradara, Granthi Roga

DOSE - 10-15 g of the drug in powder form.

## UŚĪRA (Root)

Uśira consists of dried fragrant fibrous roots of *Vetiveria zizanioides* (Linn.) Nash (Fam. Poaceae); a densely tufted grass, found throughout the plains and lower hills of the country, especially on the banks of rivers and rich marshy soil, ascending to an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Vīraṇa, Āḍhaya, Sevya
Assamese	:	Usir, Virina
Bengali	:	Venarramula, Khaskhas
English	:	Cuscus Grass
Gujrati	:	Sugandhi Valo, Valo
Hindi	:	Khasa, Gandar, Bena, Khas
Kannada	:	Mudivala, Baladaberu, Lamanch, Bala Deberu
Kashmiri	:	--
Malayalam	:	Ramaceam, Vetiver, Lamajja, Ramacham
Marathi	:	Bala, Vala
Oriya	:	Ushira, Benachera
Punjabi	:	Panni, Khas
Tamil	:	Vetiver, Vilamichaver
Telugu	:	Vetivelu, Vettiveru
Urdu	:	Khas

### DESCRIPTION

#### a) Macroscopic

Clusters of wiry roots upto 2 mm in diameter, minute, longitudinally grooved; colour varies from cream, grey or light yellow to brown; fracture, short and splintery; odour, strong aromatic; taste, slightly bitter.

## b) Microscopic

Root shows an epidermis consisting of tangentially elongated cells having brownish content, followed by a layer of hypodermis, consisting of thin-walled cells, similar to epidermis; cortex consisting of 2-3 layers of thick-walled, lignified sclerenchymatous cells towards periphery and aerenchymatous cells towards centre; endoderm is, single layered of barrel-shaped cells with highly thickened inner walls; pericycle many layered with thick-walled, sclerenchymatous cells enclosing radial vascular bundles arranged in a ring; simple, round to oval, starch grains measuring 8-12  $\mu$  in diameter present in aerenchyma, pericycle and pith cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, Appendix	2.2.10.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1 :5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.49 and 0.72 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.28, 0.75 and 0.94 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.19, 0.33, 0.73 and 0.94 (all grey).

CONSTITUENTS - Essential Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Laghu, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātaghna, Dehaklāntihara, Pittaghna, Pācana, Stambhana, Kaphapittahṛt

IMPORTANT FORMULATIONS - Uśīrāsava, Yogarāja Guggulu, Ṣaḍaṅga Kvātha Cūrṇa

THERAPEUTIC USES - Jvara, Tṛṣṇā, Mūtrakṛcchra, Vraṇa

DOSE - 3-6 g of the drug in powder form for infusion.

## UTPALA (Flower)

Utpala consists of dried flower of *Nymphaea stellata* Willd. (Fam. Nymphaeaceae); an aquatic herb, generally found in tanks and ponds throughout the warmer parts of the country.

### SYNONYMS

Sanskrit	:	Kumuda, Nīlotpal
Assamese	:	--
Bengali	:	Kumud, Sundi
English	:	Indian Blue Water Fily
Gujrati	:	Poyanu
Hindi	:	Neel Kamal, Kumudinee
Kannada	:	Neeltare
Kashmiri	:	--
Malayalam	:	Ambal Poovu
Marathi	:	Kamoda, Neel Kamal
Oriya	:	--
Punjabi	:	Neel Kamal, Kamalini
Tamil	:	Alli, Ambal
Telugu	:	Allitamara, Kaluvapoovu
Urdu	:	Neelofar

### DESCRIPTION

#### a) Macroscopic

Drug occurs mostly in broken form of varying sizes of dried pieces of flowers and buds, dark brown, attached with a pedicel of 0.5-1.0 cm long when present; sepals-5 - 6 cm long, 1.5 - 2.0 cm wide, oblong, lanceolate, tip acute or subacute, free, adnate to base of disc; petals - 3.5 - 4.5 cm long 2.0-2.5 cm wide, linear-oblong or lanceolate, yellowish-brown; stamen- 6 to indefinite, free, adnate to fleshy thalamus; filaments-dilated at base; anther - with lingual appendages, introrse, ditheous; gynoecium 3 to indefinite, enclosed

by thalamus; style short; ovary unilocular.

#### b) Microscopic

**Sepal** - Single layered epidermis on either side, unicellular hairs present on upper epidermis; both epidermis followed by 4-6 layers of collenchymatous cells with angular thickenings; central region occupied by 4-5 layers of elongated, thin-walled, spongy parenchymatous cells; large stellate air canals and vascular tissues present in this region; tanniniferous content present in collenchymatous cells.

**Petal** -Epidermis on either side, followed by 2-3 layers of collenchymatous cells, central region composed of 3-4 layers, elongated spongy parenchyma; stellate air canals and vascular stellate tissues present in this region; tanniniferous contents also found scattered in petals.

**Stamen** - Single layered upper and lower epidermis, followed by 2-3 layers, rounded to oval, large parenchymatous cells; 3-4 layers elongated parenchymatous cells present in centre; stellate air canals present in this region; anther shows 4 splitting pollen chambers attached with parenchymatous connective tissues, vascular tissues and stellate idioblasts present in this region, endothecium consisting of single layered columnar cells, stromium in both the chambers and a few rounded 22 - 27  $\mu$  in dia., pollen grains having thick smooth, exine and a thin intine.

**Powder** - Brown; shows groups of parenchymatous cells, stellate air canals, uniseriate hairs, yellowish-brown rounded pollen grains, measuring 22 - 27  $\mu$  in dia., having 'thick, smooth, exine and thin intine.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Ethylacetate : Formic acid (5 : 4 : 1) shows in visible light three spots at Rf. 0.59, 0.68 and 0.81 (all bluish grey). On spraying with 10% Ferric Chloride solution (aqueous) two spots appear at Rf. 0.68 and 0.81 (both blue and correspond to that of Tannic acid).

CONSTITUENTS - Tannins.

## PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Picchila, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Rucya, Rasāyana, Keśya, Dehapaustikara, Medhya, Dāha, Dārḍhyakara, Pittanāśaka, Raktaprasādaka

IMPORTANT FORMULATIONS - Aśokāriṣṭa, Aravindāsava, Uśīrāsava, Candanāsava, Kalyāṇaka Ghṛta, Samaṅgādi Cūrṇa, Kanaka Taila, Jātyādi Taila, Tuṅgadrumādi Taila, Mañjiṣṭhādi Taila, Candanādi Lauha, Triphalā Ghṛta

THERAPEUTIC USES - Pipāsā, Dāha, Raktapitta, Chardi, Mūrccā, Hṛdroga, Mūtrakṛcchra, Jvarātisāra

DOSE - 3-6 g of the drug.

# **THE AYURVEDIC PHARMACOPOEIA OF INDIA**

## **PART- I VOLUME – IV**



**GOVERNMENT OF INDIA  
MINISTRY OF HEALTH AND FAMILY WELFARE  
DEPARTMENT OF AYUSH**

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## LEGAL NOTICES

In India there are laws dealing with drugs that are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by these laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of the law are being complied with.

In general, the Drugs & Cosmetics Act, 1940 (subsequently amended in 1964 and 1982), the Dangerous Drugs Act, 1930 and the Poisons Act, 1919 and the rules framed thereunder should be consulted.

Under the Drugs & Cosmetics Act, the Ayurvedic Pharmacopoeia of India (A.P.I.), Part-I, Vol. IV, is the book of standards for single drugs included therein and the standards prescribed in the Ayurvedic Pharmacopoeia of India, Part-I, Vol. IV would be official. If considered necessary these standards can be amended and the Chairman of the Ayurvedic Pharmacopoeia Committee authorised to issue such amendments. Whenever such amendments are issued the Ayurvedic Pharmacopoeia of India, Part-I, Vol. IV, would be deemed to have been amended accordingly.

## GENERAL NOTICES

**Title** - The title of the book is "Ayurvedic Pharmacopoeia of

**Name of the Drugs** - The name given on the top of each monograph of the drug is in Sanskrit as mentioned in the Ayurvedic classics and/or in the Ayurvedic Formulary of India, Part-I and Part-II will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

**Introductory Para** - Each monograph begins with an introductory paragraph indicating the part, scientific name of the drug in Latin with short description about its habit, distribution and method of collection, if any.

**Synonyms** - Synonyms of each drug appearing in each monograph in Sanskrit, English, Hindi, Urdu and other Indian regional languages have been mentioned as found in the classical texts, Ayurvedic Formulary of India, Part-I and Part-II as procured from the experts, scholars of Ayurveda and officials in the field from different states.

**Italics** - Italic type has been used for scientific name of the drug appearing in the introductory paragraph of each monograph as also for chemicals and reagents, substances or processes described in Appendix.

**Odour and Taste** - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description, as large numbers of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour.

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case if poisonous drugs, indicated in monograph.

**Mesh Number** - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

**Weights and Measures** - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gramme (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube, which delivers in 20 drops 1 gram of distilled water at 15°C.

Metric measures are required by the Pharmacopoeia to be graduated at 20°C and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

**Identity, Purity and Strength** - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects, pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive, water-soluble extractive, ether-soluble extractive, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method, which he uses, will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

**Limits for Heavy Metals** – All Ayurvedic Drugs (Single/Compound formulation) must comply with the limits for Heavy Metals prescribed in individual Monograph and wherever limit is not given then they must comply with the limits given in WHO publication "Quality Control Methods for Medicinal Plants and Material".

**Standards** - For statutory purpose, statements appearing in the API, Part-I, Vol. V, under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

**Thin Layer Chromatography (T.L.C.)** - Under this head, wherever given, the number of spots and R<sub>f</sub> values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

**Quantities to be weighed for Assays and Tests** - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

**Constant Weight** - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

**Constituents** - Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

**Percentage of Solutions** - In defining standards, the expression per cent (%), is used, according to circumstances, with one of the four meanings given below.

Per cent w/w (percentage weight in weight) expresses the number of grammes of active substance, in 100 grammes of product.

Per cent w/v (Percentage weight in volume) expresses the number of grammes of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent v/w (percentage volume in weight) expresses the number of millilitres of active substance in 100 grammes of product.

**Percentage of alcohol** - All statements of percentage of alcohol (C<sub>2</sub>H<sub>5</sub>OH) refer to percentage by volume at 15.56 °C.

**Temperature** - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

**Solutions** - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

**Reagents and Solutions** - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

**Solubility** - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities, which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that 1 gramme of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

Descriptive terms	Relative quantities of solvent
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1000 parts
Very slightly soluble	From 1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

**Therapeutic uses and important formulations** –Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognised Ayurvedic classics and in the Ayurvedic Formulary of India, Part –I and Part-II.

**Doses** – The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in Ayurvedic texts. A conversion table is appended giving classical weights of Ayurvedic System of Medicine with their metric equivalents. Doses mentioned in the Ayurvedic Pharmacopoeia of India (A.P.I.) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

The abbreviations commonly employed are as follows:

Abbreviations of technical terms	
m	Metre
l	Litre
mm	Millimetre
cm	Centimetre
μ	Micron (0.001 mm)
kg	Kilogram
g	Gramme
mg	Milligram
ml	Millilitre
in	Normal solution
0.5 N	Half-normal solution
0.1 N	Decinormal solution
1M	Molar solution
Fam.	Family
PS	Primary Standards
TS	Transverse Section

### Abbreviations used for Languages

Sansk.	Sanskrit
Assam.	Assamese
Beng.	Bengali
Eng.	English
Guj.	Gujrati
Kan.	Kannada
Kash.	Kashmiri
Mal.	Malayalam
Mar.	Marathi
Ori.	Oriya
Punj.	Punjabi
Tam.	Tamil
Tel.	Telugu

### ABBREVIATIONS FOR PARTS OF PLANTS

Cotyledon	Cotldn.
Flower	Fl.
Fruit	Fr.
Heart Wood	Ht. Wd.
Leaf	Lf.
Pseudo-bulb	Pseudo-bulb
Root Bark	Rt. Bk.
Root	Rt.
Rhizome	Rz.
Seed	Sd.
Stem Bark	St. Bk.
Stem	St.
Tuberous Root	Tub. Rt.
Wood	Wd.
Whole Plant	Wh. Pl.

## **ĀDHAKĪ (Seed)**

Āḍhakī consists of dried seed of *Cajanus cajan* Linn. (Fam. Fabaceae), an erect shrub 1.5 to 3 m high, cultivated nearly throughout the country as a pulse crop.

### **SYNONYMS**

Sanskrit	:	Tuvari
Assamese	:	Ruharmah
Bengali	:	Arhar
English	:	Pigeon Pea
Gujrati	:	Tuver
Hindi	:	Arhar
Kannada	:	Togari
Kashmiri	:	--
Malayalam	:	Thuvara
Marathi	:	Toor
Oriya	:	Harada, Kandulagachha
Punjabi	:	Arhar
Tamil	:	Adagi Tuvari, Thuvarai, Tuvarai
Telugu	:	Kandulu
Urdu	:	Arhar

### **DESCRIPTION**

#### **a) Macroscopic**

Seed rounded to oval, 0.4 to 0.7 cm dia., having a white hilum; varying in colour from yellow and red to brown; odour and taste not distinct.

## **b) Microscopic**

Seed coat shows single layered, radially elongated, palisade-like, thin-walled cells, covered externally by striated cuticle and internally supported by a single layered bearer cells, followed by 8 to 10 layers of tangentially elongated, elliptical, thin-walled, parenchymatous cells; cotyledon composed of oval to polygonal, thin-walled, parenchymatous cells most of them containing groups of simple, rounded to oval starch grains, measuring 5 to 36  $\mu$  in dia.

**Powder-** Light brown; seed coat in surface view shows polygonal, thin-walled cells with intercellular spaces; groups of oval to polygonal, parenchymatous cells, and rounded to oval starch grains measuring 5 to 36  $\mu$  in dia.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Protein content	Not less than 20 per cent	-

(as determined by following method)

## **ASSAY**

### **Method:**

### **Determination of Total Nitrogen:-**

Place an appropriate amount of the substance, accurately weighed, in a 500 ml Kjeldahl's flask of hard glass. The material to be tested, if solid or semi-solid, may be wrapped in a sheet of nitrogen free filter paper for convenience in transferring it into the flask. Add 10 g of powdered potassium sulphate, 0.5 g of powdered copper sulphate and 30 ml of nitrogen free sulphuric acid. Incline the flask at an angle of about 45° and gently heat the mixture, keeping the temperature below the boiling point of the mixture until frothing has ceased. Increase the heat until the acid boils and continue the heating for four hrs until the solution acquires a clear greenish colour. Allow the mixture to cool, add 150 ml of water, thoroughly mix the contents of the flask and cool again. Add cautiously, so as to cause the solution to flow down inside the flask to form a layer under the acid solution, 100 ml of a 30 % w/v solution of sodium hydroxide in water. Add a few pieces of granulated zinc, and connect the flask by means of kjeldahl connecting bulb with a condenser, the delivery tube from which dips beneath the surface of a mixture of 30 ml of 0.5 N HCl or 0.5 N H<sub>2</sub>SO<sub>4</sub> and 25 ml of water contained in an Erlenmeyer flask or a wide mouthed bottle of

about 500 ml capacity. Mix the contents of the flask by gentle rotation, and distil until about two thirds of the contents of the flask have distilled over. Add about 3 drops of solution of methyl red to the contents of the receiving vessel and determine the excess of acid by titration with 0.5 N sodium hydroxide. Repeat the experiment with the same quantities of reagents and in the same manner, but omitting the substance under test. The difference between the two titrations represent the acid required to neutralize the ammonia. Each ml of 0.5 N hydrochloric acid or 0.5 N Sulphuric acid is equivalent to 0.007004 g of N.

When the nitrogen content of the substance under test is known to be low, 0.5 N hydrochloric or 0.5 N sulphuric acid may be replaced by 0.1N hydrochloric acid or 0.1 N sulphuric acid and 0.1 N sodium hydroxide should then be used in titrating the excess acid. Each ml of 0.1 N hydrochloric acid or 0.1 N sulphuric acid is equivalent to 0.001401 g of N

Total Protein = Total Nitrogen X 6.25.

### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' using Toluene: Ethyl acetate (90: 10) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.11, 0.23, 0.30 and 0.40 (all blue). On exposure to Iodine vapour three spots appear at Rf. 0.23, 0.30 and 0.96 (all yellow).

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Madhura
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātakara, Kaphahara, Pittakara, Medohara, Saṃgrahi, Varṇya, Viṣāpaha, Stanyavṛddhi

### **IMPORTANT FORMULATIONS** - Kāṅkāyana Guṭikā

**THERAPEUTIC USES** - Atisthaulya, Raktavikāra, Raktapitta, Viṣaroga, Sthaulya, Medoroga, Arśa

**DOSE** - As directed by the physician

## AGARU (Heart Wood)

Agaru consists of dried heart wood of *Aquilaria agallocha* Roxb. (Fam. Thymelacaceae), a large evergreen tree, distributed in North East part of the country.

### SYNONYMS

Sanskrit	:	Aguru, Lauha, Kṛmija
Assamese	:	Agaru
Bengali	:	Agaru, Agarkashtha, Agar Chandan
English	:	Eagle Wood
Gujrati	:	Agar
Hindi	:	Agar
Kannada	:	Krishna Agar
Kashmiri	:	--
Malayalam	:	Akil
Marathi	:	Agar
Oriya	:	--
Punjabi	:	Ooda, ooda, pharsi
Tamil	:	Akil kattai
Telugu	:	Agaru
Urdu	:	Ood Hindi, Agar

### DESCRIPTION

#### a) Macroscopic

Drug available in cut pieces, dark brown to nearly black; fracture, hard; no characteristic smell and taste.

#### b) Microscopic

Shows mostly uniseriate sometimes biseriate xylem rays; vessels isolated having

simple pitted thickening and filled with dark brown contents; xylem fibres short having narrow lumen occupying a major portion of wood; xylem parenchyma less in number and simple pitted; included phloem tissues in pockets partially disorganised, leaving large circular or oval holes, containing collapsed and broken tissues.

**Powder** - Dark brown; shows numerous aseptate fibres, simple pitted vessels with dark brown contents.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows in visible light two spots at Rf. 0.17 and 0.27 (both light brown). Under U.V. (366 nm) five fluorescent zones appear at Rf. 0.17, 0.27, 0.36, 0.57 and 0.80 (all blue). On exposure to Iodine vapour eight spots appear at Rf. 0.05, 0.11, 0.15, 0.24, 0.33, 0.57, 0.73 and 0.80 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and after heating the plate for ten minutes at 105°C five spots appear at Rf. 0.13, 0.18, 0.25, 0.37 and 0.59 (all violet).

**CONSTITUENTS** - Essential Oil

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Guṇa** : Snigdha, Tīkṣṇa, Laghu  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Tvacya, Pittalam, Vātahara, Kaphahara, Śirovirecana

**IMPORTANT FORMULATIONS** - Madhukāsava, Mr̥dvīkāsava, Karpūrādyarka,  
Cyavanaprāśa Avaleha, Aṇu Taila, Candanādi Taila, Khadirādi Guṭikā, Śvāsahara Kaṣāya  
Cūrṇa, Guḍūcyādi Taila

**THERAPEUTIC USES** - Kuṣṭha, Karṇa Roga, Akṣiroga, Viṣa, Śvāsa

**DOSE** - 1-3 g

## **AKLĀRI (Endosperm)**

Aklāri consists of dried endosperm of *Lodoicea maldivica* Pers. Syn. *L. seychel larum* Labill. (Fam. Areaceae), a tall, dioecious palm with straight, smooth, annulated trunk, 18 to 30 m high and 0.3 m dia, growing on all types of soils from the sandy shore to the arid mountain top and also cultivated in India.

### **SYNONYMS**

Sanskrit	:	Samudra Nārikēḷa
Assamese	:	--
Bengali	:	Narikel, Jora Narikel
English	:	Double coconut
Gujrati	:	Dorai Nareal
Hindi	:	Dari yai Nariyal
Kannada	:	Joditengu
Kashmiri	:	--
Malayalam	:	Aklari
Marathi	:	Dariyacha Naral
Oriya	:	Samudra Narikela
Punjabi	:	Dariyai Nariyal
Tamil	:	Thunga, Kadal Thengai
Telugu	:	Samudra Tenkaya Kohari
Urdu	:	Narjeel Daryae

### **DESCRIPTION**

#### **a) Macroscopic**

Drug occurs in varying sizes, about 2.0 cm thick; very hard having much the appearance and texture of vegetable ivory; outer surface moderately rough to smooth, dark brown in colour; inner surface rough, dirty white in colour with number of small tooth-like

projections, when soaked in water it softens a little and can be split into thin fibrous bundles; fracture, very hard; odour and taste not characteristic.

#### **b) Microscopic**

Testa shows 4 to 6 layers of polygonal, tangentially elongated, lignified, thick-walled cells filled with reddish-brown contents, followed by a wide zone of oval to polygonal, thick-walled cells; endosperm consists of spindle-shaped cells with thick walls having a central lumen with club-shaped canals extending to the cell wall; a few simple starch grains present in endosperm measuring 13 to 18  $\mu$  in dia., and small minute aleurone grains; oil globules present throughout the region.

**Powder** - Dirty brown; shows thick-walled, elongated, spindle-shaped endosperm cells, moderately thick-walled, polygonal, slightly wavy cells of testa in surface view, a few of them containing oil globules and small minute aleurone grains and simple starch grains measuring 13 to 18  $\mu$  in dia.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	0.3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) v/v shows under UV (366 nm) one fluorescent zone at Rf. 0.94 (blue). On

exposure to Iodine vapour four spots appear at Rf. 0.40, 0.60, 0.77 and 0.94 (all yellow). On spraying with 60% Methanolic-Sulphuric acid reagent and heating the plate at 120°C for ten minutes two spots appear at Rf. 0.31 (brown) and 0.94 (dark brown).

**CONSTITUENTS** - Sugars and Sterols.

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Kaṭu

**Guna** : Laghu

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Hṛdya, Viṣaghna, Tṛṣṇanigrahaṇa, Śītapraśamana, Agnidīptikara

**IMPORTANT FORMULATIONS** - Gorocanādi Vaṭī, Mṛtasañjīvanī Guṭikā, Javahara Mohara

**THERAPEUTIC USES** - Visūcika, Hṛdroga, Śīta Jvara

**DOSE** - 5-10 gm of the drug in the powder form

## APARĀJITĀ (Leaf)

Aparājītā consists of dried leaf of *Clitoria ternatea* Linn. (Fam. Fabaceae), a perennial twining climber common all over the tropical parts of country being cultivated and also found wild, growing over hedges and thickets

### SYNONYMS

Sanskrit	:	Girikarṇika
Assamese	:	--
Bengali	:	Aparajita
English	:	Winged-leaved clitoria
Gujrati	:	Garnee
Hindi	:	Aparajita, Koyal
Kannada	:	Girikarnike
Kashmiri	:	--
Malayalam	:	Shankhpushpam
Marathi	:	Gokarnee
Oriya	:	Aparajita
Punjabi	:	Aparajita
Tamil	:	Kakkanam
Telugu	:	Dintena, Sankupushpam
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug generally occurs in the form of leaves and leaflets, rachis broken with or without intact leaflets; leaflet with small petiolule, ovate or elliptic oblong, rarely roundish, obtuse, entire, glabrous or with a few short appressed hairs, subcoriaceous, base obtuse or acute; 2.5 to 5.0 cm long, 1.8 to 3.0 cm wide, yellowish-green; no odour or taste.

## b) Microscopic

*Rachis*- shows single layered epidermis externally covered with thick, smooth cuticle; uni to tricellular, hooked hair with warty cuticle, found on epidermis of either side; vascular bundle crescent shaped consisting of xylem and phloem; pericycle present in the form of broken ring; rest of the tissues between epidermis and pericycle composed of oval to polygonal, thin-walled, 3 to 5 layered, parenchymatous cells.

*Leaflet* - shows dorsiventral structure; both upper and lower epidermis consists of single layered cells, covered externally with thick cuticle; some epidermal cells of both surfaces elongate outwards forming uni to tri-cellular warty hairs, basal cells smaller and apical cells longer; palisade single layered; palisade ratio 3 or 4; spongy parenchyma 4 or 5 layered with intercellular spaces and containing a few prismatic crystals of calcium oxalate; stomata paracytic, present on both surfaces; stomatal index 58 to 64 on lower surface, 31 to 42 on upper surface; vein islet number 22 to 24; veinlet terminal number 34 to 37 per sq. mm.

**Powder** - Yellowish-green; shows groups of spongy parenchyma, palisade cells, fibres, xylem vessels with spiral thickenings, fragments of hairs with or without warty cuticle. wavy thin-walled, epidermal cells with paracytic stomata in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel "G" plate using n-Butanol : Acetic Acid: Water (4:1:5) shows under UV (366 nm) three spots at Rf. 0.34 (violet). 0.59 (blue) 0.93 (red). On exposure to Iodine vapour three spots appear at Rf. 0.29. 0.54 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.25 (brown), 0.35 (grey). and 0.59 (yellow).

**CONSTITUENTS** - Glycosides - Flavonal glycosides and Resin glycosides

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Medhya, Kaṇṭhya, Cakṣusya, Pittopadravanaśini, Tridoṣa Śāmaka, Viṣāpaha, Grahaghni

**IMPORTANT FORMULATIONS** - Vāta Raktāntaka Rasa

**THERAPEUTIC USES** - Kuṣṭha, Mūtradoṣa, Śoṭha, Vraṇa, Viṣa, Unmāda, Ardhāvabhedaka, Śūla, Graha Bādhā, Āmadoṣa, Raktātisāra, Bhrama, Śvāsa, Kāsa, Jvara, Dāha, Vamana

**DOSE** - Root powder 1-3g Seed powder 1-3 g Leaf powder 2-5 g

## ĀTMAGUPTĀ (Root)

Ātmagupta consists of dried root of *Mucuna prurita* Hook. Syn. *M. pruriens* (L.) DC. (Fam. Fabaceae), a herbaceous twining annual found wild almost all over the country and in Andaman and Nicobar Islands.

### SYNONYMS

Sanskrit	:	Kapikacchu, Markai, Kandura, Śūkaśimbi, Kapiprabha
Assamese	:	--
Bengali	:	Aalkushee, Alkusa
English	:	Cowhage, Cowitch
Gujrati	:	Kaucha, Kavach
Hindi	:	Kevanch, Kaunch, Khujanee
Kannada	:	Nasukunnee, Nasuganni, Nayisonanguballi
Kashmiri	:	--
Malayalam	:	Shoriyanam, Naykkorana, Naykkuran
Marathi	:	Khajkuhilee
Oriya	:	Baikhujnee
Punjabi	:	Aalkushee, Kavanch
Tamil	:	Punaik-Kalee, Punaikkalee, Punaippidukkam
Telugu	:	Piliyadugu, Pillee adugu
Urdu	:	Kaunch

### DESCRIPTION

#### a) Macroscopic

Root long, 7 mm or more in thickness, hard, having lateral roots, dark brown to black; fracture, fibrous; odour and taste not distinct.

### **b) Microscopic**

Root shows a narrow cork consisting of 4 or 5 rows of tangentially elongated cells; secondary cortex narrow consisting of 2 to 5 rows of thin-walled, parenchymatous cells, a few containing brownish contents; secondary phloem wide, forming bulk of the bark in the form of long, radial strips that are conical due to the medullary rays funneling out in the phloem region; phloem fibres are arranged in groups or occasionally single; phloem rays uni to biseriate; cambium distinct 1 or 2 layered; secondary xylem very wide composed of usual elements, vessels large as well as small, surrounded by xylem parenchyma and fibres; medullary rays in the xylem also mostly uniseriate, somewhat wavy, consisting of radially elongated thin-walled cells.

**Powder** - Grey to dark brown; shows fragments of cork, fibres singly or groups and xylem vessels.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under UV (366 nm) four fluorescent zones at Rf. 0.33, 0.51, 0.66 and 0.86 (all blue). On exposure to Iodine vapour seven spots appear at Rf. 0.10, 0.20, 0.38, 0.48, 0.59, 0.77 and 0.86 (all yellow). On spraying with Ninhydrin and on heating the plate at 110° C for ten minutes four conspicuous spots appear at Rf. 0.38, 0.48, 0.59 and 0.86 (all light pink).

**CONSTITUENTS** - Choline

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Vṛṣya, Bṛmhaṇa, Balya, Yonisañkīrṇakara, Vājīkaraṇa

## IMPORTANT FORMULATIONS - -

**THERAPEUTIC USES** - Duṣṭa Vraṇa, Pakvātisāra, Raktapitta, Kuṣṭha, Kṛśata, Śīta Pitta, Vātavyādhi, Yoni Śithilata

**DOSE** - 3-6 g of the drug in the powder form for decoction

## **BILVA (Stem Bark)**

Bilva consists of dried stem bark of *Aegle marmelos* Corr. (Fam. Rutaceae), an armed, medium sized tree occurring in the plains and upto 1000 m in the hills as well as cultivated throughout the country, particularly in sacred groves.

### **SYNONYMS**

Sanskrit	:	Śrīphala
Assamese	:	Bael, Vael
Bengali	:	Bela, Bilva
English	:	Bengal Quince, Bael
Gujrati	:	Bill, Bilum
Hindi	:	Bela, Sripthal, Bel
Kannada	:	Bilva
Kashmiri	:	--
Malayalam	:	Koovalam
Marathi	:	Bel, Baela
Oriya	:	Bela
Punjabi	:	Bil
Tamil	:	Vilvam
Telugu	:	Maredu
Urdu	:	Belgiri, (Bael)

### **DESCRIPTION**

#### **a) Macroscopic**

Bark occurs as pieces of about 0.5 to 1 cm thick, flat or channelled; surface rough and warty due to a number of lenticels, ridges and furrows; fracture tough, gritty in outer and fibrous in inner region; odour and taste, not characteristic.

## b) Microscopic

Cork stratified, tangentially elongated, lignified, with four to eight bands alternating with smaller cells of 2 to 16 layers and larger cells of 2 to 20 layers; secondary cortex wide, consisting of parenchyma, and a large number of groups of, or some times single, thick walled, lignified, stone cells showing transverse striations due to radiating canals; smaller ones 16 to 64  $\mu$  wide and 48 to 160  $\mu$  long and larger ones 32 to 110  $\mu$  wide and 160 to 640  $\mu$  long; secondary phloem consisting of fibres, sieve elements and crystal fibre, traversed by phloem rays; phloem fibres long, tapering, sharply pointed to blunt; fibre groups arranged in rings; phloem rays uni to triseriate, biseriate rays being more common, uniseriate rays 3 to 6 cells high, while biseriate rays 6 to 25 cells high.

**Powder** - Yellowish; fragments of rectangular elongated, lignified cork cells; pieces of fibres with pointed or blunt ends; sieve elements and crystals fibre pieces; uni to biseriate phloem rays; lignified, thick-walled stone cells in groups or singly, with narrow lumen showing striations and measuring 16 to 640  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene: Ethyl acetate (95:5) shows under U.V. (366 nm) five fluorescent spots at Rf. 0.07 (greenish blue), 0.14 (greenish blue), 0.25, 0.39 and 0.67 (all blue). On exposure to Iodine vapour three spots appear at Rf. 0.14, 0.25 and 0.97 (all yellow). On spraying with Dragendorff reagent one spot appears at Rf. 0.25 (orange).

**CONSTITUENTS** - Coumarins and Sterols.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Tīkṣṇa, Rūkṣa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpanīya, Kaphahara, Vātahara, Saṃgrāhi, Pittakara, Viṣaghna

**IMPORTANT FORMULATIONS** - Puṣyānuga Cūrṇa, Grahaṇī Mihira Tāila, Sudarśana Cūrṇa, Candanādi Taila, Aṇu Taila

**THERAPEUTIC USES** - Chardi, Vātavyādhi, Śūla, Śoṭha, Atīśāra, Raktātīśāra, Kuṣṭhīśūla, Āmaśūla, Arśa, Medoroga, Grahaṇīroga, Madhumeha, Pravāhikā

**DOSE** - 15-30 ml

## CAMPAKA (Flower)

Campaka consists of dried buds and flowers, including calyx, of *Michelia champaca* Linn. (Fam. Magnoliaceae), a tall, ever green tree, usually upto 30 m in height and 3.5 m in girth with a straight trunk, found in eastern Himalayas, North-East India and Western Ghats; it is planted throughout India in gardens and near temples.

### SYNONYMS

Sanskrit	:	Campēya, Hamapuṣpa
Assamese	:	--
Bengali	:	Champaka, Champa
English	:	Golden Champa
Gujrati	:	Raichampo, Pilo Champo
Hindi	:	Champa
Kannada	:	Sampige
Kashmiri	:	--
Malayalam	:	Campakappuv
Marathi	:	Sonachanpha
Oriya	:	--
Punjabi	:	Champa
Tamil	:	Sampagi
Telugu	:	Chattu Sampangi
Urdu	:	Champa

### DESCRIPTION

#### a) Macroscopic

Drug consists of broken pieces of pedicel, sepal, petal, anthers, gynophore (torus), flowers solitary, fragrant, crumbled, blackish-brown in colour; sepal brown, linear, acute; petal dark brown, oblong; stamens numerous; anther linear, adnate, introrse; gynophore, 2.5-4 cm long; curved style with beak-shaped simple stigma.

## b) Microscopic

*Pedicel* -Shows ridges and furrows in outline with a single layered epidermis having a few unicellular hairs; cortex composed of a wide zone of collapsed, thin-walled, parenchymatous cells having a few oil globules; collateral vascular bundle and secretory cells are present; pith consisting of thin-walled, oval to polygonal, parenchymatous cells; irregular, elongated, lignified stone cells isolated or in groups, having narrow lumen and pits, found in cortex and pith.

*Sepal* - Single layered epidermis, slightly sinuous in surface view, present on both surfaces, a few unicellular hairs are in outer surface; ground tissue composed of thin-walled, oval to polygonal, parenchymatous cells having a few prismatic crystals of calcium oxalate; a few vascular bundles present in ground tissue.

*Petal* -Epidermis single layered of rectangular cells, slightly sinuous in surface view, present on both surfaces; a few fibro-vascular bundles present in ground tissue along with a few cluster crystals of calcium oxalate.

**Powder** - Dark-brown; shows fragments of parenchymatous cells, broken unicellular hairs, vessels with spiral thickening, a few prismatic and cluster crystals of calcium oxalate; a few irregular shaped, elongated, lignified, stone cells with narrow lumen in singles or groups; fairly large circular to spherical, brown coloured, numerous smooth pollen grains measuring 67-82  $\mu$  in dia. having clear exine and intine and a few oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' using Toluene: Ethylacetate (9:1) shows under UV (366 nm) one fluorescent spot at Rf. 0.92 (blue). On exposure to Iodine vapour nine spots appear at Rf. 0.20, 0.25, 0.35, 0.40, 0.51, 0.57, 0.77, 0.88 and 0.92 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and on heating the plate for ten minutes at 105°C seven spots appear at Rf. 0.20, 0.25, 0.40, 0.51, 0.57, 0.77 and 0.92 (light violet).

**CONSTITUENTS** - Volatile Oil

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittajit, Kaphapittāsra Nāśaka, Viṣaghna, Hṛdya

**IMPORTANT FORMULATIONS** - Candanabalālakṣādi Taila, Balādhātryādi Taila

**THERAPEUTIC USES** - Kṛmi, Mūtrakṛcchra, Vātarakta, Kuṣṭha, Kaṇḍū, Vraṇa

**DOSE** - Puṣpa Cūrṇa 1-3 gm

## CIÑCĀ (Fruit Pulp)

Ciñcā consists of fruit pulp without seeds of *Tamarindus indica* Linn. (Fam. Fabaceae), a moderate sized to large evergreen tree upto 24 m in height and 7 m in girth, cultivated throughout India, or self sown in waste places and in forest lands; also planted as avenue trees

### SYNONYMS

Sanskrit	:	Amlika, Tintiḍika
Assamese	:	Tamar, Teteli
Bengali	:	Tetula, Tentul, Ambli
English	:	Tamarind Tree
Gujrati	:	Anvali
Hindi	:	Imli
Kannada	:	Hunisemale
Kashmiri	:	--
Malayalam	:	Puli, Amlam
Marathi	:	Chinch
Oriya	:	Koina, Omlika
Punjabi	:	Imli, Amlī
Tamil	:	Puli, Aanvilam
Telugu	:	Chint, Chinta
Urdu	:	Imli

### DESCRIPTION

#### a) Macroscopic

Fruit pulp occurs as a reddish-brown, moist, sticky mass, in which yellowish-brown fibres are readily seen; odour, pleasant; taste, sweetish and acidic.

## **b) Microscopic**

Fruit pulp consists of thin-walled, elongated to polygonal, parenchymatous cells of considerable size, traversed by a number of long fibro-vascular bundles and having a very few small starch granules, and numerous prismatic crystals of calcium oxalate.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	46	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	59	per cent, Appendix	2.2.7.

## **T.L.C.**

T.L.C. of alcoholic extract on Silica Gel 'G' using n-Butanol : Acetic acid : Water (5:1:4) shows under U.V. (366 nm) two spots at Rf. 0.27 and 0.46 (both yellowish blue). On exposure to Iodine vapour five spots appear at Rf. 0.27, 0.46, 0.57, 0.65 and 0.87 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes five spots appear at Rf. 0.46, 0.57, 0.65, 0.71 and 0.87 (all grey)

**CONSTITUENTS** - Inorganic acids, Sugars, Saponin and bitter principle - Tamarindinca

## **PROPERTIES AND ACTION**

**Rasa** : Amla, Madhura, Kaṣāya

**Guṇa** : Guru, Rūkṣa, Sara  
**Vīrya** : Uṣṇa  
**Vipāka** : Amla  
**Karma** : Kaphavātanut, Dīpana, Bastīsuddhikara, Bhedi, Viṣṭambhi, Dīpana,  
Hṛdya

**IMPORTANT FORMULATIONS** - Śankha Drāvaka, ŚankhaVaṭī

**THERAPEUTIC USES** - Udararoga, Agnimāndya, Arocaka, Paktiśūla, Tṛṣṇā, Klama, Śrama,  
Bhrānti, Kṛmi, Karṇaśūla, Nāḍī Vraṇa

**DOSE** - 4-10 g of the drug

## DĀDĪMA (Fresh Fruit)

Dāḍima consists of fresh fruit of *Punica granatum* Linn. (Fam. Punicaceae), a large deciduous shrub or a small tree; found growing wild in the valley and outer hills of Himalayas, between 900 and 1800 m and cultivated in many parts of the country.

### SYNONYMS

Sanskrit	:	Dantabīja, Lōhitapuṣpa
Assamese	:	Dalim
Bengali	:	Dadima, Dalimgach, Dalim
English	:	Pomenagrate
Gujrati	:	Dadam, Dadam phala
Hindi	:	Anar, Anar-ke-per
Kannada	:	Dalimba, Dalimbe haonu
Kashmiri	:	--
Malayalam	:	Mathalam
Marathi	:	Dalimba
Oriya	:	Dalimba
Punjabi	:	Anar
Tamil	:	Madulam Pazham
Telugu	:	Dadimbakaya, Dadimma
Urdu	:	Anar

### DESCRIPTION

#### a) Macroscopic

Fruit a balausta, globose, 4 to 8 cm diam; depressed, bluntly 5 to 8 angled and tipped with persistent calyx alongwith withered stamens; coriaceous, smooth; yellowish brown or red; odour, not distinct; carpel four to five, with papery, thin-walled, fused in 2 whorls, seeds numerous, compressed with a whitish-pink or bright red, transparent, fleshy testa;

taste, sour to sweet; seed appears hard, angular, white to buff with an astringent taste.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Nil
Total Ash	Nil
Acid-insoluble ash	Nil
Alcohol-soluble extractive	Nil
Water-soluble extractive	Nil

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Amla, Madhura, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Dīpana, Pācana, Rucya, Grāhī, Mukhagandhahara, Hṛdya, Medhya, Śramahara, Śukrala, Tarpaka, Varcovibandhanīya, Balya, Medhya

**IMPORTANT FORMULATIONS** - Dādhika Ghṛta, Dāḍimāṣṭaka Cūrṇa, Bhāskaralavaṇa Cūrṇa, Bṛhat Chāgalādyā Ghṛta

**THERAPEUTIC USES** - Dāha, Jvara, Tṛṣṇā, Kāsa, Āmavāta, Atīśāra, Raktapitta, Arocaka

**DOSE** - 15-30 ml

## **DĀDĪMA (Fruit Rind)**

Dāḍima consists of dried fruit rind (pericarp) of *Punica granatum* Linn. (Fam. Punicaceae), a large deciduous shrub or a small tree, found wild in the warm valleys of the outer hills of Himalayas between 900 to 1800 m and also cultivated in many parts of the country.

### **SYNONYMS**

Sanskrit	:	Lōhiṭapuṣpa, Daṇṭabīja
Assamese	:	Dalim
Bengali	:	Dadima, Dalim, Dalimgach
English	:	Pomenagrate
Gujrati	:	Dadam, Dadam phala
Hindi	:	Anar, Anar-ke-per
Kannada	:	Dalimba, Dalimbe haonu
Kashmiri	:	--
Malayalam	:	Mathalam
Marathi	:	Dalimba
Oriya	:	Dalimba
Punjabi	:	Anar
Tamil	:	Madulam Pazham
Telugu	:	Dadimbakaya, Dadimma
Urdu	:	Anar

### **DESCRIPTION**

#### **a) Macroscopic**

Drug occurs in 0.1 to 0.5 cm thick, more or less concave, salver- shaped pieces, some pieces showing residual carpel walls and some having persistent toothed calyx tube alongwith withered stamens, styles and a few seeds; coriaceous, tough and nearly smooth; brown to reddish-brown externally and brownish-yellow internally; bearing impressions left

by seeds; fracture, short; odour not distinct; taste, astringent.

### **b) Microscopic**

Epicarp single layered covered with thick cuticle; mesocarp consists of a wide zone of oval to polygonal thin walled parenchymatous cells; a few fibro-vascular bundles, tanniferous vessels, secretory canals, oil globules, single and a number of groups of round or oval to elongated stone cells, simple and compound starch grains having 2 or 3 components with concentric striations and central hilum, and rosette crystals of calcium oxalate present in mesocarp.

**Powder** - Yellowish-brown; shows single or groups of stone cells; oval to polygonal, parenchymatous cells in surface view; vessels with scalariform thickening, tanniferous vessels and a few rosette crystals of calcium oxalate and rounded to oval starch grains, measuring 3 to 5  $\mu$  in dia.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	4 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C of alcoholic extract on Silica gel 'G' plate using Chloroform: Ethylacetate : Formic acid (5:4:1) shows in visible light one spot at Rf. 0.74 (bluish grey). Under U.V. (366 nm) one fluorescent zone is visible at Rf. 0.74 (dark blue). On exposure to Iodine vapour two spots appear at 0.74 (dirty yellow) and 0.95 (yellow). On spraying with 10% aqueous Ferric chloride reagent one spot appears at Rf. 0.74.(blue). On spraying with 5%

Mathanolic-Sulphuric Acid and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.74 (brownish grey) and 0.95 (violet)

**CONSTITUENTS** - Tannic acid, Sugar and Gum

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Amla
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Anuṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vāta Kaphahara, Vraṇaropaka, Grāhī

**IMPORTANT FORMULATIONS** - Khadirādi Guṭikā, Mṛtasañjīvanī Surā, Kalyāṇaka Ghṛta, Maricādi Guṭikā, Nīlikādyā Taila

**THERAPEUTIC USES** - Dāha, Jvara, Kaṇṭha Roga, Mukha daurgandhya, Aruci, Amlapitta, Atīśāra, Pravāhikā, Raktapitta, Raktavikāra, Kāsa

**DOSE** - Powder 3-6 g

## DĀḌĪMA (Leaf)

DāḌima Dadima consists of dried leaf of *Punica granatum* Linn. (Fam. Punicaceae), a small deciduous shrub or small tree, found wild in the warm valleys of the outer hills of Himalayas between 900 to 1800 m and also cultivated in many parts of the country.

### SYNONYMS

Sanskrit	:	Lōhitapuṣpa, Dantābīja
Assamese	:	Dalim
Bengali	:	Dadima, Dalim, Dalimgach
English	:	Pomenagrate
Gujrati	:	Dadam, Dadam phala
Hindi	:	Anar, Anar-ke-per
Kannada	:	Dalimba, Dalimbe haonu
Kashmiri	:	--
Malayalam	:	Mathalam
Marathi	:	Dalimba
Oriya	:	Dalimba
Punjabi	:	Anar
Tamil	:	Madulam Pazham
Telugu	:	Dadimbakaya, Dadimma
Urdu	:	Anar

### DESCRIPTION

#### a) Macroscopic

Leaves 2 to 8 cm long, 0.7 to 2.0 cm broad, oblong, lanceolate, acute, entire, glabrous, greyish-green to yellowish-green.

## **b) Microscopic Leaf-**

*Petiole* - shows single layered epidermis covered by thin cuticle, epidermis followed by 2 or 3 layered collenchymatous hyodermis; single, bicollateral, crescent-shaped, vascular bundle situated in centre; rest of the tissues between vascular bundle and hypodermis consists of 3 layers or more, oval to polygonal, thin-walled, parenchymatous cells, some having rosette and a few prismatic crystals of calcium oxalate.

*Midrib* -shows single layered epidermis covered by a thin cuticle, epidermis followed by 2 or 3 layers of round to angular collenchymatous cells; beneath collenchyma 3 or 4 layers of parenchyma present, some containing a few rosette and prismatic crystals of calcium oxalate, simple and compound starch grains, consisting of 2 or 3 components, round to oval shaped, measuring 5.5 to 8.5  $\mu$  in dia.; vascular bundle situated centrally, similar to that of petiole.

*Lamina* -shows epidermis on both surfaces, single layered; palisade single layered; spongy parenchyma 3 or 4 layered; idioblast containing very large solitary crystal of calcium oxalate; a few small solitary calcium oxalate crystals also present in spongy parenchyma; palisade ratio 4 to 6; stomatal index 12 to 25; anomocytic stomata, present only on lower surface.

**Powder** - Greyish-green; shows spiral vessels, palisade and spongy parenchyma cells, rosette and prismatic crystals of calcium oxalate; fragments of upper and lower epidermis with beaded straight walled and sinuous walled respectively in surface view, simple, round to oval, starch grain measuring 5.5 to 8.5  $\mu$  in dia., and compound starch grains having 2 or 3 components.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	10.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25 per cent, Appendix	2.2.7.

## **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Benzene: Ethylacetate (9: 1) v/v shows in visible light four spots at Rf. 0.06 (light green), 0.48 (light

green), 0.68 (light green) and 0.79 (green). Under U.V. (366 nm) four fluorescent zones visible at Rf. 0.06, 0.14, 0.54 and 0.94 (all blue). On exposure to Iodine vapour nine spots appear at Rf. 0.02, 0.09, 0.38, 0.62, 0.66, 0.76, 0.87, 0.91 and 0.97 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate at 105°C for ten minutes nine spots appear at Rf. 0.06, 0.10, 0.33, 0.41, 0.54, 0.62, 0.79, 0.89 and 0.97 (all grey).

**CONSTITUENTS** - Tannins and  $\beta$ -Sitosterol

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Dīpana, Rucya

**IMPORTANT FORMULATIONS** - -

**THERAPEUTIC USES** - Aruci, Agnimāndya, Atīśāra, Pravāhikā, Kṛmi, Raktapitta, Kāsa, Jvara, Mukhapāka

**DOSE** - Patra Svarasa : 5-10 ml Patra Kalka : 5-10 g

## DEVADĀRU (Heart Wood)

Devadāru consists of dried heart wood of *Cedrus deodara* (Roxb.) Loud. (Fam. Pinaceae), a very large and tall ever green tree, upto 75m in height and ranging from 2.4 to 3.6 m in girth, occasionally even upto 13.5 m in girth, found in North Western Himalayas from Kashmir to Garhwal, between 1200 to 3000 m and also cultivated in Kumaon.

### SYNONYMS

Sanskrit	:	Bhadradāru, Surabhūruha, Amaradāru, Dēvakāṣṭha, Dāru, Suradāru, Amarataru
Assamese	:	Shajar Tuljeen
Bengali	:	Devdaroo
English	:	Deodar, Himalayan Cedar
Gujrati	:	Devdar, Teliyo Devdar
Hindi	:	Devdar, Devdaroo
Kannada	:	Deevdar
Kashmiri	:	--
Malayalam	:	Devtaram
Marathi	:	Devdar, Telya Dedaroo
Oriya	:	--
Punjabi	:	Diyar, Dewdar
Tamil	:	Devdaroo
Telugu	:	Devdari Chettu, Devdaree
Urdu	:	Deodar

### DESCRIPTION

#### a) Macroscopic

Wood moderately hard, light yellowish-brown to brown; wood splits readily longitudinally; annual rings well marked; medullary rays appear as whitish lines; resin

canals, if present, arranged in long tangential rows, showing up as dark, narrow line on the radial surface of the wood pieces; odour, aromatic; taste, not distinct.

#### **b) Microscopic**

Mature wood almost entirely of narrow, quadrangular or rarely five or six sided tracheids, having very thick-wall with pits and a narrow lumen; xylem rays very fine, numerous and run straight throughout the region, uniseriate and 2 to 16 cells high in tangential section; vessels absent.

**Powder** - Brownish-yellow in colour and oily, shows entire or fragments of tracheids and xylem ray cells.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) six fluorescent zones at Rf. 0.11. 0.18. 0.32. 0.46, 0.65 and 0.75 (all blue). On exposure to Iodine vapour seven spots appear at Rf. 0.14. 0.42. 0.51, 0.67, 0.78, 0.84 and 0.92 (all yellow). On spraying with Methanolic-Sulphuric acid reagent and on heating the plate for ten minutes at 105°C eight spots appear at Rf. 0.10 (violet), 0.18 (violet), 0.52 (grey), 0.64 (violet), 0.71 (violet). 0.78 (violet). 0.89 (violet), 0.92 (green).

**CONSTITUENTS** - Terpenoids, Flavonoids and Glycosides.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Duṣṭavrāṇa Śodhaka

**IMPORTANT FORMULATIONS** - Khadirāriṣṭa, Daśamūlāriṣṭa, Devadārvāriṣṭa, Mṛtasañjīvanī Surā, Karpūrādyarka, Pramehamihira Taila, Candanādi Cūrṇa, Sudarśana Cūrṇa, Nārayaṇa Taila, Pradarāntaka Lauha, Vātaraktāntaka Lauha, Mahā Viṣagarbha Taila

**THERAPEUTIC USES** - Vibandha, Ādhmāna, Śoṭha, Tandrā, Hikkā, Jvara, Prameha, Pīnasa, Kāsa, Kaṇḍū, Kṛmi, Kuṣṭha, Āmavāta, Raktavikāra, Sūtikāroga

**DOSE** - 3-6 g of the drug in powder form

## DHATTŪRA (Whole Plant)

Dhattūra consists of dried whole plant of *Datura metel* Linn. Syn. *D. fastuosa* L.; (Fam. Solanaceae), occurring wild throughout the country.

### SYNONYMS

Sanskrit	:	Kanaka, Unmatta, Dhustura
Assamese	:	Dhatura
Bengali	:	Dhatura
English	:	White Thorn Apple
Gujrati	:	Dhanturo
Hindi	:	--
Kannada	:	Ummatti, Madagunaki, Dathura
Kashmiri	:	--
Malayalam	:	Umman, Ummatt, Ummattu
Marathi	:	Dhotra
Oriya	:	Dudura
Punjabi	:	Dhatura
Tamil	:	Umattai
Telugu	:	Tella-ummettha
Urdu	:	Dhatura

### DESCRIPTION

#### a) Macroscopic

**Root** - Cylindrical with lateral branches, brown coloured, rough due to fissures and root scars; fracture, splintery; odour, not characteristic; taste, bitter.

**Stem** - Dichotomously branched, cylindrical, blackish-dark to purple colour, internode very short; fracture, short; odour, not characteristic; taste, bitter.

**Leaf** - Petiolate, pubescent; 6 to 11 cm long, 2 to 8 cm broad; ovate, acute, repand and dentate, but sometimes entire, base unequal, odour, not characteristic; taste, bitter.

**Flower** - Stalked, stalk finely pubescent, calyx upto 10 cm long, tubular, lobes acuminate; corolla purple or purple tinged outside, upto 15 cm long, usually double, sometime triple (3 whorls), funnel-shaped, lobes 5 for each whorl; stamen -5, epipetalous with-connivent anthers, anther 10 to 12 mm long; gynoecium-bicarpellary, carpels placed obliquely in relation to mother axis, placentation axile, placenta swollen, ovule numerous.

**Fruit** - Capsule, ovate to obovate with persistent reflexed calyx; about 4 cm long, 3 cm wide, covered with short, stout, spines; taste, bitter and acrid.

**Seed** - Light brown, reniform, compressed, flattened, 0.4 to 0.5 cm long, and 0.4 cm wide, foveate, surface finely pitted; taste, bitter and acrid (warning -poisonous).

## **b) Microscopic**

**Root** - Shows 4 to 7 layers of thin-walled, rectangular cork cells; secondary cortex composed of 3 to 4 layers, thin-walled, parenchymatous, tangentially elongated cells; secondary phloem composed of usual elements, traversed by phloem rays; secondary xylem composed of usual elements; vessels two types with spiral thickening or with bordered pits; xylem rays 1 to 4 cells wide; sandy microsphenoidal crystal of calcium oxalate scattered in the secondary cortex and phloem parenchyma.

**Stem** - Shows a single layered, epidermis covered by striated, thick cuticle having a few unicellular trichomes, followed by 2 or 3 layered, ruptured, rectangular cork cells; secondary cortex consisting of 4 to 7 layered, collenchymatous and 2 to 5 layered parenchymatous cells; endodermis distinct, containing starch grains; pericycle consists of 1 or 2 layers of parenchyma and pericyclic fibres in singles or groups of 2 or 3 or more; secondary phloem composed of sieve elements and parenchyma but no fibres; secondary xylem composed of vessels, tracheids, fibres and parenchyma; vessels with spiral thickening and pits; sandy crystals of calcium oxalate are found scattered in secondary cortex and phloem parenchyma; starch grains oval to rounded, simple, measuring 3 to 7  $\mu$  in dia., present in secondary cortex and phloem parenchyma.

## **Leaf**

*Petiole* - shows plano-convex outline, cuticularised single layered epidermis, followed by cortex composed of 7 or 8 rows of round to polygonal, thick-walled, collenchyma cells and 2 or 3 rows of thin-walled, round to polygonal, parenchyma cells; vascular bundles bicollateral in a discontinuous ring, number of sandy microsphenoidal, a few rosette and prismatic crystals of calcium oxalate present in cortex and pith region.

*Midrib* - shows similar structure to that of petiole; collenchyma well developed in basal region and poorly in middle and upper region; cortex and endodermal cells containing simple and compound, oval to round, mostly eccentric starch grains measuring 2 to 4  $\mu$  in dia. with 2 or 3 components; cortical cells large hexagonal to round, without any crystals.

*Lamina* - shows cuticularised single layered epidermal cells bearing both glandular and non-glandular trichomes on both surfaces; non-glandular trichomes uniseriate, mostly multicellular; a few unicellular trichomes with warty surface; glandular trichomes short, stalked with multicellular, globose head; mesophyll differentiated into palisade parenchyma of single layer and spongy parenchyma of 6 to 8 layers, having numerous rosette and a few micro sphenoidal crystals of calcium oxalate; stomata anisocytic, present on both surfaces; stomatal index 16 to 17 on upper surface, 17 to 23 on lower surface; palisade ratio 5 to 6; vein islet number 19 to 22 per sq. mm.

**Seed** - Shows an outline with bulges at 3 places, single layered epidermis with elongated cells; seed coat consists of thick-walled, lignified, sclerenchymatous cells, forming club shaped structure, followed by 3 to 5 layered, more or less tangentially elongated, parenchymatous cells; endosperm composed of polygonal, thin-walled, parenchymatous cells filled with aleurone grains and abundant oil globules, embryo more or less curved.

**Powder** - Greyish-brown; shows fragments of both glandular and non-glandular trichomes; glandular trichomes short stalked with multicellular globose heads; non glandular trichomes unbranched, long, mostly multicellular, a few unicellular trichomes with warty surfaces; anisocytic stomata, vessels with spiral thickening, a few sandy micro sphenoidal and rosette crystals of calcium oxalate; simple, oval to round starch grains measuring 2 to 7  $\mu$  in dia., and compound starch grains with 2 or 3 components.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 16 per cent, Appendix	2.2.3.

Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (80:20) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.65 (blue), 0.67 (pink) and 0.98 (pink). On exposure to Iodine vapour nine spots appear at Rf. 0.07, 0.15, 0.37, 0.48, 0.61, 0.67, 0.83, 0.89 and 0.98 (all yellow). On spraying with Dragendorff reagent followed by sodium nitrite solution, two spots appear at Rf. 0.11 and 0.98 (both orange yellow).

**CONSTITUENTS** - Alkaloids (Hyoscine) and two withanolide Glucosides (Daturametelin A & B)

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya, Madhura, Tikta
<b>Guṇa</b>	:	Tīkṣṇa, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Madakāri, Kaphahara, Agni Vṛddhikara, Varṇya, Jāṅgama Viṣahara

**IMPORTANT FORMULATIONS** - Kanakāsava, Ekāṅgavīra Rasa, Puṣpadhanva Rasa, Tribhuvana Kīrti Rasa, Śri Jayamaṅgala Rasa, Laghu Viṣagarbha Taila, Viṣatinduka Taila, Dhattūra Taila

**THERAPEUTIC USES** - Kāsa, Śvāsa, Jvara, Kuṣṭha, Vraṇa, Mūtrakṛcchra, Tvak Doṣa, Yūka  
Likṣa, Kṛmi, Alarka Viṣa, Karma Nāḍī, Kaṇḍū, Indralupta, Pādadhāha, Stanasthita Pīḍā,  
Unmāda

**DOSE** - 100 - 200 mg

## DŪRVĀ (Whole Plant)

Dūrva consists of dried whole plant of *Cynodon dactylon* (Linn.) Pers. (Fam. Poaceae), an elegant, tenacious, perennial, creeping grass growing throughout the country and ascending to 2440 m.

### SYNONYMS

Sanskrit	:	Śataparva, Śatavalli, Nīladūrva
Assamese	:	Ushb
Bengali	:	Doorva, Neel Doorva
English	:	Creeping Cynodon, Dhub Grass
Gujrati	:	Dhro, Khaddhro, Leelodhro, Neeladhro
Hindi	:	Doob, Neelee Doob
Kannada	:	Garikai-Hallu, Garike, Garik Hallu
Kashmiri	:	--
Malayalam	:	Karuk, Karukappullu
Marathi	:	Harlee, Neel durva, Haryali
Oriya	:	--
Punjabi	:	Dubea
Tamil	:	Arukampillu
Telugu	:	Doolu, Harvali, Garichgaddi
Urdu	:	Doob Ghas

### DESCRIPTION

#### a) Macroscopic

**Root** -Fibrous, cylindrical, upto 4 mm thick, minute hair-like roots arise from the main roots; cream coloured.

**Stem** -Slender, prostrate, upto 1.0 mm thick, jointed, leafy, very smooth, yellowish green in colour.

**Leaf** - 2 to 10 cm long and 1.25 to 3 mm wide, narrowly linear or lanceolate, finely acute

more or less glaucous, soft, smooth, usually conspicuously distichous in the barren shoots and at the base of the stems; sheath light, glabrous or sometimes bearded, ligule a very fine ciliate rim.

## **b) Microscopic**

**Root** - Mature root shows epiblema or piliferous layer composed of a single layer of thin-walled, radially elongated to cubical cells; hypodermis composed of 1 or 2 layered, thin-walled, tangentially elongated to irregular shaped cells; cortex differentiated into two zones, 1 or 2 layers of smaller, thin-walled, polygonal, lignified sclerenchymatous and 4 to 6 layers of larger thin-walled, elongated parenchymatous cells; endodermis quite distinct, single layered, thick-walled, tangentially elongated cells; pericycle 1 or 2 layers composed of thin-walled sclerenchymatous cells; vascular bundles consisting of xylem and phloem, arranged in a ring on different radials; xylem exarch, having usual elements; centre occupied by wide pith, composed of oval to rounded thick-walled parenchymatous cells containing numerous simple, round to oval or angular starch grains measuring 4 to 16  $\mu$  in dia., and compound starch grains having 2 to 4 components

**Stem** - Oval in outline with a little depression on one side, shows a cuticularised epidermis single layered, having lignified walls; hypodermis 1 or 2 layers, sclerenchymatous; cortex composed of 3 to 5 layers of round to oval thin walled parenchymatous cells; endodermis not distinct; pericycle present in the form of continuous ring of 2 to 5 layers of sclerenchymatous fibres; vascular bundle collateral, closed and scattered throughout the ground mass of parenchyma, each surrounded by sclerenchymatous sheath; vessels simple, spiral, scalariform, and annular; medullary rays not distinct; fibres short, thick walled, having narrow lumen and pointed tips; starch grains simple and compound having 2 to 4 components, present in cortex and ground tissue, simple grains measuring 4 to 16  $\mu$  in dia.

**Leaf** - Lamina shows nearly square to oval epidermis having irregularly cutinised outer wall, bulliform cells present on the dorsal side which are grouped together and lie at the bottom of a well defined groove in between the veins; these are thin walled and lack chlorophyll, extend deep into the mesophyll; mesophyll not differentiated into palisade and spongy parenchyma; row of vascular bundles nearly alike, except that the median bundle is larger; bundle sheath single, and consists of thin-walled more or less isodiametric parenchyma cells containing chloroplast; mesophyll tissue broken by 1 or 2 thin-walled colourless cells which extend from bundle sheath to the thin walled parenchymatous band of stereome near upper and lower epidermis.

**Powder** - Yellowish-green; simple pitted, scalariform, annular and spiral, vessels; short lignified, thick walled, pointed fibres, paracytic stomata; epidermis in surface view, of elongated, rectangular long cells and nearly square small cells having sinuous walls; simple and compound starch grains, measuring 4 to 16  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9.5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (90 : 10) shows in visible light five spots at Rf. 0.1 (green), 0.40 (yellow), 0.45 (green), 0.51 (yellow) and 0.57 (green). On exposure to Iodine vapour six spots appear at Rf. 0.22, 0.40, 0.45, 0.51, 0.57 and 0.64 (all yellow in colour). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appear at Rf. 0.22, 0.40, 0.45, 0.51 (all grey), 0.57 (green) and 0.64 (grey).

**CONSTITUENTS** - Phenolic Phytotoxins (Ferulic, Syringic, P-coumaric, Vanillic, P-Hydroxybenzoic and O-Hydroxyphenil acetic acid)

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Madhura, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura

**Karma** : Pittahara, Kaphahara, Sraṃsana, Rucya

**THERAPEUTIC USES** - Raktapitta, Tṛṣṇā, Chardi, Dāha, Mūrccā, Visarpa, Raktavikāra, Tvak Roga, Atīśāra, Kaphaja Jvara, Vātaja Jvara, Jvara, Nāsāgata Raktapitta

**DOSE** - Svarasa 10-20 ml

## GAMBHĀRĪ (Stem Bark)

Gambhārī consists of dried stem bark of *Gmelina arborea* Linn. (Fam. Verbenaceae), a large deciduous tree, mostly found in southern peninsula and upto Kashmir

### SYNONYMS

Sanskrit	:	Kaśmari, Kaśmarya, Śrīparṇi
Assamese	:	Gamari
Bengali	:	Gamar
English	:	Candhar Tree
Gujrati	:	Shivani hannu, Shewan
Hindi	:	Gambhar Khambhari
Kannada	:	Shivani, Shivanigida
Kashmiri	:	--
Malayalam	:	Kumizhu, Kumbil, Kumpil, Kumizhin
Marathi	:	Shivan
Oriya	:	Gambhari
Punjabi	:	Gumhar, Kumhar
Tamil	:	Nilakumizh
Telugu	:	Peggumudu, Peggumaddi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Mature stem bark 0.2 to 0.7 cm thick, channelled pieces, ribbed, quilled at some places; outer surface yellowish-brown in colour and rough due to some longitudinal and horizontal cracks, inner surface fairly smooth and reddish-brown to black in colour; fracture, short; odour and taste not distinct.

## b) Microscopic

Shows a wide zone of cork consisting of rectangular, thick-walled, lignified cells; cork cambium 1 or 2 layers, filled with reddish-brown contents; secondary cortex consists of 2 or 3 layers, tangentially elongated, elliptical, thin-walled, parenchymatous cells; secondary phloem composed of sieve elements, parenchyma and phloem rays; parenchyma rectangular to polygonal, phloem rays 1 to 7 cells wide, 3 to 16 cells high; rays 4 or 5 cells wide and 8 to 10 cells high more common; stone cells oval to elliptical, lignified, pitted, with wide lumen; stone cells and lysigenous cavities present throughout phloem.

**Powder** - Reddish-brown; shows fragments of cork cells, thick-walled, elliptical, lignified, pitted stone cells with wide lumen.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Chloroform Methanol (95:5) shows under U.V. (366 nm) no fluorescent spot. On exposure to Iodine vapour two spots appear at Rf. 0.20 and 0.60 (both yellow).

**CONSTITUENTS** - Alkaloids, in traces.

**PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṭu, Madhura

**Guṇa** : Guru

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Kaphahara, Śothahara, Dīpana, Pācana, Medhya, Bhedana, Viṣahara,  
Dāha Praśamana

**IMPORTANT FORMULATIONS** - Candanāsava

**THERAPEUTIC USES** - Śūla, Arśa, Jvara, Raktapitta, Tṛṣṇā, Bhrama, Śoṭha

**DOSE** - 3-5 gm

## IKṢU (Root Stock)

Ikṣu consists of root stock of *Saccharum officinarum* Linn. (Fam. Poaceae), a plant generally cultivated in all hotter parts of the country for extraction of sugar.

### SYNONYMS

Sanskrit	:	Asipatra, Bhurirasa, Dīrghacchada, Gudamula, Tṛṇarasa
Assamese	:	Kuhiyare
Bengali	:	Akh, Ganna
English	:	Sugar-cane
Gujrati	:	Sheradi
Hindi	:	Ganna, Ikh
Kannada	:	Ikshu, Kabbu
Kashmiri	:	--
Malayalam	:	Karimpu
Marathi	:	Us
Oriya	:	--
Punjabi	:	Ganna
Tamil	:	Karumbu Ver
Telugu	:	Cheraku, Cheruku
Urdu	:	Ganna, Naishkar

### DESCRIPTION

#### a) Macroscopic

Drug occurs in form of root stock with attached yellowish-brown stem portion, having 10 to 15 cm long, numerous grey to blackish-brown fibrous roots; solid, jointed, more or less cylindrical, 2 to 2.5 cm thick and varying in length, rough; fracture, splintery; odour and taste, not distinct.

**b) Microscopic**

**Root Stock** - Shows single layered epidermis followed by 3 to 4 layers of oval to elliptical, lignified, thick-walled more or less radially elongated, sclerenchymatous cells; cortex consists of upper 12 to 15 layers oval to polygonal, thin-walled and lower 5 layers, elliptical, parenchymatous cells; endodermis single layered; pericycle 3 or 4 layers, sclerenchymatous; fibro-vascular bundle, covered with sclerenchymatous sheath, scattered throughout the ground mass of parenchymatous cells.

**Root** - Shows single layered epidermis of thin-walled, rectangular cells, followed by a layer of hypodermis of thin-walled, rectangular cells, outer cortex composed of 2 or 3 layers of thick-walled, polygonal to circular, sclerenchymatous cells filled with dark brown or blackish pigment, inner cortex composed of large aerenchymatous cells; endodermis composed of barrel-shaped, thin-walled cells, enclosing a layer of pericycle consisting of rectangular cells having inner wall thickened, and vascular tissue; xylem and phloem form an equal number of separate bundles. arranged in a ring; centre occupied by a large pith. composed of circular to oval. parenchymatous, thin-walled cells.

**Powder** - Blackish in colour; shows sclerenchymatous cells of cortex. xylem vessels and fibres. groups of spindle-shaped, elongated, epidermal cells in surface view.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract on Silica Gel 'G' using n-Butanol : Acetic acid : Water (4:1:5) shows under visible light two spots at Rf. 0.80 and 0.96 (both grey). Under U.V. (366 nm) four fluorescent zones are visible at Rf. 0.67 (light blue). 0.80 (dark blue). 0.86 (light blue) and 0.96 (dark blue). On exposure to Iodine vapour several spots appear out of which three spots are conspicuous at Rf. 0.30. 0.80 and 0.96 (all yellow). On spraying with 5% Methanolic- Sulphuric acid reagent and heating the plate for ten minutes at 110°C several spots appear out of which three are conspicuous at Rf. 0.10. 0.86 and 0.96 (all grey).

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Sara, Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Bṛmhaṇa, Vṛśya, Vātaśāmakā, Kaphakara, Pittahara, Mūtrala, Balya

**IMPORTANT FORMULATIONS** - Tṛṇapañcamūla Kvātha, Sukumara Ghr̥ta, Brahma Rasāyana

**THERAPEUTIC USES** - Raktapitta, Mūtrakṛcchra, Ojokṣaya, Nāsā Raktasrāva, Grahaṇī, Pāṇḍu, Kṣataja Kāsa, Visarpa

**DOSE** - 15-30 gm in decoction form.

## KADALĪ (Flower)

Kadalī Kadali consists of dried flower of *Musa paradisiaca* Linn. (Fam. Musaceae), a monoecious herb, cultivated widely in the country in most of the states.

### SYNONYMS

Sanskrit	:	Mouca, Varana, Ambusāra
Assamese	:	Kal, Talha
Bengali	:	Kela, Kala, Kanch Kala
English	:	Banana
Gujrati	:	Kela
Hindi	:	Kela
Kannada	:	Bale gadde, Kadubale, Kattebale, Kadali
Kashmiri	:	--
Malayalam	:	Kadali, Ksetrak
Marathi	:	Kel, Kela
Oriya	:	Kadali, Kadila
Punjabi	:	Kela
Tamil	:	Vazhai, Pazham
Telugu	:	Arati chettu
Urdu	:	Kela (Mouz)

### DESCRIPTION

#### a) Macroscopic

**Flower** -Inflorescence spike, drug occurs in cut and crumpled pieces, 2.5 to 4.0 cm long sessile, unisexual; calyx and corolla present; calyx 2.5 to 4 cm long crumpled, tubular spathaceous, dark brown having ridges and furrows; corolla 1.5 to 2.5 cm long, connate, crumpled, boat-shaped creamish-yellow, membranous, toothed at apex; stamens 5 + 1 rudimentary, 0.8 to 1.2 cm long dark brown; filament erect, strongly filiform; anthers linear,

bitheous; carpels 3, syncarpous, ovary inferior, trilocular, each with several ovules; axile placentation; style 3.0 to 4.5 cm long light brown, filiform; stigma capitate or sub globose, 3 or 4 lobed, greyish-brown; taste arid odour not characteristic.

#### **b) Microscopic**

**Calyx**- Shows thin-walled, single layered, upper and lower epidermis, followed by thin walled, parenchymatous mesophyll, embedding vascular bundle, having usual elements surrounded by some large, thin-walled, specialised cells containing oleo-resin ducts, tannin cells and a few oil globules.

**Corolla** -Shows thin-walled, striated single layered epidermis on either surface and oval to polygonal in surface view; mesophyll 2 or 3 layered consisting of thin-walled, parenchymatous cells; numerous prismatic crystals of calcium oxalate present in mesophyll.

**Androecium** - Filament shows single layered epidermis, followed by ground tissues consisting of oval to polygonal, thin-walled, parenchymatous cells having crescent shaped vascular bundles and oleo-resin cells; anther lobe shows two layered wall, 4 to 6 celled tapetum; pollen grains spherical measuring 26 to 47  $\mu$  in diam., smooth, yellowish-brown, having clear, thick-walled, pigmented exine, thin-walled, colourless intine.

**Gynoecium**-Ovary shows single layered, cuticularised epidermis followed by ground tissue consisting of oval, polygonal, thin-walled, parenchymatous cells embedding a few thickened pitted cells; stigma consists of 6 chambers having single layered epidermis.

**Powder** - Brown, shows fragments of straight walled, polygonal, thin walled epidermal, cells, simple pitted cells, vessels with spiral thickening, anisocytic stomata, a few prismatic crystals of calcium oxalate, spherical, smooth, yellowish-brown pollen grains, having clear exine and intine and measuring 26 to 47  $\mu$  in dia., a few oil globules, and oleoresin cells; a few simple, oval or irregular starch grains measuring upto 65  $\mu$  in length and 35  $\mu$  in width.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	18	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' using Toluene: Ethylacetate (9 :1) shows under U.V. (366 nm) six fluorescent zones at Rf. 0.09 (blue), 0.23 (grey), 0.31 (blue), 0.36 (violet), 0.66 (blue) and 0.97 (violet). On exposure to Iodine vapour five spots appear at Rf. 0.23, 0.31, 0.33, 0.66 and 0.97 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.09, 0.23, 0.66 and 0.97 (all blue).

**CONSTITUENTS** - Saponins, Tannins, reducing and non-reducing Sugars, Sterols and Triterpenes.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Madhura, Tikta
<b>Guṇa</b>	:	Mṛdu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura

**Karma** : Pittanaśaka, Rucya, Kaphaghna, Balya, Vṛśya, Stambhaka, Grāhī, Dīpana

**IMPORTANT FORMULATIONS** - Hemanātha Rasa

**THERAPEUTIC USES** - Kṛmi, Śvāsa Roga, Raktapitta, Pradara

**DOSE** - 10-20 gm

## KARCŪRA (Rhizome)

Karcūra consists of dried pieces of rhizome of *Curcuma zedoaria* Rose, (Fam. Zingiberaceae), a large perennial herb with underground tuberous root-stock, growing wildly in eastern Himalayas and in moist deciduous forests of the central region of Karnataka; also cultivated throughout the country.

### SYNONYMS

Sanskrit	:	Kaccura, Draviḍa
Assamese	:	Katuri
Bengali	:	Sali, Ekangi, Sari, Kachura
English	:	Zedoary
Gujrati	:	Kachuro, Shatakachuro
Hindi	:	Kacura
Kannada	:	Kachora
Kashmiri	:	--
Malayalam	:	Kachalam
Marathi	:	Kachora
Oriya	:	Kachoramu, Gandha Sunthi, Karchura
Punjabi	:	Kachur
Tamil	:	Kichili, Kizhangu, Kitchiliki Zhangu, Padam Kizhangu
Telugu	:	Kachoramu, Kichili Gadda
Urdu	:	Zarambad

### DESCRIPTION

#### a) Macroscopic

Drug occurs as whole or longitudinally and tangentially cut pieces; the whole drug 2 to 6 cm long, cylindrical; transversely cut pieces 2 to 3.5 cm in dia., surface rough due to longitudinal wrinkles and occasional protuberances; nodes and internodes distinct, a few pieces bear thin root and root scars at places; colour externally greyish-buff and internally cream; odour, camphoraceous; taste, slightly bitter.

## b) Microscopic

Shows a thin zone of cork composed of 4 to 7 layers of thin-walled, tangentially elongated, rectangular cells, sometimes epidermis intact with cork having uniseriate covering trichomes; ground tissue consist of thin-walled, circular, oval or polygonal, parenchymatous cells, mostly filled with simple starch grains but some cells also contain yellow oleo-resin; stelar region demarked from cortex by somewhat collapsed cells of endodermis and consists of rounded and oval to polygonal cells mostly filled with starch grains but some having yellow masses of oleo-resin; vascular bundles closed and collateral, distributed throughout cortical and stelar region, consisting of a few xylem and phloem elements; vascular bundles found in the form of a ring in the cortical region and in the stelar region, just below endodermis; most of the vascular bundles in rest of the stelar region smaller in size and scattered; number of vessels in each bundle varies from 2 to 10, bundle with single vessels being very rare; starch grains round to oval, a few with slight projection at one end striations distinct, numerous; hilum cleft, indistinct at the narrow end, 20 to 70  $\mu$  in length and 15 to 35  $\mu$  in width.

**Powder** - Greyish-yellow; aromatic; shows fragments of cork, oleo-resin cells, simple circular to oval, abundant starch grains measuring 20 to 70  $\mu$  in length and 15 to 35  $\mu$  in width.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.
Volatile oil	Not less than	2	per cent, Appendix	2.2.10

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene Ethylacetate (93 : 7) v/v shows under U.V. (366 nm) five fluorescent zones at Rf. 0.25, 0.47, 0.76 (all light blue), 0.83 (blue) and 0.97 (light blue). On exposure to Iodine vapour eight spots appear at Rf. 0.25, 0.34, 0.47, 0.58, 0.67, 0.76, 0.83 and 0.97 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C eight spots appear at Rf. 0.25 (violet), 0.34 (light violet), 0.47 (violet), 0.58 (violet), 0.67 (light brown), 0.76 (bluish grey), 0.83 (violet) and 0.97 (light brown).

**CONSTITUENTS** - Essential Oil and Resin.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Rucya, Dīpana, Mukhavaiśadyakara

**IMPORTANT FORMULATIONS** - Karcūrādi Cūrṇa (Karcūrādi Lepa), Karpūrādyarka, Sūtaśekhara Rasa

**THERAPEUTIC USES** - Hikkā, Śvāsa, Kāsa, Kuṣṭha, Arśa, Gulma, Jvara, Vraṇa, Plīhā, Galagaṇḍa, Kṛmi

**DOSE** - 1-3 gm of the drug in powder form.

## KASTŪRĪLATIKĀ (Seed)

Kastūrīlatkā consists of seed of *Hibiscus abelmoschus* Linn. Syn. *Abelmoschus moschatus* Medik (Fam. Malvaceae), an evergreen shrub about 1.22 m in height cultivated in hotter parts of India.

### SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Latakasturi
English	:	--
Gujrati	:	Bhindo, Bhinda
Hindi	:	--
Kannada	:	Kasturi Kande, Kadu Kastuar
Kashmiri	:	--
Malayalam	:	Kattu Kasthuri, Kasturi Kanda
Marathi	:	Kasturbhendi
Oriya	:	--
Punjabi	:	Mushak Dana, Lata Kasturi
Tamil	:	Kasturi-vendai
Telugu	:	Kasturi Benda
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seeds greyish-brown and blackish, not velvety to touch, kidney-shaped, slightly compressed with shallow depressions on both sides, marked with minute parallel ridges and furrows; hilum small and distinct; odour, musk-like; no taste.

## **b) Microscopic**

Shows two integuments, outer integument forms ridges and furrows; epidermis consists of single layered tangentially elongated cells, followed by 1 to 3 layers of thin-walled tangentially elongated cells in the region of furrows; 1 to 4 rows of rounded, thick-walled cells containing yellowish-brown masses with 1 or 2 of the upper most rows thin-walled, tangentially elongated and pointed cells present in the region of ridges; inner integument represented by palisade like cells, containing some granular masses followed by thin and thick-walled parenchyma; the thick-walled being 4 to 8 layered, compactly arranged, tangentially elongated, having reddish-brown contents, followed by the thin-walled and colourless cells; 8 to 12 layers of cells large, isodiametric to oval; a single layer of tangentially elongated cells present; cotyledons two, consisting of single layered cubical to irregular cells of epidermis covered by cuticle and followed by a single layered palisade like cells; the rest of the cotyledons consists of 4 to 6 rows of thin-walled, isodiametric cells filled with granular masses; lower epidermis composed of a single layer of cells covered with cuticle.

**Powder** - Greyish-brown; shows brown coloured parenchyma cells, rounded, thick walled cells, a few palisade cells and polygonal and straight walls epidermal cells in surface view

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.
Fixed Oil	Not less than	10	per cent, Appendix	2.2.8

## **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) under UV (366 nm) shows two fluorescent zones at Rf. 0.36 and 0.93 (both blue). On exposure to Iodine vapour five spots appear at Rf. 0.19, 0.31, 0.53, 0.71 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C five spots appear at Rf. 0.19, 0.31, 0.53, 0.71 and 0.93 (all grey). On spraying with 5% Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.19, 0.31, 0.53, 0.71 and 0.93 (all grey).

**CONSTITUENTS** - Fixed Oil and Volatile Oils

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Madhura
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Caḡsusya, Chedini, Vṛṣya, Kaphahara, Mukhadaurgandhyanāṣaka, Vasti Viśodhani

**IMPORTANT FORMULATIONS** - Karpūrādyarka

**THERAPEUTIC USES** - Trṣṇā, Vasti Roga, Mukha Roga

**DOSE** - 2-4 gm of the drug in powder form.

## KATAKA (Seed)

Kataka consists of dried seed of *Strychnos potatorum* Linn. f.(Fam. Loganiaceae), a tall tree occurring plentifully in deciduous forests in most of the parts of the country upto 400m.

### SYNONYMS

Sanskrit	:	Nirmali, Payah Prasadisa
Assamese	:	--
Bengali	:	Nirmali
English	:	Clearing nut
Gujrati	:	Nirmali
Hindi	:	Chillikavi
Kannada	:	Katakam, Tetramabaral
Kashmiri	:	--
Malayalam	:	Katakam
Marathi	:	Nirmal
Oriya	:	--
Punjabi	:	Nirmali
Tamil	:	Kottai
Telugu	:	Chilla
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seed upto 8 mm dia., circular, bluntly lenticular, shiny with short, appressed silky hairs; cream-white in colour with a slightly prominent ridge round the border, no bitterness, (Seeds of *Strychnos nux-vomica* bitter).

### **b) Microscopic**

Shows testa, consisting of 2 or 3 layers, thick-walled, elongated, lignified sclerenchymatous cells covered with numerous, cylindrical, unicellular, lignified, trichomes having basal portion ramified; outer endosperm composed of 3 to 8 layers of thick-walled, elongated palisade-like cells arranged in rows, an inner endosperm composed of thin-walled, oval to polygonal, parenchymatous cells having numerous small aleurone grains and oil globules.

(In seed of *Strychnos nux-vomica* base of trichome is pitted, bulbous, ramified with a projection normally elongated and thick-walled).

**Powder** - Creamish-yellow and oily; shows fragments of testa, trichomes, endosperm cells and oil globules.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate : Diethylamine (70:20: 1 0). On spraying with Dragendorff reagent with tartaric acid two spots appear at Rf. 0.38 (orange and corresponding to that of Brucine) and at Rf. 0.55 (faint orange and corresponding to that of Strychnine).

**CONSTITUENTS** - Alkaloids.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Guru, Śīta
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Cakṣusya, Vātahara, Śleṣmahara, Viṣaghna, Pittala, Āśu Dṛṣṭiprasādakṛt (Kāśyapa), Jala Prasādakara

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Nirūryādi Guṭikā

**THERAPEUTIC USES** - Mūtrakṛcchra, Mūtrāśmarī, Kṛmi, Aruci, Tṛṣṇā, Śūla, Netraroga, Śarkarameha, Rakta Abhiṣyanda, Prameha, Vṛścika Viṣa, Apasmāra

**DOSE** - 3-6 gm

## **KHARJŪRA (Dried Fruit)**

Kharjura consists of dried fruit, with seeds removed, of *Phoenix dactylifera* Linn. (Fam. Araceae ), a tall tree upto 36 m high, cultivated or occasionally self-sown in arid parts of the country.

### **SYNONYMS**

Sanskrit	:	Piṇḍa Kharjura
Assamese	:	Tamar
Bengali	:	Sohara
English	:	Dried Dates
Gujrati	:	Kharek, Kharika
Hindi	:	Chuhara, Chohara
Kannada	:	Karinchula, Khajura
Kashmiri	:	--
Malayalam	:	Intappazham, Inthappana
Marathi	:	Kharika, Kharik Phala, Khajur, Kharik
Oriya	:	Kharjjuri, Khajur
Punjabi	:	Khajur
Tamil	:	Pericham, Karchuram, Perichehantay
Telugu	:	Kharjura, Kharjuramu
Urdu	:	Khurma (Khajoor)

### **DESCRIPTION**

#### **a) Macroscopic**

Fruit an oblong berry, 2.5 to 7.5 cm long, wrinkled, hard, reddish-brown, and sweet

#### **b) Microscopic**

Shows a wide pericarp consisting of a single layered epidermis covered with striated cuticle; below epidermis 3 to 5 layers of tangentially elongated, tabular, thin walled cells followed by a layer of stone cells with narrow lumen, thick walled, 28 to 55  $\mu$  in dia., with clear striations; below this a wide zone of oval to elongated, thin-walled parenchymatous cells present; cells of outer 10 layers more elongated than the inner ones; some vascular bundles, groups of tanniferous idioblasts and oil globules present scattered in this region.

**Powder** - Reddish-brown; shows groups of thin-walled parenchyma; stone cells, oil globules and tanniferous idioblasts.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	74	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid : Water (5:1:4) shows in visible light one spot at Rf. 0.12 (grey). On exposure to Iodine vapour two spots appear at Rf. 0.12 and 0.25 (both yellow). On spraying with 5% Methanolic-Sulphuric acid reagent four spots appear at Rf. 0.12, 0.25 (both black), 0.33 and 0.62 (both grey).

**CONSTITUENTS** - Sugars, Tannins and Vitamins.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Hṛdya, Tarpaṇa, Balya, Bṛmhaṇa, Vṛśya, Śukrala

**IMPORTANT FORMULATIONS** - Drākṣādi Cūrṇa, Elādyā Modaka, Elādi Guṭikā, Śiva Guṭikā (Laghu)

**THERAPEUTIC USES** - Kṣaya, Kṣata Kṣaya, Dāha, Raktapitta, Mūrcchā, Tṛṣṇā, Madātyaya, Abhighāta, Kāsa, Śvāsa, Śrama, Gulma, Jvara, Mukha Vairasya, Hikkā, Prameha, Pittaśūla

**DOSE** - 10-15 gm

## **KHARJŪRA (Fresh Fruit)**

Khajūrā consists of ripe and mature fruit with seed removed, of *Phoenix dactylifera* Linn. (Fam. Araceae), a tall palm tree upto 36 m high, cultivated or occasionally self-sown in arid parts of the country

### **SYNONYMS**

Sanskrit	:	Aharjūra, Piṇḍa Kharjrūra
Assamese	:	--
Bengali	:	Khejur
English	:	Date
Gujrati	:	Khajur
Hindi	:	Khajur, Pinda, Khajur
Kannada	:	Kharjura, Pinda Kharajura
Kashmiri	:	--
Malayalam	:	Prantha Puzam
Marathi	:	Khajur
Oriya	:	Khejuri
Punjabi	:	Pinda Khajur
Tamil	:	Pericham Pazham
Telugu	:	Khajur pupandu
Urdu	:	Khurma (Khajoor)

### **DESCRIPTION**

#### **a) Macroscopic**

Fruit a berry, oval to oblong, compressed, of varying shapes; 2 to 3 cm long, smooth or slightly wrinkled, reddish-brown to yellowish-brown; pulp fleshy, sticky, soft, viscous; odour, not distinct; taste, sweet.

## **b) Microscopic**

Fruit shows single layered epidermis with striated cuticle, containing heavily cutinized cells and having stomata; below epidermis, 4 or 5 layered tangentially elongated, thin-walled, parenchymatous hypodermis present, followed by a row of stone cells with narrow lumen, thick-walled, 28 to 55  $\mu$  in dia., with clear striations; mesocarp differentiated into two zones, outer consisting of thin-walled parenchyma cells with scattered tannin, and oil globules, inner consisting of collapsed, crushed and disorganized cells appearing as loose, shining, 'fibrous' mass, representing the so called "rag." scattered sclerosed cells also occur in this region; endocarp composed of single layered inner epidermis together with underlying compact tissues.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	3 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	65 per cent, Appendix	2.2.7.

## **T.L.C.**

T.L.C. of alcoholic extract on Silica Gel 'G' using n-Butanol : Acetic acid : Water (5:1:4) shows in visible light one spot at Rf. 0.12 (grey). On exposure to Iodine vapour two spots appear at Rf. 0.12 and 0.25 (both yellow). On spraying with 5% Methanolic-Sulphuric acid reagent four spots appear at Rf. 0.12, 0.25 (both black), 0.33 and 0.62 (both grey).

**CONSTITUENTS** - Sugars, Protein and Vitamins

## **PROPERTIES AND ACTION**

**Rasa** : Madhura, Kaṣāya

**Guṇa** : Guru, Snigdha

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātahara, Pittahara, Kaphahara, Māṃsavardhaka, Śukrakara, Rucikara, Hr̥dya, Balya, Tarpaka, Koṣṭhagata Vāyunāśaka, Vāmaka, Kṣudhāhara, Śramahara

**IMPORTANT FORMULATIONS** - Drākṣādi Cūrṇa, Elādyā Modaka, Elādi Guṭikā, Śiva Guṭikā (Laghu)

**THERAPEUTIC USES** - Kṣata Kṣaya, Raktapitta, Jvarātisāra, Tṛṣṇā, Kāsa, Śvāsa, Mūrccā, Madātyaya, Dāha, Abhighāta

**DOSE** - 10-50 gm

## KṚṢṆASĀRIVĀ (Root)

Kṛṣṇasāriṅva consists of dried roots of *Cryptolepis buchanani* Roem. & Schult. (Fam. Asclepiadaceae), a perennial, much branched climber with milky juice, found throughout the country from Western Kashmir to Assam, ascending to 1200 m in the Himalayas and in south upto Kerala.

### SYNONYMS

Sanskrit	:	Jambu Patra, Śyāma, Kṛṣṇavalli, Kṛṣṇamūli
Assamese	:	--
Bengali	:	Shyamalata, Krishna Saarivaa
English	:	--
Gujrati	:	--
Hindi	:	Kaleesar, Kalee Anantmool
Kannada	:	Karccumbu
Kashmiri	:	--
Malayalam	:	Kalipalvalli
Marathi	:	Mothi Kawalee, Kallee Kawalee
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Naltig, Adavipalatige, Rokallipala
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Roots vary in length and are 1 to 1.5 cm thick; slender, cylindrical, dark brown or blackish; rough due to fine longitudinal ridges and wrinkles running sinuously lengthwise; thicker roots show a few transverse cracks, fissures and longitudinal wrinkles with remnants of rootlets and a few lenticels; cork easily peelable; fracture, short and fibrous; odour,

slightly aromatic; taste, sweet and astringent.

#### **b) Microscopic**

Shows thin cork consisting of 4 to 14 layers of thin-walled, rectangular to tangentially elongated cells, arranged radially; cork cambium single layered, followed by a wide zone of secondary cortex composed of polyhedral, oval to tangentially elongated cells having fibres in single or in groups of two to ten; fibres long, thick-walled but very occasionally appear also as elongated stone cells; secondary phloem wide consisting of sieve elements, phloem parenchyma, fibres and a few crystal fibres, and traversed by phloem rays; phloem fibres occur in small groups or rarely in singles, somewhat similar in shape to those of secondary cortex with comparatively thicker walls; crystal fibres elongated, thick-walled and divided into chambers, usually 7 to 17 in number, each chamber containing a prismatic crystal of calcium oxalate; medullary rays urn-to triseriate; cambium 2 to 4 layered; secondary xylem composed of vessels, tracheids, fibre-tracheids, fibres and parenchyma and traversed by xylem rays; vessels with bordered pits, and filled with tyloses; tracheids long and narrow having bordered pits, and moderately thick-walls; xylem parenchyma usually rectangular in shape with pitted walls but some of the pits become T or Y shaped with reticulate thickening; xylem elements thick-walled and lignified; simple and compound starch grains found in abundance in all parenchymatous cells simple being elliptical to oval, measuring 3 to 19  $\mu$  in dia., with central hilum and compound with 2 or 3 components.

**Powder** - Light grey; shows fragments of cork cells, vessels having bordered pits, tracheids, fibres, prismatic crystals of calcium oxalate, starch grains numerous, simple and compound, elliptical to oval, measuring 3 to 19  $\mu$  in dia., with central hilum and compound with 2 or 3 components.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (90 : 10) shows under U.V. (366 nm) ten fluorescent zones at Rf. 0.05, 0.10, 0.22, 0.30 (all blue), 0.39 (yellow), 0.49, 0.60, 0.72, 0.80 (all blue) and 0.88 (violet). On exposure to Iodine vapour nine spots appear at Rf. 0.09, 0.17, 0.26, 0.35, 0.43, 0.61, 0.74, 0.88 and 0.96 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.09, 0.17 (both gery), 0.26 (blue), 0.35, 0.43, 0.49, 0.61 and 0.96 (all violet).

**CONSTITUENTS** - Alkaloids.

### PROPERTIES AND ACTION

**Rasa** : Madhura, Tikta  
**Guṇa** : Guru, Snigdha  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Śukrakara, Kaphanaśaka, Viṣaghna, Rucya, Saṃgrāhi, Rakta Vikāra  
Nāśaka, Āma Viṣaghna, Tridoṣahara, Tṛṣṇāhara

**IMPORTANT FORMULATIONS** - Śatāvarī Guḍa, Kalyāṇaka Ghṛta, Triphalā Ghṛta, Bṛhat Phala Ghṛta, Mahā Kalyāṇaka Ghṛta, Mahā Tiktaka Ghṛta, Mahā Pancagavya Ghṛta, Vastyāmayānaka Ghṛta, Candanādi Taila, Bṛhat Chāgalādyā Ghṛta

**THERAPEUTIC USES** - Agnimāndya, Aruci, Śvāsa, Kāsa, Jvara, Prameha, Mukha Daurgandhya, Atīśāra, Kuṣṭha, Kaṇḍū, Pradara, Vātarakta, Dehadurgandha, Raktapitta

**DOSE** - 5-10 gm

## KUNDURU (Exudate)

Kundururu consists of exudate of *Boswellia serrata* Roxb. (Fam. Burseraceae), a moderate sized, deciduous tree, upto 18 m in height and upto 2.4 m in girth, commonly found in the dry forests from Punjab to West Bengal and in peninsular India.

### SYNONYMS

Sanskrit	:	Śallaki
Assamese	:	Sallaki
Bengali	:	Luban, Salai, Salgai
English	:	--
Gujrati	:	Shaledum, Saleda, Saladi, Gugal, Saledhi
Hindi	:	Salai, Labana
Kannada	:	Madimar, Chilakdupa, Tallaki, Maddi
Kashmiri	:	Kunturukkam, Samprani
Malayalam	:	--
Marathi	:	Salai cha dink
Oriya	:	--
Punjabi	:	Salai Gonda
Tamil	:	Parangi Sambrani
Telugu	:	Parangi sambrani, Anduga, Kondagugi tamu
Urdu	:	Kundur

### DESCRIPTION

#### a) Macroscopic

Drug occurs in stalactitic, transparent, tears forming agglomerates of various shapes and sizes, brownish-yellow, upto 5 cm long, 2 cm thick, fragrant, fracture brittle; fractured surface waxy and translucent; burns readily and emanates an agreeable characteristic, balsamic resinous odour; taste, aromatic and agreeable.

**b) Microscopic**

Debris of fibres, rectangular cork cells, very few yellowish oil globules and numerous, small or large, oval to round or rhomboidal crystalline fragments present.

**Identification** - Trituration with water forms an emulsion; when immersed in alcohol (90%) a tear of Kunduru is not altered much in form but becomes almost opaque and white; when a drop of con. H<sub>2</sub>SO<sub>4</sub> is added on a freshly fractured surface, it becomes cherry red which, when washed with water changes to a white emulsion, then turn to a buff colour.

**Fluorescence Test** - Brownish-yellow colour in day light; aqueous extract under U.V. light (366 nm) light green and in (254 nm) shows dark blue colour; alcoholic extract under U.V. light (366 nm) is colourless and in (254 nm) shows light green colour.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	5	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	8	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	45	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	28	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract on Silica Gel 'G' using Toluene : Ethylacetate (9: 1) shows under U.V. (366nm) four fluorescent zones at Rf. 0.23 (light blue), 0.79 (light blue), 0.91 (blue) and 0.96 (blue). On exposure to Iodine vapour nine spots appear at Rf. 0.08, 0.23, 0.29, 0.41, 0.47, 0.55, 0.82, 0.91 and 0.96 (all yellow). On spraying with Vanillin Sulphuric acid reagent and heating the plate for ten minutes at 110°C tailing with four conspicuous spots appear at Rf. 0.23, 0.55, 0.79 and 0.91 (all violet).

**CONSTITUENTS** - Oleo-gum-resins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṭu, Tikta
<b>Guṇa</b>	:	Guru, Tīkṣṇa, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphapittahara, Kaphahara, Vātahara, Rakta Stambhahara, Balya, Svedahara

**IMPORTANT FORMULATIONS** - Karpūrādyarka, Jīrakādi Modaka, Balā Taila, Balā Guḍūcyādi Tāila

**THERAPEUTIC USES** - Śvāsa, Pittābhiṣyanda, Pradara, Jvara, Śarkarāmeha, Vṛṣaṇa Śūla, Mukharoga, Uka

**DOSE** - 1-3 gm

## KUNKUMA (Style and Stigma)

Kunkuma consists of dried style and stigma from the flowers of *Crocus sativus* Linn. (Fam. Iridaceae), a small bulbous perennial, 15 to 25 cm high and cultivated by corms in the Kashmir valley, specially in the Pampor plateau, at about 1600 m.

### SYNONYMS

Sanskrit	:	Kēśara, Ghuśiṇa, Kāśmīra, Rakta
Assamese	:	Kumkum
Bengali	:	Jafran
English	:	Saffron
Gujrati	:	Keshar, Kesar
Hindi	:	Keshar, Keshara
Kannada	:	Kunkuma, Kesari
Kashmiri	:	--
Malayalam	:	Kunkuma Puvu
Marathi	:	Keshar
Oriya	:	--
Punjabi	:	Kesar, Keshar
Tamil	:	Kungumapuvu
Telugu	:	Kunkuma Puvvu
Urdu	:	Zafran

### DESCRIPTION

#### a) Macroscopic

Yellowish style, broken or intact along with trifid stigma; stigma is dark red or reddish-brown, cornucopia shaped, with fimbriate margin, and about 25 mm long; broken style are very thin, upto about 10 mm long; odour, strongly aromatic; taste, slightly bitter.

## **b) Microscopic**

Stigma composed mostly of elongated, thin-walled, parenchyma cells containing colouring matter; at the upper end numerous cylindrical papillae or trichomes up to 150 microns long present; pollen grains, a few, spherical, nearly smooth, from 40 to 120 microns in dia; occasionally germinated and exhibiting pollen tubes.

**Powder** - Pale reddish-brown; aromatic, shows elongated, thin-walled, parenchymatous cells, unicellular trichomes, a few spherical, smooth, pollen grains measuring 40 to 120  $\mu$  in dia. and xylem vessels with annular and spiral thickenings.

## **IDENTITY, PURITY AND STRENGTH-**

### **Identification**

- i. When sprinkled on sulphuric acid, the stigmas turn blue immediately, gradually changing to purple and finally purplish red.
- ii. Stamens of safflower and florets of marigold should be absent; should be free from artificially dyed corn silk or fibres.

### **Organic dyes :**

- i. Digest about 0.1 g in 10 ml of water for 15 minutes with frequent shaking, filter and add 1 g of decolorising charcoal to the filtrate; shake and allow to stand for 10 minutes; filter; the filtrate is colourless.
- ii. Macerate 10 mg in 5 ml of alcohol (95 per cent) or methanol; a distinct greenish yellow colour is imparted to the liquid; with corresponding quantities of Kunkuma in ether or chloroform the solvents remain almost colourless; so also with xylene, benzene or carbon tetrachloride.

**Absence of Fixed oil or glycerin:** Press between clear filter paper, the paper does not display translucent oily spots.

## **IDENTITY, PURITY AND STRENGTH**

**ASSAY**

**Foreign organic matter** - Not more than 2 per cent. Styles not more than 10 per cent.

**Loss on drying:** Loses not more than 14 per cent of its weight, when dried at 100°C.

**Ash:** Not more than 7.5 per cent.

**Acid-insoluble ash:** Not more than 1 per cent

**Assay:** Weigh accurately 0.1 g in moderately fine powder and macerate at room temperature in 100 ml of water for 3 hours with frequent shaking. Filter immediately, adding sufficient water through the filter to make 100 ml. Dilute 10 ml of this filtrate, accurately measured, to 100 ml with water. Immediately compare the colour of this solution in Nessler tubes or in a colorimeter, with the colour of N/100 potassium dichromate. The colour of the solution approximates that of the N /100 potassium dichromate, and the strength of the colour is not less than that of an equal depth in mm of the N /100 potassium dichromate.

**CONSTITUENTS** - Essential Oils, Bitter Glycoside, Picrocrocin and Crocin

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Gūṇa** : Snigdha

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Varṇya, Śleṣmahara, Vātahara, Rasāyana, Viṣaghna, Jantuhara

**IMPORTANT FORMULATIONS** - Karpūrādyarka, Bālārka Rasa, Yakūti, Kuṅkumādi Taila, Mahā Nārayaṇa Taila, Puśyanuga Cūrṇa

**THERAPEUTIC USES** - Vyāṅga, Vraṇa, Śiroroga, Dṛṣṭi Roga, Chardi, Kāsa, Kaṅṭha Roga, Sidhma, Mūtraśoṭha, Udāvarta, Mūtrāghāta, Sūryāvarta, Ardhāvabhedaka

**DOSE** - 25-50 mg

## KŪṢMĀṄḌA (Fruit)

Kūśmāṅḍa consists of the dried piece of fruits of *Benincasa hispida* (Thunb.) Cogn. (Fam. Cucurbitaceae), an extensive trailing or climbing herb cultivated throughout the plains of India and on the hills upto 1200 m altitude, as a vegetable.

### SYNONYMS

Sanskrit	:	Puśpaphalam, Bṛihatphalam
Assamese	:	Kumra
Bengali	:	Chal Kumra
English	:	White guard melon
Gujrati	:	Safed Kohalu, Bhuru, Kohalu, Bhuru Kolu
Hindi	:	Kushmand, Petha
Kannada	:	Boodi Humbala
Kashmiri	:	--
Malayalam	:	Kumbalanga
Marathi	:	Kohala
Oriya	:	Kakharu, Panikakharu
Punjabi	:	Petha
Tamil	:	Pooshanikkai
Telugu	:	Boodida Gummadi
Urdu	:	Petha

### DESCRIPTION

#### a) Macroscopic

Drug occurs in deformed, compressed, cut pieces of various sizes; epicarp cream coloured with light yellowish to brownish mesocarp; taste, slightly acidic.

## b) Microscopic

Mature fruit shows cuticularised epicarp consisting of single layered, squarish or slightly tangentially elongated cells of epidermis, outer tangential walls of epidermis thickened and cuticularised; a few epidermal cells divide periclinally and become 2 or 3 layered; mesocarp has a heterogenous structure consisting of multilayered hypodermis composed of tangentially elongated, thin-walled, parenchymatous cells; immediately within this is a zone of thick-walled, multilayered, lignified sclereids with the outer one to three layers thicker than the inner 2 to 6 or more layers; beneath this zone, thin-walled tangentially elongated, parenchymatous cells present, their size gradually increasing from those at periphery to those inside of mesocarp, the latter becoming circular having conspicuous intercellular spaces; vascular bundles poorly developed, bicollateral, found scattered throughout mesocarp.

**Powder** - Dirty brown; shows numerous fragments of thin-walled, tangentially elongated and circular parenchymatous cells, numerous sclereids in groups and singles and a few fragments of xylem vessels having spiral thickenings.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	12 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Benzene: Ethylacetate (9:1) shows under U.V. (366nm) two fluorescent zones at Rf. 0.71 and 0.79 (both violet). On exposure to Iodine vapour eight spots appear at Rf. 0.07, 0.18, 0.28, 0.40, 0.50, 0.59, 0.71 and 0.79 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minute six spots appear at Rf. 0.07, 0.18, 0.40, 0.50, 0.71 and 0.79 (all violet).

**CONSTITUENTS** - Fatty Oil

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Amla

**Guna** : Laghu

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Dīpana, Hṛdya, Bastiśodhaka, Vṛśya, Balya, Mehana, Tridoṣahara, Jīṛṇā  
ṅga Puṣṭiprada, Bastiśodhaka, Sraṃsana, Arocakahara, Vātapittajit

**IMPORTANT FORMULATIONS** - Kūṣmāṇḍaka Rasāyana, Dhātryādi Ghṛta, Vastyāmayānaka  
Ghṛta

**THERAPEUTIC USES** - Mūtrāghāta, Prameha, Mūtrakṛcchra, Aśmarī, Tṛṣṇā, Mānasa  
Vikāra, Malabandha

**DOSE** - 5-10 gm.

## MADAYANTĪ (Leaf)

Madayantī consists of dried leaves of *Lawsonia inermis* Linn. (Fam. Lythraceae); a small, elegant bush with fragrant flowers, cultivated and naturalised all over the country.

### SYNONYMS

Sanskrit	:	Nil Madayantika
Assamese	:	--
Bengali	:	Mehadi
English	:	Henna
Gujrati	:	Mendi
Hindi	:	Mehandi
Kannada	:	Goranta, Korate, Madarangi
Kashmiri	:	--
Malayalam	:	Mailanelu
Marathi	:	Mendi
Oriya	:	--
Punjabi	:	Mehndi
Tamil	:	Marudum
Telugu	:	Gorinta
Urdu	:	Mehendi, Hina

### DESCRIPTION

#### a) Macroscopic

Leaves simple, 2 to 3 cm in length, 1 to 1.5 cm in width, greenish-brown to dull green; entire, lanceolate; apex mucronate, base tapering, petiole short and glabrous; odour, aromatic when crushed; taste, sweet, mucilaginous and slightly astringent.

## b) Microscopic

*Petiole* -shows concavo-convex outline; epidermis consisting of single layered cells covered by thick, striated cuticle; below epidermis 2 to 4 layered collenchyma and 3 to 4 layered parenchyma having intercellular spaces; pericycle 2 to 4 layered, stele bicollateral; cambium a thin strip present between xylem and phloem; phloem consisting of usual elements; xylem mostly composed of tracheids and vessels.

*Midrib* -shows upper and lower epidermis covered externally by thick and striated cuticle; epidermis followed by 2 to 4 layers of collenchymatous cells, circular in shape with angular thickening; beneath which are 3 or 4 layers of parenchymatous cells, isodiametric with intercellular spaces; stele crescent-shaped, consisting of usual elements traversed by medullary rays; phloem fibres seen in the phloem region; a few parenchymatous cells contain rosette and prismatic crystals of calcium oxalate.

*Lamina* - shows upper and lower epidermis composed of tangentially elongated cells covered externally by a thick striated cuticle; some large epidermal cells form mucilage sacs projecting into adjacent palisade zone; anomocytic stomata distributed on both surfaces; mesophyll composed of 1 to 3 layers of palisade tissue and 2 to 4 layers of spongy parenchyma; palisade cells filled with chloroplasts, spongy parenchyma oval to circular in shape, oil globules present in palisade and spongy parenchyma; rosette and prismatic crystals of calcium oxalate also present in spongy parenchyma; mesophyll traversed by vascular strands composed of xylem surrounded by phloem with a patch of sclerenchymatous fibres on abaxial side; average stomatal index 10 to 15 and 15 to 18 in upper and lower surface the respectively; palisade ratio 5 to 8 on both surfaces; vein islet number 30 to 45.

**Powder** - Dark brown; shows fragments of thin-walled, parenchyma cells, wavy thinwalled epidermal cells in surface view, anomocytic stomata, rosette and prismatic crystals of calcium oxalate, a few oil globules, and vessels showing spiral thickenings.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	18	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows in the visible light three spots at Rf. 0.35, 0.60 and 0.63 (all grey). Under U.V. (366 nm) seven spots appear at Rf. 0.18, 0.26, 0.35, (all violet), 0.39, 0.61, 0.68 (all reddish violet) and 0.73 (violet). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 105°C for ten minutes five grey colour spots appear at Rf. 0.09, 0.41, 0.61, 0.70 and 0.95.

**CONSTITUENTS** - Glycosides, colouring matter (Lawson), Hennotannic acid, Essential Oil containing  $\beta$ -Ionone.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphaśāmaka, Pittaśāmaka

**IMPORTANT FORMULATIONS** - Gorocanādi vaṭi

**THERAPEUTIC USES** - Jvara, Kaṇḍū, Raktapitta, Kāmalā, Raktapittahara, Kuṣṭha, Mūtrakṛcchra, Bhrama, Vraṇa

**DOSE** - 5-10ml (Svarasa)

## MAHĀNIMBA (Stem Bark)

Mahānimba consists of dried stem bark of *Melia azedarachta* Linn. (Fam. Meliaceae), a moderate sized deciduous tree, 9 to 12 m high with a cylindrical bole, naturalized throughout the country and occurring wild in the sub-Himalayan tracts upto 1800 m.

### SYNONYMS

Sanskrit	:	Ramyaka, Drēka
Assamese	:	Khammaga
Bengali	:	Ghoranim
English	:	Persian Lilac
Gujrati	:	Bakan Limado, Bakai Nimbu
Hindi	:	Bakain, Drek
Kannada	:	Kadu bevu
Kashmiri	:	--
Malayalam	:	Malaveppu
Marathi	:	Bakana Nimb
Oriya	:	--
Punjabi	:	Dharek, Bakain, Drek
Tamil	:	Malaivembu
Telugu	:	Turakavepa
Urdu	:	Neem

### DESCRIPTION

#### a) Macroscopic

Bark comparatively thin, about 0.2 to 0.6 cm thick; outer surface black and rough being slightly fissured and exfoliating in small slightly woody pieces light and dark-grey to greyish-black in colour; inner bark made up of creamy layer alternating with whitish ones; fracture, fibrous; taste, extremely bitter.

## b) Microscopic

Mature bark shows outer zone of rhytidoma, formed of alternating strips of dark brown cork cells and dead secondary phloem; cork cells compressed, almost rectangular and many layered; secondary phloem multilayered and compressed; cork cambium and secondary cortex almost absent; beneath rhytidoma a wide zone of secondary phloem present, with sieve tubes with compound sieve plates, and with groups of fibres; phloem parenchyma oval to irregular, thin-walled, colourless with intercellular spaces; phloem rays 2 to 5 cells wide; rosette and prismatic crystals of calcium oxalate present in phloem parenchyma and ray cells; a few very small, simple, round to oval, starch grains measuring 5 to 11  $\mu$  in dia., having 2 or 3 components.

Powder - Greyish-yellow; shows fragment of cork cells, phloem fibres, rosette and prismatic crystals of calcium oxalate and small, simple round to oval, starch grains measuring 5 to 11  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (9: 1) under U.V. (366 nm) shows eight fluorescent zones at Rf. 0.10, 0.26, 0.34, 0.50, 0.68, 0.76, 0.86 (all blue) and 0.95 (bluish green). On exposure to Iodine vapour nine spots appear at Rf. 0.10, 0.18, 0.26, 0.34, 0.50, 0.64, 0.76, 0.86 and 0.95 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent two spots appear at Rf. 0.26 and 0.95 (both orange).

**CONSTITUENTS** - Tannins and Alkaloids.

**PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṣāya, Kaṭu  
**Guṇa** : Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Grāhī, Kaphajit, Pittajit, Rakta Vikārajit, Dāhanāśaka, Pittakaphahara, Raktadāhahara

**IMPORTANT FORMULATIONS** - Bṛhat Mañjiṣṭhādi Kvatha Cūrṇa, Mahā Viṣagarbha Taila

**THERAPEUTIC USES** - Prameha, Kuṣṭha, Hṛllāsa, Śvāsa, Gulma, Arśa, Mūṣika Viṣa, Visūci, Bhrama, Chardi, Viṣamajvara

**DOSE** - 5-10 gm

## MAṄḌŪKAPARṆĪ (Whole Plant)

Mandūkaparṇī consists of dried whole plant of *Centella asiatica* (Linn.) Urban. Syn. *Hydrocotyle asiatica* Linn. (Fam. Apiaceae), a prostrate, faintly aromatic, stoloniferous perennial herb, commonly found as a weed in crop fields and other waste places throughout India upto an altitude of 600 m.

### SYNONYMS

Sanskrit	:	Manduki, Darduracchada
Assamese	:	Manimuni
Bengali	:	Jholkhuri, Thalkuri, Thankuni
English	:	Indian Pennywort
Gujrati	:	Khodabrahmi, Khadbhrammi
Hindi	:	Brahma Manduki, Brahmi
Kannada	:	Ondelaga, Brahmi soppu
Kashmiri	:	--
Malayalam	:	Kodangal
Marathi	:	Karivana
Oriya	:	--
Punjabi	:	Brahmi
Tamil	:	Vallarai
Telugu	:	Saraswati Aku, Vauari
Urdu	:	Brahmi

### DESCRIPTION

#### a) Macroscopic

Small creeping herb with slender stem, rooting at nodes giving rise to thin, brownish-grey, roots of about 2.5 to 6.0 cm in length; leaves 1 to 3 from each node, orbicular-reniform, crenate, base cordate, petioles channelled with adnate stipules; flowers fascicled umbels each carrying 3 or 4 flowers, short stalked; fruits cremocarp, ovoid, with laterally compressed seeds.

## **b) Microscopic**

**Root** - Shows wavy outline, consisting of 3 to 5 layered, rectangular, cork cells having exfoliated cells, followed by 3 or 4 layers of parenchyma cells containing oval to round, simple, starch grains measuring 8 to 16  $\mu$  in dia., having centric hilum and microsphenoidal crystals of calcium oxalate; secondary cortex composed of thin-walled, oval to polygonal, parenchymatous cells; secretory cells present, scattered towards periphery region; secondary phloem and secondary xylem consisting of usual elements; vessels lignified with reticulate and spiral thickening; pith nearly obliterated.

**Stem** - More or less concave-convex outline, shows single layered epidermis composed of round to cubical cells covered by striated cuticle; below this 2 or 3 layers of collenchymatous cells, followed by 6 to 8 layers of thin-walled, isodiametric, parenchymatous cells with intercellular spaces present; vascular bundles collateral, open, arranged in a ring, capped by patches of sclerenchyma and traversed by wide medullary rays; vessels with spiral thickening present, resin duct present in parenchymatous cells of cortex and generally one in between vascular bundles; pith of isodiametric, parenchyma with intercellular spaces.

## **Leaf-**

*Petiole* - shows a characteristic outline due to two projections adjacent to ventral groove; epidermis single layered, cells cubical covered by a thick cuticle; inner walls of epidermal cells adjoining the cortex much thickened; hairs absent; collenchyma 2 or 3 layered, absent on the projections, a broad zone of more or less rounded parenchyma cells present with intercellular spaces, and a few containing rosette crystals of calcium oxalate; resin canal present on dorsal side of each vascular bundle except in the vascular bundles occurring projecting arms; vascular bundles seven in number, two of which less developed and present in projections.

*Midrib* - show a single layered epidermis, 2 or 3 layered collenchyma on both surfaces, 4 or 5 layered parenchyma, mostly devoid of chloroplasts; central zone occupied by vascular bundles differentiated into xylem towards ventral side and phloem towards dorsal side; phloem consisting of sieve tubes, companion cells and phloem parenchyma; xylem consisting of radial rows of vessels with xylem parenchyma in between.

*Lamina* -shows an epidermis of tangentially elongated cells on both surfaces, larger on the upper surface, covered by striated cuticle; mesophyll differentiated into 2 or 3 layers of palisade cells, 5 to 7 layers of loosely arranged, somewhat isodiametric spongy parenchyma; rosette crystals of calcium oxalate present in a few cells; stomata more on the lower surface, anisocytic in general, but anomocytic type also occurs on both surfaces, palisade ratio 3 to 5, stomatal index on upper surface, 9 to 12, and lower surface 11 to 17.

**Fruit** - Shows several ridges in outline; epicarp consists of single layered epidermis covered externally with thick cuticle; mesocarp consists of polygonal, thin walled parenchymatous cells having patches of sclerenchymatous cells on both lateral side; each ridge having a vittae and patch of sclerenchyma; endocarp consists of columnar shaped sclereids arranged in wavy layers; endosperm and embryo composed of oval to polygonal, thin-walled parenchymatous cells.

**Powder** - Green to greenish-brown, shows fragments of epidermal cells polygonal in surface view with stomata, palisade cells, vessels with spiral, reticulate and annular thickening; microsphenoidal and rosette crystals of calcium oxalate; simple, oval to round starch grains measuring 8 to 16  $\mu$  in dia.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

### **ASSAY**

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (80 : 20) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.72 and 0.85 (both blue). On exposure to Iodine vapour six spots appear at Rf. 0.08, 0.16, 0.32, 0.72, 0.85 and 0.96 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes seven spots appear at Rf. 0.08 (grey), 0.16 (blue), 0.23 (grey), 0.32 (violet), 0.72, 0.85 (both violet) and 0.96 (violet).

**CONSTITUENTS** - Glycosides - Saponin Glycosides

### **PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṣāya, Madhura, Kaṭu

**Guṇa** : Laghu, Sara  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Kaphapittahara, Hr̥dya, Medhya, Svarya, Rasāyana, Dīpana, Varṇya,  
Viṣaghna, Āyusya, Balya, Smṛtiprada

**IMPORTANT FORMULATIONS** - Brahma Rasāyana

**THERAPEUTIC USES** - Raktapitta, Kuṣṭha, Meha, Jvara, Śvāsa, Kāsa, Aruci, Pāṇḍu, Śoṭha,  
Kaṇḍū, Raktadoṣa

**DOSE** - 3-6 gm

## **MAYAKKU / MĀYUKAM (Gall)**

Māyakku consists of dried galls found on *Quercus infectoria* Olivo (Fam. Fagaceae), a small tree or shrub, 2 to 5 m high, native of Greece, Asia Minor, Syria and Iran. The galls are excrescences on the twigs, resulting from insect attack of the growing, rudimentary leaves; they are imported into India.

### **SYNONYMS**

Sanskrit	:	Māyaphala
Assamese	:	Aphsa
Bengali	:	Majoophal, Majuphal
English	:	Oak-Gall
Gujrati	:	Muajoophal, Mayfal
Hindi	:	Maajoophal, Majuphal
Kannada	:	Machikaai, Mapalakam
Kashmiri	:	--
Malayalam	:	Majakaanee, Mashikkay
Marathi	:	Maayaphal
Oriya	:	Mayakku
Punjabi	:	Maju
Tamil	:	Machakaai, Masikki, Mussikki
Telugu	:	Machikaaya
Urdu	:	Mazu, Mazuphal

### **DESCRIPTION**

#### **a) Macroscopic**

Galls spherical or pear-shaped, hard and brittle 1.2 to 2.5 cm in diameter having a short basal stalk and numerous rounded projections on the upper part of the gall; they usually sink in water; surface, smooth, rather shining, bluish-green, olive green or white brown, a few galls show the escape route of insect, in the form of a small rounded hole leading to a cylindrical canal which passes to the centre of the gall; taste, astringent,

followed by sweetness; average weight of ten galls picked at random should not be less than 2.5 g.

### **b) Microscopic**

Gall shows outer most zone of small thin-walled parenchymatous cells, irregular in shape; a ring of large, oval-shaped sclerenchymatous cells and a small inner zone of thick-walled parenchymatous cells present near the central cavity; outer zone of the parenchyma differentiated into three type of cells; uppermost small, irregular, thin-walled, middle large, oval, and inner long parenchymatous cells, all having intercellular spaces; vascular bundles irregularly distributed in this region, consisting of small patches of xylem and phloem; vessels with spiral and reticulate thickening; around the central cavity, a ring of sclerenchyma of great variation in shape and size, present, with rectangular, ovoid, elongated, small sclereids, having heavily thickened striated walls with numerous pits, lumen large, usually filled with dense brown material, large sclereids are much elongated; a few rosette crystals of calcium oxalate in outer and middle region and prismatic crystals in inner parenchymatous cells present; starch grains simple and compound with central hilum, compound grains consisting of 2 to 5 or sometimes more components, simple grains round to oval, measuring upto 25  $\mu$  in dia, present abundantly in innermost zone of parenchyma.

**Powder** - Cream colour; shows fragments of palisade-like thin-walled and oval to polygonal, thin-walled parenchymatous cells; sclereids with thickened and striated walls with numerous pits and vessels with reticulate and spiral thickening; simple, round to oval starch grains, measuring upto 25  $\mu$  in dia.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Nil	Appendix	2.2.2
Total Ash	Not more than 2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 60	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 55	per cent, Appendix	2.2.7.
Total Tannin content	Not less than 50	per cent,	

when determined by the following method:

## ASSAY

Approximately 2 gms. of powdered fruit, accurately weighed, was refluxed twice for two hrs. with alcohol (95%) on a water bath and filtered. The extract was concentrated almost to dryness, the residue was taken up in 50 ml of water in a separating funnel and extracted four times with 20 ml of solvent ether, collecting the upper ethereal layer in each case in a separating funnel. The combined ethereal layer was extracted twice with 10 ml of water and aqueous extract was combined with original aqueous extract. The combined aqueous extract was saturated with sodium chloride and shaken with successive quantities of 25, 20, 20, 15 ml of ethyl acetate until complete extraction of the tannins was effected (tested by Ferric chloride reagent).

The combined ethylacetate layer containing the tannins was filtered through a cotton plug (previously soaked with ethyl acetate). The filter was washed with 5 ml of ethylacetate and mixed with the original filtrate. The solvent was then distilled on a water bath and when the volume was reduced to about 10 ml, it was quantitatively transferred to a tared glass dish, the solvent removed on a boiling water bath and residue dried to constant weight at 90°C. The residue gives the weight of the tannins present in the drug.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' using Chloroform: Ethylacetate :Formic acid (5:4:1) shows in visible light three spots at Rf. 0.60, 0.69 & 0.78 (all grey). Under U.V. (366 nm) three fluorescent zones are visible at Rf. 0.60, 0.69 & 0.78 (all grey). On exposure to Iodine vapour five spots appear at Rf. 0.60, 0.69, 0.78, 0.84 & 0.96 (all yellow). On spraying with Ferric chloride reagent four spots appear at Rf. 0.13, 0.60, 0.69 & 0.78 (all greyish blue).

**CONSTITUENTS** - Tannic Acid, Starch and Sugars

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Dīpani, Grāhī

**IMPORTANT FORMULATIONS** - Gorocanādi vaṭi, Asthisandhānaka lepa

**THERAPEUTIC USES** - Atīsāra, Grahaṇī, Pravāhikā, Śveta Pradara, Arśa, Danta Roga, Mukha Roga, Yoni Kanda

**DOSE** - 1-3 gm of the drug in powder form.

## MUDGAPARNĪ (Whole Plant)

Mudgaparṇi consists of dried whole plant of *Vigna trilobata* (L.) Verde. Syn. *Phaseolus trilobus* Ait. (Fam. Fabaceae), a prostrate or twining perennial herb, found wild, but also occasionally cultivated throughout the country as a forage crop.

### SYNONYMS

Sanskrit	:	Suryaparṇi, Saha
Assamese	:	--
Bengali	:	Muganee
English	:	--
Gujrati	:	Janglee Maga
Hindi	:	Janglee Mung
Kannada	:	Abaregid
Kashmiri	:	--
Malayalam	:	Kattuppayaru
Marathi	:	Ranmug
Oriya	:	--
Punjabi	:	Mugvan
Tamil	:	Kattuppayaru, Panippayavu
Telugu	:	Pilla pesara
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Occurs in 2.5 to 15.0 cm long, 0.1 or 0.2 cm thick; cylindrical pieces, external surface brownish-grey, rough due to secondary roots; fracture, fibrous.

**Stem** - Occurs in 12.0 to 55.0 cm long, 0.1 or 0.2 cm thick pieces, more or less cylindrical, grooved, slender, glabrous, pale green; fracture, fibrous

**Leaf** - Leaves alternate, pinnately trifoliate, petioled; leaflets palmately 3-lobed; 1.3 to 2.5

cm long; mid lobe large, obovate spatulate, lateral lobe oblique and small, margin ciliate, apiculate, pale green in colour.

**Flower** - Sessile or very shortly pedicelled; small, yellow with conspicuous persistent bracts and bracteole; calyx, gamosepalous, campanulate, 1 or 2 mm long, pale yellow, five toothed; corolla papilionaceous.

**Fruit** - A pod; 2.5 to 6 or 7 cm long, 3 mm thick; greyish-black; linear or rarely oblong, torose, subcylindrical, smooth glabrous, recurved or reflexed, 6 to 12 seeded.

**Seed** - Grey, smooth, with 2 punctate, shortly linear hilum and without strophiole.

## b) Microscopic

**Root** - Shows a wavy outline, having single layered epidermis, consisting of thick walled, parenchymatous cells, covered by thick cuticle; secondary cortex composed of 3 to 6 layered, thin-walled, oval to polygonal, parenchymatous cells; pericycle fibres are present in a discontinuous ring; vascular bundles arranged in a ring; secondary phloem composed of thin-walled cells with brownish contents; secondary xylem consisting of usual elements; radially arranged, lignified, vessels with pitted or reticulate thickening, followed by pith consisting of thin-walled, oval to polygonal, parenchymatous cells.

**Stem** - Shows a more or less wavy outline; epidermis single layered consisting of thin walled, parenchymatous cells; secondary cortex consisting of 2 to 5 layers collenchymatous and 1 or 2 layers of parenchymatous thin walled cells; pericycle present in form of a discontinuous ring; vascular bundles arranged in a ring; secondary phloem consisting of compactly arranged, thick-walled cells, having usual elements traversed by phloem rays; secondary xylem composed of usual elements; lignified vessels radially arranged, showing pitted and spiral thickenings; crystal fibres absent; xylem fibres moderately thick walled with narrow lumen and blunt tips, central region occupied by pith consisting of thin-walled, circular, parenchymatous cells.

## Leaf-

**Midrib** - shows single layered epidermis having a few unicellular, pointed hairs on both surfaces, 6 or 7 layers, polygonal collenchyma cells on upper and 5 or 6 layers, thick walled, collenchyma on lower surface; a single layered thick-walled, lignified polygonal, sclerenchymatous cells present on either side of 'C' shaped vascular bundle having usual elements.

**Lamina** - isobilateral, shows single layered, elongated, balloon-shaped, thin-walled, epidermis cells on both surfaces, a few unicellular hairs similar as in midrib present on both surfaces; stomata paracytic, present on both surfaces; palisade 2 or 3 layered on upper epidermis, 1 or 2 layered on lower epidermis; palisade ratio 6 or 7 on lower surface, 7 or 8 on upper surface; vein islet number 34 to 45; veinlet termination number 20 to 33; stomatal index, 30 to 36 per sq. mm on lower surfaces, 20 to 27 per sq. mm on upper surface.

**Seed** - Shows testa consisting of 2 or 3 layered, thick-walled, elongated, lignified stone cells having striations and narrow lumen; cotyledon composed of oval to polygonal, thin walled, parenchymatous cells.

**Powder** - Light greyish-green; shows fragments of parenchyma, unicellular pointed broken hairs; lignified, simple pitted, reticulate or spiral vessels; paracytic stomata, epidermal cells in surface view with wavy outline.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 11.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 11 per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract on Silica Gel 'G' using n-Butanol : Acetic acid: Water (4:1:5) shows under UV (366 nm) five fluorescent zones at Rf. 0.35, 0.42, 0.58, 0.70 and 0.82 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.30, 0.42, 0.50, 0.58, 0.70 and 0.82 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and on heating the plate for ten minutes at 105° C five spots appear at Rf. 0.30, 0.42, 0.58, 0.70 and 0.82 (all yellow).

**CONSTITUENTS** - Sterols.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Madhura
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Śukradoṣahara, Kaphahara, Pittahara, Cakṣusya, Śukrala, Viṣaghna, Rasāyana, Garbhasthāpana

**IMPORTANT FORMULATIONS** - Amṛtaprāśa Ghṛta, Aśoka Ghṛta, Vidāryādi Ghṛta, Dhānvantara Taila, Brahma Rasāyana, Balā Taila, Mahā Nārayaṇa Taila, Ratnagiri Rasa

**THERAPEUTIC USES** - Dāha, Jvara, Vātarakta, Pitta Dāha, Kāsa, Mūṣika Viṣa, Kṣaya, Kṛmi, Kṣata Śoṭha, Kuṣṭha, Pradara, Madya Tṛṣṇā

**DOSE** - 3-5 gm.

## MUNḌĪTIKĀ (Whole Plant)

Munḍitakā consists of dried whole plant of *Sphaeranthus indicus* Linn. (Fam. Asteraceae), an aromatic, much branched herb, 30 to 60 cm high found abundantly in damp places throughout the country, ascending to an altitude of 1,500 m.

### SYNONYMS

Sanskrit	:	Mundi, Sravani, Bhumikadamba
Assamese	:	Kamadarus
Bengali	:	Surmuriya, Mudmudiya
English	:	--
Gujrati	:	Gorakhmundi
Hindi	:	Mundi, Gorakhmundi
Kannada	:	Mudukattanagida, Karande
Kashmiri	:	--
Malayalam	:	Manni
Marathi	:	Mundi, Gorakhmundi
Oriya	:	Bhuikadam
Punjabi	:	Gorakhmunda
Tamil	:	Karandai
Telugu	:	Bodasarumu Badataramu
Urdu	:	Mundi

### DESCRIPTION

#### a) Macroscopic

**Root** - Pieces 5 to 15 cm long and 0.3 to 0.5 cm thick, a few branching; smooth, slender, somewhat laterally flattened, greyish-brown; fracture, short; odour not characteristic; taste, slightly bitter.

**Stem** - Pieces 10 to 30 cm long, 0.2 to 0.4 cm thick, branched, cylindrical or somewhat flattened with toothed wings, rough due to longitudinal wrinkles, externally brownish black to brownish-green, internally creamish-grey; fracture, fibrous; odour nil, taste, bitter.

**Leaf** - Sessile, decurrent, 2 to 7 cm long, 1 to 1.5 cm wide, obovate-oblong, narrowed at the base, dentate or serrate, hairy, greenish-brown; odourless; taste, bitter.

**Flower** - Globose, head about 1.5 cm long and about one cm in diameter; purplish-brown with linear involucre bracts which are shorter than the head and ciliate at apex; peduncle with toothed wings; outer female flowers 12 to 16, inner bisexual 2 or 3, corolla of female 2 toothed, ovary, inferior, carpels 2, style - arms connate.

**Fruit** - Achene, smooth, stalked.

## b) Microscopic

**Root** - Epidermis single layered, rectangular; secondary cortex composed of oval to tangentially elongated, thin-walled, parenchymatous cells having aerenchyma; secondary phloem composed of thin-walled, oval to polygonal cells, a large number of groups of lignified phloem fibres found scattered in this zone; central portion occupied by lignified, secondary xylem having usual elements; vessels simple pitted; starch grains simple, round to oval with concentric striations and distinct hilum. measuring 13 to 27  $\mu$  in dia., present in secondary cortex.

**Stem** - Epidermis single layered covered with thick cuticle; cortex consisting of 4 to 6 layers of oval to polygonal, thin-walled, parenchymatous cells; endodermis single layers of barrel-shaped cells; pericyclic fibres, lignified arranged in discontinuous ring; secondary phloem narrow, having usual elements; groups of cellulosic fibres found scattered in this zone; secondary xylem composed of usual elements; vessels with spiral thickening or simple pitted; pith very wide composed of oval to polygonal, thin-walled, parenchymatous cells.

### **Leaf-**

**Midrib** - epidermis single layered, followed by 4 to 6 layered collenchyma and 3 or 4 layered parenchyma cells present on both surfaces; trichomes both non-glandular and glandular, present on both surfaces, glandular trichomes 2 or 3 cells high, uni or biseriate stalk, having a multicellular head; non-glandular trichomes uniseriate with 2 to 5 cells, vascular bundle 3 or 4, situated centrally having usual elements.

**Lamina** - epidermis single layered having numerous non-glandular and glandular trichomes similar to those present in midrib; mesophyll composed of oval to polygonal thin walled parenchymatous cells and not differentiated into palisade and spongy parenchyma cells, anisocytic stomata present on both surfaces; stomatal index 32 to 38 on lower surfaces, 20 to 29 on upper surfaces; stomatal number 47 to 54 per sq. mm on lower surfaces, 15 to 22 per sq. mm on upper surfaces; vein islet number 20 to 26.

**Powder** - Greyish-yellow; shows fragments of thin-walled, oval to polygonal aerenchyma cells; thin-walled, sinuous, elongated epidermal cells; small pieces of glandular trichomes; a few anisocytic stomata; vessels with spiral and pitted thickening; fibres short, thick walled,

lignified with wide lumen and blunt tips having simple pits; oval to round, elliptic, simple starch grains with centric hilum and striations, measuring 13 to 27  $\mu$  in diameter.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	23	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	9	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' using Toluene : Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent spots at Rf. 0.54 and 0.76 both green. On exposure to Iodine vapour one spot appears at Rf. 0.44 (brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for 10 minutes at 105°C five spots appear at Rf. 0.20 (violet), 0.25 (blue), 0.44, 0.54 and 0.59 (all violet).

**CONSTITUENTS** - Essential Oil, Sterols and Alkaloids

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Medhya, Kaphapittanut, Rucya, Svarya, Rasāyana, Viṣaghna

**IMPORTANT FORMULATIONS** - Muṇḍī Arka, Vātagajāñkuśa Rasa, Ratnagiri Rasa,  
Navaratna Rajamṛgāñka Rasa

**THERAPEUTIC USES** - Apau, Mūtrakṛcchra, Kṛmiroga, Vātarakta, Pāṇḍu, Yoni Roga,  
Āmāṭisāra, Kāsa, Ślīpada, Apasmāra, Plīhāroga, Medoroga, Gudaroga, Prameha, Chardi

**DOSE** - 10-20 ml Svarasa

## NYAGRODHA JAṬĀ (Aerial Root)

Nyagrodha Jaṭa consists of dried aerial of *Ficus bengalensis* Linn. (Fam. Moraceae), a very large tree with spreading branches, occurring throughout the country, and also planted on road sides and in gardens.

### SYNONYMS

Sanskrit	:	Vata Jaṭa, Bahupāda
Assamese	:	--
Bengali	:	Bar, Bot
English	:	Banyan Tree
Gujrati	:	Vad Vadavai
Hindi	:	Baragada jata, Valajatta
Kannada	:	Alada Chirugu
Kashmiri	:	--
Malayalam	:	Peralveru
Marathi	:	Vada Paranika
Oriya	:	Bara gachha
Punjabi	:	Bardajattu
Tamil	:	Alamvizhuthu
Telugu	:	Peddammatti, Marri Udalu
Urdu	:	Bargad

### DESCRIPTION

#### a) Macroscopic

Drug occurs in cut pieces, 4 to 8 cm long, 0.1 to 1.2 cm thick, cylindrical, unbranched or branched; rough due to longitudinal and transverse cracks and transverse rows of lenticels; external surface grey; cut surface reddish-brown; fracture, fibrous in bark portion and tough and short in wood portion.

## b) Microscopic

Aerial root shows cork consisting of 4 to 6 or more rows of narrow, tangentially elongated cells; secondary cortex consisting of a zone of 4 or 5 rows of stone cells, followed by wide zone of thin-walled parenchymatous cells, filled with reddish-brown contents; a number of large groups of stone cells, oval to elliptical, elongated, thick-walled, with wide lumen and clear pit canals found scattered throughout secondary cortex; secondary phloem a wide zone consisting of sieve tubes, phloem fibres and phloem parenchyma, traversed by phloem rays; phloem fibres numerous, arranged in tangential bands alternating with sieve elements; secondary xylem very wide consisting of pitted xylem vessels, fibres and xylem parenchyma, all elements being lignified; vessels single or in groups, xylem parenchyma numerous, xylem fibres numerous, thick-walled with blunt tips and wide lumen; xylem rays numerous, uni to tetraseriate.

**Powder** - Reddish-brown; shows oval to elliptical, elongated, thick-walled stone cells with wide lumen and clear pit canals; fibres, thick-walled with blunt tips and wide lumen; xylem vessels showing pitted thickening.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C of alcoholic extract on Silica gel 'G' using Toluene: Ethyl acetate (7:3) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.34 (sky blue), 0.63 (sky blue) and 0.78 (blue). On spraying with 10% Methanolic-Sulphuric acid reagent and on heating the plate for about ten minute at 105°C three spots appear at Rf. 0.63 (grey), 0.78 (brownish grey) and 0.96 (brown).

## PROPERTIES AND ACTION

**Rasa** : Madhura, Kaṣāya

**Guṇa** : Rūkṣa, Guru  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Pittahara, Kaphahara, Grāhī, Stambhaka, Varṇa, Bhagnasandhānakara, Śodhana, Ropana, Keśya

**IMPORTANT FORMULATIONS** - Kuṅkumādi Taila, Rasa Sindhūra, Abhraka Bhasma (Māraṇa), Taila Mūrcchana

**THERAPEUTIC USES** - Raktapitta, Tṛṣṇā, Dāha, Yoniroga, Medoroga, Bhagandara, Visarpa

**DOSE** - 2-5 gm of the drug in powder form.

## NIMBŪ (Fresh Fruit)

Nimbū consists of fresh fruit of *Citrus limon* (Linn.) Burm. f. Syn. *C. medica* var. limonum (Fam. Rutaceae); a straggling bush or small tree, 3 to 4 m high with thorny branches, cultivated in many parts of the country in orchards.

### SYNONYMS

Sanskrit	:	Jambīra, Māha Nimbu
Assamese	:	--
Bengali	:	Patinebu, Kagghinebu, Baranebu
English	:	The lemon of India, Lemon
Gujrati	:	Limbu
Hindi	:	Nimbu, Bara Nimbu, Pakari Nimbu
Kannada	:	Nimbe, Lime hannu, Nimbe hannu
Kashmiri	:	--
Malayalam	:	Cherunakaram, Vadukappulinarakam
Marathi	:	Nimbu
Oriya	:	--
Punjabi	:	Nimbu
Tamil	:	Elumichai, Elumichangai, Elumicchai, Cherunaranka
Telugu	:	Pedda Nimma, Jambira, Nimmu, Bijapuram
Urdu	:	Limu, Neebu

### DESCRIPTION

#### a) Macroscopic

Fruit a berry, hesperidium, yellow when ripe, ovoid or globose, 5 to 10 cm long; external surface even or rugged showing openings of oil glands; usually with 9 mammillate extremity and thin rind; transversely cut surface shows thin rind and an inwardly grown endocarp forming 10 to 12 segments, each containing 2 or 3 seeds with pulp formed by succulent hairs; juice acidic.

**b) Microscopic**

**IDENTITY, PURITY AND STRENGTH**

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Amla
<b>Guna</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Amla
<b>Karma</b>	:	Vātahara, Pittakara, Kaphahara, Dīpana, Pācana

**IMPORTANT FORMULATIONS** - Vāriśoṣaṇa Rasa, Vasanta Mālatī Rasa, Vaṅga Bhasma, Kāsīsa Bhasma, Gandhaka Vaṭī, Śankha Vaṭī, Ajīrṇakanaka Rasa, Kālakūṭa Rasa, Mahā Śaṅkha Vaṭī, Nāsikā Cūrṇa

**THERAPEUTIC USES** - Tṛṣṇā, Vātika Śūla, Chardi, Vibandha, Kṛmi, Aruci, Agnimāndya, Udara Roga, Visūcika

**DOSE** - 6-12 gm of the drug in juice form.

## NIRGUNDĪ (Root)

Nirgundi consists of dried root of *Vitex negundo* Linn. (Fam. Verbenaceae), a large aromatic shrub or sometimes a small tree, upto 4.5 m in height, common throughout the country ascending to an altitude of 1500 m in the lower Himalayas. It is common in waste places around village, river bank, moist localities and deciduous forests.

### SYNONYMS

Sanskrit	:	--
Assamese	:	Aslak
Bengali	:	Nirgundi, Nishinda
English	:	Five leaved chaste, Indian Privet
Gujrati	:	Nagod
Hindi	:	Nirgundi
Kannada	:	Lakkigida, Nekkigida, Lakkimara
Kashmiri	:	--
Malayalam	:	Indranee
Marathi	:	Lingad, Nigad
Oriya	:	--
Punjabi	:	Sambhalu
Tamil	:	Karuno chchil
Telugu	:	Nallavavilli
Urdu	:	Sambhalu

### DESCRIPTION

#### a) Macroscopic

Roots cylindrical, hard, tough with irregular fractures; external surface rough due to longitudinal, narrow, cracks and small rootlets; cut surface shows cork region greyish-brown, middle region greyish-white, and xylem region cream coloured; bark thin, easily separates from wood; wood hard, forming major part of root.

## b) Microscopic

Root shows 10 to 18 or more tangential rows of rectangular to cubicular, moderately thick-walled cork cells with a few rows of radially arranged cork cells also being present, inner 3 to 5 rows of cork cells thin-walled; cork cambium consists of single row of squarish to transversely elongated cells; secondary cortex composed of 4 to 12 rows of rectangular to elongated cells, some contain starch grains; numerous, small groups of stone cells found scattered in this zone; stone cells vary in shape and size; secondary phloem consists of sieve tubes with companion cells, fibres and phloem parenchyma traversed by phloem rays; distal portion of phloem conical, due to dilating phloem rays; each band of phloem composed of thin-walled, phloem tissues alternating with transverse strips of thick-walled phloem fibres; a few tangential strips of obliterated phloem tissues also present in outer-phloem region; each fibre group composed of 6 to 60 or more thick-walled, long and short fibres, short fibres comparatively thick-walled, a few fibres show forked tips; inner zone of phloem composed of intact, thin-walled, phloem tissues mainly sieve tubes, companion cells and phloem parenchyma; cambium composed of one, or sometimes two, rows of cells; central major part of root consists of xylem; vessels varying in size, scattered throughout xylem region, either in small groups of 2 to 4 or singly; a few xylem vessels show tail on one or both the ends; xylem fibres long, having thick-walls and pointed tips; xylem parenchyma contains starch grains similar to those found in cortical region; medullary rays are uni- to triseriate, almost straight, extend from pith to cork, medullary rays in xylem region radial while in phloem region they dilate; cells contain starch grain, simple and compound, oval to circular, having 4 components and measuring 8 to 12  $\mu$  in dia.

**Powder** - Pale yellow; shows parenchymatous cells containing simple oval to round and compound starch grains with 4 components, measuring 8 to 12  $\mu$  in dia; stone cells elongated, rectangular and squarish in shape with wide and narrow lumen, radiating canals and conspicuous striations; xylem vessels with pitted thickening, xylem and phloem fibres with thick walls.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' using Chloroform: Methanol (8:2) shows in visible light two spots at Rf. 0.14 and 0.95 (both yellow). Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.14 (dirty yellow), 0.14 (blue), 0.66 (blue), 0.82 (light blue), 0.90 (blue) and 0.95 (bluish green). On exposure to Iodine vapour five spots appear at Rf. 0.14, 0.04, 0.66, 0.82 and 0.95 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent two spots appear at Rf. 0.03 and 0.95 (both orange).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta, Uṣṇa (Nīla)
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittavināśana, Keśya, Netrya, Śleṣmaha, Vātahara, Piḍāhara

**IMPORTANT FORMULATIONS** - Māhā Viṣagarbha Taila, Mānasa Mitra Vaṭaka

**THERAPEUTIC USES** - Śūla Roga, Kāsa, Kuṣṭha, Kaṇḍū, Pradara, Ādhmāna, Kṛmiroga, Śleṣmaja Jvara

**DOSE** - 10-20 ml

## PALĀŚĀ ( Flower)

Palaśa consists of dried flower of *Butea monosperma* (Lam.) Kuntze, Syn. *B. frondosa* Koeing ex Roxb. (Fam. Fabaceae), an erect deciduous tree 12 to 15 m high with crooked trunk and irregular branches, commonly found throughout the greater part of the country upto about 915 m altitude.

### SYNONYMS

Sanskrit	:	Kimśuka, Brahma Vṛkṣa
Assamese	:	Palash
Bengali	:	Palas, Palash Gaccha
English	:	Flame of the Forest
Gujrati	:	Khakharo, Kesuda
Hindi	:	Dhak, Tesu, Paras
Kannada	:	Muttug, Muttulu
Kashmiri	:	--
Malayalam	:	Palashinsamatha
Marathi	:	Kakracha, Palas
Oriya	:	Porasu, Kijuko
Punjabi	:	Tesh
Tamil	:	Purasu
Telugu	:	Modyga Puvvu
Urdu	:	Dhak (Tesu)

### DESCRIPTION

#### a) Macroscopic

Drug available in about 3.0 to 4.5 cm long racemes of orange to yellow coloured flowers; bracts and bracteoles small, pedicels about twice as long as the calyx, densely brown-velvety; calyx 0.8 to 1.2 cm long, sepals 5, campanulate, densely velvety outside, clothed with silky hairs within; corolla about 2.0 to 7.0 cm long, petals 5, polypetalous, unequal keel, clothed outside with silky silvery hairs, orange or salmon coloured, keel

semicircular, beaked, veined; stamens 10, diadelphous, anthers 2 celled; carpel superior unilocular; style one and stigma one.

#### **b) Microscopic**

**Pedicel** - Shows more or less wavy outline, single layered epidermis covered with thick cuticle, unicellular, 2 or 3 celled trichomes, followed by ground tissue consisting of 6 to 8 celled, thin-walled, oval to polygonal parenchymatous cells; endodermis single layered; vascular bundle radially arranged, collateral, consisting of usual elements.

**Sepal** - Shows single layered epidermal cells, uniseriate, multicellular trichomes and club shaped secretory ducts present on lower surface, epidermis followed by 3 or 4 layered, thin-walled, loosely arranged parenchymatous cells on both surfaces, thin walled, wavy epidermal cells showing on the surface view.

**Petal** - Shows single layered, thin-walled, epidermal cells, covered with numerous, unicellular, pointed trichomes and a few glandular hairs; thin-walled, capitate or cone shaped papillae present on both surface; mesophyll consisting of thin-walled, loosely arranged, parenchymatous cells; a large number of larger and smaller vein found scattered in this region, some of the cells contain a few of oil globules.

**Powder** - Yellowish-brown; shows fragments of parenchyma, epidermis with stomatal cells; numerous, pointed, multicellular trichomes and a few oil globules.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol Acetic Acid: Water (4:1:5) shows in visible light six spots at Rf. 0.42 (light brown), 0.48 (brown), 0.58 (yellow), 0.82 (brown), 0.88 (yellow) and 0.96 (light brown). On spraying with phosphomolybdic acid reagent and heating the plate at 105°C for about ten minutes nine spots appear at Rf. 0.08 (blue), 0.19 (blue), 0.32 (blue), 0.42 (blue), 0.48 (yellow), 0.58

(blue), 0.82 (yellow), 0.88 (blue) and 0.96 (blue). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for about fifteen minutes seven spots appear at Rf. 0.19 (light red), 0.32 (light red), 0.42 (light red), 0.58 (red), 0.82 (red), 0.88 (red) and 0.96 (grey).

**CONSTITUENTS** - Glycosides and Flavonoids

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Kaṣāya, Madhura  
**Guṇa** : Laghu, Rūkṣa, Sara  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Pittahara, Kaphahara, Dīpana, Vātahara, Tṛṣṇāśāmakā, Rakta Stambhana, Mūtrala, Kuṣṭhaghna, Sandhāniya, Dāhapraśamana, Grāhī

**IMPORTANT FORMULATIONS** - Kuṅkumādi Taila, Vaṅga Bhasma (Jāraṇa(b))

**THERAPEUTIC USES** - Raktavikāra, Mūtrakṛcchra, Granthi, Kṛmi, Meha, Dāha, Vātarakta, Kuṣṭha, Tṛṣṇā, Raktapitta, Plīhāroga, Gulma, Grahaṇī, Netraśūla, Kaṇḍū, Arśa

**DOSE** - 3-6 gm of drug in powder form.

## PALĀŚĀ (Gum)

Palaśa consists of dried gum exuding from natural cracks and artificial incisions in the stem bark of *Butea monosperma* (Lam.) Kuntze Syn. *B. frondosa* Koen. ex Roxb. (Fam. Fabaceae), a medium sized tree with somewhat crooked trunk, 12 to 15 m high with irregular branches commonly found throughout greater parts of the country upto 915 m altitude.

### SYNONYMS

Sanskrit	:	Kimśuka, Triparṇa
Assamese	:	Palash
Bengali	:	Palas
English	:	Flame of forest, Bengal Kino
Gujrati	:	Khakharo, Kesudo
Hindi	:	Dhak, Palas, Teshu
Kannada	:	Mattuga, Muthuga
Kashmiri	:	--
Malayalam	:	Palashu
Marathi	:	Palas
Oriya	:	--
Punjabi	:	Dhak
Tamil	:	Purasu
Telugu	:	Moduga, Modugu
Urdu	:	Dhak (Tesu)

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces, flattish, brittle, perfectly transparent, smooth and shining, ruby red to dark brown; buff coloured pieces of bark attached; no peculiar odour; taste, astringent.

**b) Microscopic**

Angular fragments, opaque in transmitted light; shows plants debris form thick-walled rectangular cork and polygonal, thin-walled cortex, and phloem parenchymatous cells, depved from the parent plant.

**Identification:** It dissolves partially in boiling alcohol and freely, almost completely, in cold water, forming. a milky solution; when treated with 5% aqueous solution of perchloride of iron (Ferric chloride) it gives greyish-green precipitate and with lead acetate gives white precipitate.

**Fluorescence:** Colour of 5% aqueous solution light brown in day light and greyish green in U.V. light (366 nm); colour of 5% alcoholic solution reddish-brown in daylight, and light green in U.V. light (366 nm).

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	69	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	63	per cent, Appendix	2.2.7.

**ASSAY****T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (5:1:4) shows in visible light six spots at Rf. 0.30, 0.42, 0.67, 0.74, 0.84 and 0.92 (all yellowish brown). Under U.V. (366 nm) three blue fluorescent zones are visible at Rf. 0.74, 0.84 and 0.92. On exposure to Iodine vapour eight spots appear at Rf. 0.07, 0.23, 0.30, 0.42, 0.67, 0.74, 0.84 and 0.92 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.07, 0.23, 0.30, 0.42, 0.67, 0.74, 0.84 and 0.92 (all violet).

**CONSTITUENTS** - Anthocyanins and Tannins.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Kaṭu, Tikta
<b>Guṇa</b>	:	Sara, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Vṛṣya, Bhagnasandhānakṛt, Vātahara, Śleṣmahara

**IMPORTANT FORMULATIONS** - Balā Taila

**THERAPEUTIC USES** - Grahaṇī, Gulma, Arśa, Kṛmiroga, Gudaroga, Asthibhagna, Vraṇa, Pl  
īhā Roga

**DOSE** - 0.5 to 1.5 gm

## PALĀŚĀ (Seed)

Palaśā consists of dried seed of *Butea monosperma* (Lam.) Kuntze, Syn. *B. frondosa* Koen. ex Roxb. (Fam. Fabaceae), a medium sized tree with a somewhat crooked trunk, 12 to 15 m high with irregular branches, commonly found throughout the greater part of the country upto about 915 m altitude.

### SYNONYMS

Sanskrit	:	Brahma Vṛkṣa, Kimśuka, Rakta Puṣpaka, Kṣāra Śreṣa
Assamese	:	--
Bengali	:	Palash Gachha
English	:	Bengal Kinotree
Gujrati	:	Kesudo, Khakharo
Hindi	:	Dhak, Palash
Kannada	:	Muttuga
Kashmiri	:	--
Malayalam	:	Palashu
Marathi	:	Palash
Oriya	:	--
Punjabi	:	Dhak, Palash, Tesoo, Kesoo
Tamil	:	Purashu
Telugu	:	Moduga mada
Urdu	:	Dhak (Tesu)

### DESCRIPTION

#### a) Macroscopic

Seed flat, kidney-shaped, 2.5 to 4 cm long, 1 to 3 cm wide, dark reddish-brown, thin, glossy; hilum clear, situated near middle of concave edge 'of seed; odour, faint; taste, slightly acrid and bitter.

## b) Microscopic

Shows a wide zone of testa, consisting of a layer of palisade cells, a row of bearer cells and many layers of parenchymatous cells; palisade cells compactly arranged, columnar shaped and covered with thick cuticle, followed by a single row of bearer cells; parenchymatous layers consisting of many rows of cells, filled with reddish-brown contents; a number of vascular bundles occur in a row, in middle region of parenchymatous zone; cotyledons consists of a single layered epidermis, composed of square to oval cells, covered with cuticle; mesophyll cells bear hyaline walls, oval to irregular shaped with small intercellular spaces; simple, oval to round, starch grains with concentric striations, and centric hilum, compound grains having 2 to 4 components measuring 8 to 16  $\mu$  in dia., present in cotyledons.

**Powder** - Cream or grey; shows fragments of testa, bearer cells, numerous simple oval to round starch grains with concentric striations and a centric hilum, and also compound starch grains having 2 to 4 components, measuring 8 to 16  $\mu$  in diameter.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.
Hexane soluble extractive	Not less than	15	per cent.	

(By soxhlet extraction)

## ASSAY

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. light (366 nm) three fluorescent at Rf. 0.41, 0.49 to 0.65 (elongated and light blue) and 0.91 (blue). On exposure to Iodine vapour six spots appear at Rf. 0.04, 0.19, 0.28, 0.41, 0.49 to 0.65 (elongated) and 0.91 (all yellow). On

spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C six spots appear at Rf. 0.04, 0.19, 0.28, 0.41, elongated spot (0.49-0.65) and 0.91 (all violet). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent three spots appear at Rf. 0.41, 0.49 to 0.65 (elongated) and 0.91 (all light orange).

**CONSTITUENTS** - Fixed Oil, Enzymes and small quantities of Resins and Alkaloids.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Sara, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Dīpana, Vṛṣya, Asthisandhānaka, Saṃgrāhi

**IMPORTANT FORMULATIONS** - Ayaskṛti, Kṛmimudgara Rasa, Kṛmikūṭhāra Rasa, Palāśa Bīja Cūrṇa, Palāśa Arka

**THERAPEUTIC USES** - Vraṇa, Gulma, Grahaṇī, Arśa, Kṛmiroga, Basti Roga, Plīhā Roga, Dadru, Kaṇḍū, Tvak Roga, Prameha, Timira Roga, Netrābhiṣyanda, Garbhādānānivāraṇārtha

**DOSE** - 3 gm of the drug in powder form.

## PARPAṬA (Whole Plant)

Parpaṭa consists of dried whole plant of *Fumaria parviflora* Lam. (Fam. Fumaraceae), a pale green, branched, annual, diffuse herb, about 60 cm high, distributed as a weed of cultivated fields over the greater parts of the country, and also commonly growing on road sides during cold season.

### SYNONYMS

Sanskrit	:	Varāṭika, Sukṣmapatra
Assamese	:	Shahtaraj
Bengali	:	Vanshulpha, Bansulpha
English	:	--
Gujrati	:	Pittapapada, Pitpapado, Pittapapado
Hindi	:	Pittapapada, Dhamgajra, Pittapapara
Kannada	:	Kallu Sabbasige, Parpatu, Chaturasigide
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Pittapapada, Shatara, Parpat
Oriya	:	--
Punjabi	:	Shahtara, Pittapapara
Tamil	:	Tura, Tusa
Telugu	:	Parpatakamu
Urdu	:	Parpata

### DESCRIPTION

#### a) Macroscopic

**Root** - Buff or cream coloured, branched, about 3 mm thick, cylindrical; taste, bitter.

**Stem** - Light green, smooth, diffused, hollow, about 2 to 4 mm thick; taste, bitter and slightly acrid.

**Leaf** - Compound, pinnatifid, 5 to 7 cm long, divided into narrow segments; segments 5 mm long and about 1 mm broad, linear or oblong, more or less glaucous, acute or subacute; petiole, very thin, 2.5 to 4.0 cm long; taste, bitter.

**Flower** - Racemes with 10 to 15 flowers, peduncle upto 3 mm, pedicels about 2 mm, flowers about 7 mm long, bract much longer than the pedicels; sepals 2, white, minute, about 0.5 mm long, triangular ovate, acuminate; corolla in 2 whorls with very small 4 petals, each about 4 mm long; inner petals with a purple or green tip; outer petals with narrow spur, without purple spots stamens 3+3, staminal sheath subulate above, about 4 mm long, stigma 2 lipped.

**Fruit** - Capsule, 2 mm long and slightly broader, subrotund, obovate, obtuse or subtruncate, obscurely apiculate, rugose when dry; nutlets globose, upto 2 mm long, single seeded.

## b) Microscopic

**Root** - Root shows single layered epidermis, followed by 5 or 6 layers of cortex consisting of thin-walled, rectangular, parenchymatous cells, outer 1 or 2 layers irregular and brown in colour; endodermis not distinct; secondary phloem very narrow and consisting of 2 or 3 rows with usual elements; central core shows a wide zone of xylem and consists of usual elements; vessels mostly solitary having reticulate and spiral thickening, medullary ray less developed and mostly uniseriate; fibres moderately long, thick-walled, having narrow lumen and blunt tips.

**Stem** - Stem shows a pentagonal outline, having prominent angles composed of collenchymatous cells; epidermis single layered of thin-walled, oblong, rectangular cells, covered with thin cuticle; cortex narrow, composed of 2 to 4 layers of chlorenchymatous cells endodermis not distinct; vascular bundles collateral, 5 or 6 arranged in a ring; each vascular bundle capped by a group of sclerenchymatous cells; phloem consists of usual elements; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels much elongated, having reticulate, annular or spiral thickening or simple pits; xylem fibres narrow elongated with pointed ends having a few simple pits; centre either hollow or occupied by narrow pith consisting of thinwalled, parenchymatous cells.

## **Leaf**

**Petiole** .. V -shaped outline; single layer epidermis consisting of thin-walled, parenchymatous cells followed by ground tissue composed of thick-walled round, oval or polygonal, parenchymatous cells, outer cells smaller than inner; collenchymatous cells present at corners; three vascular bundle scattered in ground tissue, one central and two in wings; vascular bundle consists of phloem and xylem, phloem capped with fibrous sheath, lower epidermis single layered.

**Lamina** - Shows single layer epidermis' on either side, consisting of thin-walled, rectangular, oval-shaped, parenchymatous cells; mesophyll composed of oval to polygonal thin-walled parenchymatous cells, filled with green pigment and not differentiated into palisade and spongy parenchyma; vascular bundles scattered throughout the mesophyll; stomata anomocytic, present on both surfaces.

**Powder** - Light greenish-brown; shows fragments of parenchyma; tracheids, fibres, and vessels having simple pits and spiral thickenings; anomocytic stomata and wavy walled epidermal cells in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	30	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	10	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	29	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (8:2) shows under visible light one spot at Rf. 0.93 (green). Under U.V. (366 nm) eight fluorescent zones are visible at Rf. 0.07 (blue), 0.13 (blue), 0.29 (light blue), 0.50 (light pink), 0.60 (light yellow), 0.67 (yellow), 0.79 (blue) and 0.93 pink). On exposure to Iodine vapour twelve spots appear at Rf. 0.07, 0.10, 0.13, 0.19, 0.29, 0.50, 0.60, 0.67, 0.74, 0.79, 0.86 and 0.93 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent one spot appears at Rf. 0.07 (orange).

**CONSTITUENTS** - Alkaloids, Tannins, Sugars and salt of Potassium

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Samgrāhi, Pittahara, Kaphahara, Raktadoṣahara, Rocaka

**IMPORTANT FORMULATIONS** - Pācanāmṛta Kvātha Cūrṇa, Tiktaka Ghṛta, Mahā Tiktaka Ghṛta, Nalpamarādi Taila, Bṛhat Mañjiṣṭhādi Kvatha Cūrṇa, Paṭolādi Ghṛta, Parpaṭādi Kvatha, Śadaṅgapānīya, Bṛhat Garbha Cintāmaṇi Rasa

**THERAPEUTIC USES** - Chardi, Raktapitta, Mada, Bhrama, Jvara, Tṛṣṇā, Dāha, Raktavikāra, Glāni

**DOSE** - 1-3 gm

## PĀṬALĀ (Stem Bark)

Pāṭalai consists of dried stem bark of *Stereospermum chelonoides* (L.f.) DC. (Fam. Bignoniaceae), a large deciduous tree upto 18 m high and about 1.8 m in girth with a clear bole of about 9 m, found throughout the moist parts of the country.

### SYNONYMS

Sanskrit	:	Paṭala, Khriṣṇavṛṇa, Madhudui, Tāmrapuṣpi
Assamese	:	--
Bengali	:	Paarul
English	:	Trumpet Flower Tree, Yellow Snake Tree
Gujrati	:	Paadal
Hindi	:	Paraal, Paatar, Paadree, Paadhal
Kannada	:	Rude, Kalludi, Kaala-adri
Kashmiri	:	--
Malayalam	:	Puppaatiri, Paatiri
Marathi	:	Paadal
Oriya	:	Patudi
Punjabi	:	Paadal
Tamil	:	Paadiri, Pumpaadiri, Paadari
Telugu	:	Kokkosa, Kaligottu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug occurs in cut pieces of varying sizes, upto 0.8 cm thick, slightly recurved and very slightly channelled; external surface rough due to ridges, fissures and lenticels; dull brown; when cut across it shows lamellations due to presence of concentric bands of phloem fibres; fracture, tough and short with inner lamellae occasionally peeling off; taste, not characteristic.

### **b) Microscopic**

Cork consisting of about 8 to 22 layers of tangentially elongated, thin-walled, lignified, rectangular cells; cork cambium single layered of narrow cells; secondary cortex very wide, composed of tangentially elongated, thick-walled, polyhedral, isodiametric, parenchymatous cells with intercellular spaces having numerous, mostly groups of stone cells of various sizes, fairly large, thick-walled, lignified, oval to polygonal upto 180  $\mu$  long and upto 90  $\mu$  wide, pitted with clear striations and with wide lumen; secondary phloem composed of ceratenchyma, phloem parenchyma, fibres and rays cells; ceratenchyma present in the form of thick-walled tangential strips between two obliquely running rays; phloem fibres mostly in groups arranged in concentric manner; phloem rays mostly multi seriate, fairly large, 2 to 4 cells wide, a few uniseriate rays also occur; micro sphenoidal crystals of calcium oxalate present in phloem parenchyma and ray cells.

**Powder** - Brown; fragments of thin-walled, rectangular cork cells; single or groups of lignified, thick-walled, oval to polygonal stone cells upto 180  $\mu$  long and upto 90  $\mu$  wide, having clear striations with wide lumen and pits; fibres with small tapering and pointed ends; pieces of phloem parenchyma cells and a few microsphenoidal crystals of calcium oxalate.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	8 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Glacial Acetic acid : Water (4: 1 :5) shows under U.V. (366 nm) two fluorescent spots at Rf. 0.48 and 0.81 (both blue). On exposure to Iodine vapour four spots appear at Rf. 0.36, 0.48, 0.60 and 0.81 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appear at Rf. 0.16, 0.36, 0.54, 0.64, 0.81 and 0.89 (all black).

**CONSTITUENTS** - Gum and a bitter substance.

**PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṭu, Kaṣāya, Madhura  
**Guṇa** : Guru, Viśada  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Tridoṣahara, Dīpana, Raktadoṣahara, Viṣaghna, Tṛṣaghna, Hṛdya, Rāsāyana, Adhobhāgadoṣahara

**IMPORTANT FORMULATIONS** - Amṛtāriṣṭa, Dantyādyariṣṭa, Daśamūlāriṣṭa, Indukānta Ghṛta

**THERAPEUTIC USES** - Śvayathu, Sannipāta, Hikkā, Vami, Arocaka, Śvāsa, Ādhmāna, Dagdhavraṇa, Mūtrāghāta, Vraṇa, Śoṭha

**DOSE** - 3-6 gm in powder form.10-30 gm for decoction in dividing dose.

## PATTANĠA (Heart Wood)

Paṭṭaṅga consists of dried heart wood of *Caesalpinia sappan* Linn. (Fam. Caesalpiniaceae), a shrub or small tree, about 6 to 9 m in height, found in South India and Bengal; usually cultivated as a hedge plant.

### SYNONYMS

Sanskrit	:	Paṭrāṅga, Paṭṭaṅga
Assamese	:	Baggam, Bakam
Bengali	:	Bokom
English	:	Sappan Wood
Gujrati	:	Patang
Hindi	:	Pagang, Bakam
Kannada	:	Patang
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Patang
Oriya	:	--
Punjabi	:	--
Tamil	:	Anaikuntrumani
Telugu	:	Bukkapuchettu
Urdu	:	Pattang

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces, moderately hard, about 2.5 cm thick, smooth, dark brown on one surface and creamish-white on the other, and yellowish-orange in between; fracture, fibrous; odour and taste not characteristic.

## b) Microscopic

Shows vessels, tracheids, fibres and xylem parenchyma, traversed by numerous xylem rays; vessels numerous, barrel-shaped with bordered pits, scattered throughout xylem in single or in groups of 2 to 5, a few vessels filled with yellowish pigment; fibres spindle-shaped, pointed at both ends; xylem rays numerous uni to biseriate found more common, 3 to 30 cells high, ray cells round or oval; calcium oxalate crystals and starch grains absent.

**Powder** - Creamish-white; shows group of fibres and vessels; crystals of calcium oxalate and starch grains absent.

## Identification

**a) Colour test** - i) 5 gram of sample extracted in 100 ml of water, filtered and seen in daylight is saffron in colour; ii) 5 gram of sample extracted in 100 ml of 95% of alcohol, filtered and seen in daylight is reddish, which becomes carmine on addition of 5% aqueous solution of sodium hydroxide; iii) small fragments of wood impart crimson colour in lime water.

**b) Fluorescence** - Extract obtained in the test for water soluble extractive greenish brown under U.V. light (254 nm) and brownish-green under (366 nm); extract obtained in the test for alcoholic soluble extractive greenish yellow under U.V. light (254 nm) and dark-brown, under (366 nm).

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	1 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light three spots at Rf. 0.75 (pink), 0.89 (grey), and 0.94 (dirty yellow). Under U.V. (366 nm) four fluorescent zones are visible at Rf. 0.66 (blue), 0.75 (pink), 0.89 (grey) and 0.94 (dirty yellow). On exposure to Iodine vapour four spots appear at Rf. 0.66, 0.75, 0.89 and 0.94 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C four spots appear at Rf. 0.66, 0.75 (both light pink), 0.89 (grey) and 0.94 (orange).

**CONSTITUENTS** - Brasilin, Essential oils, Saponin Glycoside, Amino Acids and Sugars.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guna</b>	:	Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Varṇya, Pittahara, Doṣahara

**IMPORTANT FORMULATIONS** - Arimedādi Taila, Karpūrādyarka, Kuṅkumādi Taila

**THERAPEUTIC USES** - Vraṇa, Dāha, Rakta Doṣa, Pradara, Mukharoga

**DOSE** - 5-10 gm

## PIPPALĪ (Fruit)

Pippali consists of the dried, immature, catkin-like fruits with bracts of *Piper longum* Linn. (Fam. Piperaceae), a slender, aromatic climber with perennial woody roots, occurring in hotter parts of India from central Himalayas to Assam upto lower hills of West Bengal and ever green forests of Western ghats as wild, and also cultivated in North East and many parts of the South.

### SYNONYMS

Sanskrit	:	Kaṇa, Māgadhi, Magadha, Kṛṣṇa, Śauṇḍi
Assamese	:	Pippali
Bengali	:	Pipul
English	:	Long Pepper
Gujrati	:	Lindi Peeper, Pipali
Hindi	:	Pipar
Kannada	:	Hippali
Kashmiri	:	--
Malayalam	:	Pippali
Marathi	:	Pimpali, Lendi Pimpali
Oriya	:	Pipali, Pippali
Punjabi	:	Magh, Magh Pipali
Tamil	:	Arisi Tippali, Thippili
Telugu	:	Pippalu
Urdu	:	Filfil Daraz

### DESCRIPTION

#### a) Macroscopic

Fruit greenish-black to black, cylindrical, 2.5 to 5 cm long and 0.4 to 1 cm thick, consisting of minute sessile fruits, arranged around an axis; surface rough and composite; broken surface shows a central axis and 6 to 12 fruitlets arranged around an axis; taste,

pungent producing numbness on the tongue; odour, aromatic.

#### **b) Microscopic**

Catkin shows 6 to 12 fruits, arranged in circle on a central axis, each having an outer epidermal layer of irregular cells filled with deep brown content and covered externally with a thick cuticle; mesocarp consists of larger cells, usually collapsed, irregular in shape and thin-walled; a number of stone cells in singles or in groups present; endocarp and seed coat fused to form a deep zone, outer layer of this zone composed of thin-walled cells and colourless, inner layer composed of tangentially elongated cells, having reddish-brown content; most of endocarp filled with starch grains, round to oval measuring 3 to 8  $\mu$  in dia.

**Powder** - Deep moss green, shows fragments of parenchyma, oval to elongated stone cells, oil globules and round to oval, starch grains, measuring 3 to 8  $\mu$  in dia.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7 per cent, Appendix	2.2.7.

#### **T.L.C.**

T. L. C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate (90: 10) as mobile phase. Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.15, 0.26, 0.34, 0.39, 0.50 and 0.80. On exposure to Iodine vapour seven spots appear at Rf. 0.04, 0.15, 0.26, 0.34, 0.39, 0.50 and 0.93 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes five spots appear at Rf. 0.04, 0.22, 0.35, 0.43 and 0.82. On spraying with Dragendorff reagent three spots appear at Rf. 0.15, 0.26 and 0.34 (all orange).

**CONSTITUENTS** - Essential Oil and Alkaloids

## PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta, Madhura

**Guṇa** : Snigdha, Laghu

**Vīrya** : Anuṣṇa

**Vipāka** : Madhura

**Karma** : Vātahara, Kaphahara, Dīpana, Rucya, Rāsayana, Hṛdya, Vṛṣya,  
Tridoṣahara, Recana

**IMPORTANT FORMULATIONS** - Guḍapippalī, Amṛtāriṣṭa, Ayaskṛti, Aśvagandhādyariṣṭa,  
Kumāryāsava, Candanāsava, Cyavanaprāśa Avaleha, Śiva Guṭikā, Kaiśora Guggulu

**THERAPEUTIC USES** - Śvāsa, Kāsa, Plīhā Roga, Gulma, Jvara, Prameha, Arśa, Kṣaya,  
Udara Roga, Hikkā, Trṣṇā, Kṛmi, Kuṣṭha, Śūla, Āmavāta, Āmadoṣa

**DOSE** - 1-3 gm

## PLAKṢA (Fruit)

Plakṣa consists of dried fruit of *Ficus lacor Buch. -Ham. Syn. F. lucescens Blume., F. infectoria* Roxb. (Fam. Moraceae), a large spreading tree, with a few occasional aerial roots, found nearly throughout the country and commonly planted as an avenue and ornamental tree

### SYNONYMS

Sanskrit	:	Jāti
Assamese	:	Pakar
Bengali	:	Pakar
English	:	--
Gujrati	:	Peep, Pakadee
Hindi	:	Pakhar, Pilkhin
Kannada	:	Karibasari, Kadubasari, Jeevibsari Basa
Kashmiri	:	--
Malayalam	:	Itthy, Kallal
Marathi	:	Pimpari, Paicta
Oriya	:	Pakali, Pakal
Punjabi	:	Pilkhan
Tamil	:	Kallal, Itthi
Telugu	:	Juvvi, Erra-Juvvi
Urdu	:	Pakhar

### DESCRIPTION

#### a) Macroscopic

Fruit a syconus, 0.5 to 1.0 cm in dia., attached with pedicel; sub-globose, wrinkled, glabrous, having three basal bracts; greyish-brown to yellowish-brown; taste, astringent.

## b) Microscopic

Fruit shows single layered, thin-walled epidermis followed by a narrow zone of 2 to 5 layers, of round, oval, rectangular, lignified stone cells with wide lumen; rest of mesocarp very wide consisting of oval to polygonal, collenchymatous cells containing brownish contents; a few vascular traces found scattered in this zone; inner zone consisting of stone cells similar in shape and size to those found scattered in outer zone; male and female flower attached to inner layer of mesocarp.

**Powder** -Dark greyish-brown; shows fragments of epidermal cells; single, or groups of lignified stone cells; collenchymatous cells; a few debris of male and female flowers present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract on Silica Gel 'G' using n-Butanol : Acetic Acid : Water (4: 1 :5) shows in visible light three spots at Rf. 0.27, 0.63 (both grey) and 0.97 (yellowish green). Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.53, 0.63, 0.84, 0.91, 0.94 (all blue) and 0.97 (pink). On exposure to Iodine vapour twelve spots appear at Rf. 0.12, 0.16, 0.22, 0.27, 0.38, 0.50, 0.63, 0.73, 0.84, 0.91, 0.94 and 0.97 (all yellow). On spraying with Ninhydrin reagent a single spot appears at Rf. 0.97 (brick red).

**CONSTITUENTS** - Amino Acids.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Madhura
<b>Guṇa</b>	:	Śīta
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara

**THERAPEUTIC USES** - Dāha, Raktapitta, Mūrccā, Śrama, Pralāpa, Bhrama, Śoṭha

**DOSE** - 5-10 gm

## PRIYĀLA (Stem Bark)

Priyāla consists of dried stem bark of *Buchanania lanzan* Spreng. Syn. *B. latifolia* Roxb. (Fam. Anacardiaceae), an evergreen tree upto 15 m high, found throughout the country in dry deciduous forests.

### SYNONYMS

Sanskrit	:	Priyala, Carah, Kharaskandhah
Assamese	:	--
Bengali	:	Chironji, Pial
English	:	Calumpang Nut Tree
Gujrati	:	Chaaroli
Hindi	:	Chiraunji, Piyaar, Chironji
Kannada	:	Kolatmavu, Chalaali
Kashmiri	:	--
Malayalam	:	Priyaalam, Mural maram
Marathi	:	Chaaroli Jhaada
Oriya	:	Char, Charakoli, Priyal
Punjabi	:	Chironji
Tamil	:	Saarapparuppu
Telugu	:	Sarapappu Chettu, Chinna morilli Mori, Saara
Urdu	:	Habb-us-Samena

### DESCRIPTION

#### a) Macroscopic

Bark occurs in 3 to 11 cm long, and about 1.0 cm thick pieces; external surface greyish-brown, rough due to formation of fissures; internal surface reddish-brown and fibrous; recurved, flat or more or less channelled; fracture, fibrous.

### **b) Microscopic**

Shows a wide zone of rhytidoma, consisting of oval thick-walled cork cells, hardened dead cortical cells, having a few oil globules, groups of lignified phloem fibres, stone cells and a large number of lysigenous cavities with yellow contents; secondary phloem a wide zone composed of oval to polygonal, parenchymatous cells containing prismatic crystals of calcium oxalate and a few oil globules; groups of round to oval stone cells having distinct striations with both narrow and wide lumen; phloem rays usually biseriate, composed of round to oval, slightly thick-walled cells.

**Powder** -Greyish-brown; shows fragments of parenchymatous cells, phloem fibres, stone cells and a few prismatic crystals and oil globules.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

### **ASSAY**

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using n-Butanol ; Acetic acid Water (4:1:5) shows in visible light two spots at Rf. 0.14 and 0.91 (both grey). Under U.V. (366nm) two fluorescent zones appear at Rf. 0.70 and 0.78 (both blue). On exposure to Iodine vapour two spots appear at Rf. 0.14 and 0.91 (both yellow). On spraying with Ferric chloride solution two spots appear at Rf. 0.14 and 0.91 (both dirty blue).

**CONSTITUENTS** - Alkaloids, Tannins, Saponins, reducing Sugars, Triterpenoids and Flavonoids

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Dāhahara, Raktaprasādana, Hṛdya, Vṛśya, Virecanopaga

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa, Aśoka Ghṛta

**THERAPEUTIC USES** - Jvara, Tṛṣṇā, Raktapitta, Raktātisāra

**DOSE** - 5-10 gm

## PRIYAᅅGU (Fruit)

Priyaᅅgu consists of dried fruit of *Callicarpa macrophylla* Vahl. (Fam. Verbenaceae), a stout shrub, about 1.2 to 1.8 m high, occurring in the sub-Himalayan tracts from Hazara eastwards to Assam upto 1800 m. and in Upper Gangetic and West Bengal plains;

### SYNONYMS

Sanskrit	:	Phalini, Vanita
Assamese	:	--
Bengali	:	Priyangu
English	:	--
Gujrati	:	Ghaunla, Priyango
Hindi	:	Priyangu
Kannada	:	Kadu-edi, Sannanathdagida, Proyangu, Navane
Kashmiri	:	--
Malayalam	:	Nazhal, Kadurohini, Njazhal, Jnazhal
Marathi	:	Gauhala, Gahula, Priyangu
Oriya	:	Priyangu
Punjabi	:	Priyangu
Tamil	:	Gnazalpoo
Telugu	:	Prekhanamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Fruit globose, 1 to 3 mm in dia., yellowish-brown with or without fruit stalk; 4-toothed, bell-shaped calyx sometimes attached; fruit contains four one seeded pyrenes; taste, astringent; no characteristic odour.

## b) Microscopic

Fruit shows pericarp differentiated into an epicarp, a mesocarp and an endocarp; epicarp thin, forms skin of fruit consisting of outer epidermal cells; a few epidermal cells elongate to form short stalked, disc-shaped, 2 to 4 celled glandular hairs; some other epidermal cells form stellate hairs; mesocarp composed of 5 to 8 layered, thin-walled, parenchymatous cells; endocarp hard and stony, consisting of sclerenchymatous cells, which are larger towards inner side and smaller towards outer side; seeds four in each fruit; yellowish coloured; endosperm 2 to 6 layered consisting of isodiametric cells; cotyledons 2, consisting of isodiametric cells.

**Powder** - Brown; shows fragments of straight walled, lignified cells of seed coat; oval to elongated, elliptical endocarp cells in surface view; single and groups of elongated, oval to rectangular, lignified stone cells having concentric striations, radial canal, with narrow lumen; a few glandular and stellate hairs and pieces of polygonal endosperm cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 10 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. light (366 nm) one conspicuous fluorescent spot at Rf. 0.82 (sky blue). On exposure to Iodine vapour two spots appear at Rf. 0.82 & 0.92 (both yellowish brown). On spraying with Ferric Chloride (10% aqueous solution) two spots appear at Rf. 0.82 & 0.92 (both greyish brown).

**CONSTITUENTS** - Fixed Oil

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Śīta, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Saṃgrāhi, Balakṛta, Udrikta Raktaprasādana

**IMPORTANT FORMULATIONS** - Jīrakādi Modaka, Bṛhatphala Ghṛta, Bṛhat Chāgalādyā Ghṛta, Vyāghrī Taila

**THERAPEUTIC USES** - Jvara, Dāha, Chardi, Raktadoṣa, Bhrama, Vātaroga, Vaktrajāḍya

**DOSE** - 1-2 gm of the durg in powder form.

## PRŚNIPARNĪ (Whole Plant)

Prśniparṇi consists of dried whole plant of *Uraria picta* Desv. (Fam. Fabaceae), an erect, under shrub upto 90 cm high, distributed throughout the country.

### SYNONYMS

Sanskrit	:	Citraparṇi, Kalasi, Dhavani, Pṛthakparṇi, Shrigalavinna
Assamese	:	--
Bengali	:	Salpani, Chhalani, Chakule
English	:	--
Gujrati	:	Pithavan
Hindi	:	Pithavan, Dabra
Kannada	:	Murele Honne, Ondele honne, Prushniparni
Kashmiri	:	--
Malayalam	:	Orila
Marathi	:	Pithvan, Prushnipamee
Oriya	:	Prushnipamee, Shankarjata
Punjabi	:	Detedarnee
Tamil	:	Oripai
Telugu	:	Kolakuponna
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Occur in pieces of varying size, thickness of 1 to 2 cm, gradually tapering, tough, woody, cylindrical; externally light yellow to buff, internally pale yellow; surface bearing fine longitudinal striations; fracture, splintery or fibrous; taste, slightly acrid.

**Stem** - About 8.0 to 16.0 cm long, 0.2 to 0.4 cm in diameter, in cut pieces; cylindrical, branched, pubescent, external surface light yellow to brown; transversely cut and smoothed surface shows buff-white colour, mature stem longitudinally wrinkled, leaf scar present at nodes; fracture, fibrous.

**Leaf** - Very variable, imparipinnate, upto 20 cm or more long, upto 2 cm wide; leaflets on the upper part of the stem 5 to 7, rigidly sub-coriaceous, linear-oblong, acute, blotched with white; glabrous above, finely reticulately veined and minutely pubescent beneath, base rounded; leaflets on the lower part of the stem 1 to 3, sub-orbicular or oblong.

## **b) Microscopic**

**Root** - Shows 5 or 6 layers of thin-walled, tabular, regularly arranged cork cells; cork cambium single layered; secondary cortex composed of 4 to 6 layers of oval, tangentially arranged, thin-walled, parenchymatous cells, a few fibres present singly or in groups; secondary phloem composed of sieve elements, parenchyma and fibres traversed by phloem rays; sieve elements somewhat collapsed towards periphery but intact in inner phloem region; phloem parenchyma composed of rounded to somewhat oval cells, larger towards periphery; fibres thick-walled, lignified with narrow lumen and tapering ends; phloem rays 1 to 5 cells wide, their cells being oval or rectangular in the portion nearer the wood but broader towards their distal ends; secondary xylem composed of vessels, tracheids, fibres, crystal fibres and parenchyma traversed by xylem rays; vessel very few, mostly confined to inner and outer part of xylem; fibres similar to those of phloem fibres and arranged in close set concentric bands; in isolated preparation vessels are cylindrical, pitted with transverse to oblique perforation; tracheids possess bordered pits; xylem parenchyma mostly rectangular with simple pits; xylem ray cells isodiametric showing simple pits; starch grains simple, round to oval, measuring 6 to 17 $\mu$  in dia., distributed throughout parenchymatous cells of secondary cortex, phloem and xylem; prismatic crystals of calcium oxalate present in crystal fibres, as well as in many parenchymatous cells of secondary cortex, phloem and ray cells.

**Stern** - Shows single layered epidermis covered with cuticle, a few epidermal cells elongate outwards forming papillae; cortex 8 to 10 cells wide, consisting of oval to circular, thin walled, parenchymatous cells; groups of pericyclic fibres present in the form of discontinuous ring; phloem consisting of usual elements except phloem fibres; phloem rays 2 to 4 cells wide; xylem consisting of usual elements; vessels mostly simple pitted; fibres simple with blunt tips; xylem rays 1 to 4 cells wide and 2 to 8 cells in height; pith wide, consisting of thin-walled, round to oval parenchymatous cells.

## **Leaf-**

**Midrib** - single layered epidermis on either surfaces covered with striated cuticle having a few unicellular or bicellular, hooked or straight and pointed tipped hairs present on both surfaces but more on lower surface ; collenchyma 2 or 3 layered, followed by 2 layers of parenchyma cells; single row of pericyclic fibers present on both sides; vascular bundle located centrally.

**Lamina** - shows single layered epidermis on either surfaces, a few unicellular or bicellular, hooked or straight, pointed tipped hairs present on lower surface; mesophyll differentiated into single layered palisade and spongy parenchyma; spongy parenchyma cells oval to rounded having small intercellular spaces; numerous paracytic stomata present on lower surface; stomatal index 27 to 36 on lower surface; palisade ratio 4 or 5; vein-islet number 29 to 32 per sq. mm.; vascular bundle present centrally.

**Powder** - Greenish-yellow; shows simple pitted vessels; fragments of fibres, tracheids, parenchyma cells; pieces of hairs; palisade cells; a few prismatic crystals of calcium oxalate; epidermal cells wavy walled in surface view showing paracytic stomata and starch grains simple, round to oval, measuring 6 to 17  $\mu$  in dia.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

### **ASSAY**

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene: Ethyl acetate (9:1) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.13 (Red), 0.26 (light blue) and 0.30 (Red). On exposure to Iodine vapour nine spots appear at Rf. 0.07, 0.18, 0.26, 0.30, 0.44, 0.63, 0.86, 0.91 and 0.97 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes eight spots appear at Rf. 0.18, 0.26, 0.30, 0.39, 0.44, 0.86, 0.91 and 0.97 (all grey).

### **CONSTITUENTS -**

### **PROPERTIES AND ACTION**

**Rasa** : Madhura, Kaṭu, Amla, Tikta

**Guṇa** : Laghu, Sara

**Vīrya** : Uṣṇa  
**Vipāka** : Madhura  
**Karma** : Tridoṣahara, Vṛṣya, Dīpana, Saṃgrāhi, Vātahara, Śoṭhahara, Aṅgamardapraśamana, Sandhānīya, Jīvāṇu Nāśaka, Balavardhaka

**IMPORTANT FORMULATIONS** - Aṅgamarda Praśamana Kaśaya Cūrṇa, Amṛtāriṣṭa, Daśamūla Taila, Vyāghrī Taila, Madhyama Nārayaṇa Taila, Śiraḥ Śūlādi Vajra Rasa, Daśamūlāriṣṭa

**THERAPEUTIC USES** - Dāha, Jvara, Śvāsa, Raktavikāra, Vātaroga, Unmāda, Chardi, Kāsa, Raktātisāra, Atīsāra, Vraṇa, Raktārśa, Kaphajamadātyaya Tṛṣṇā, Nataprabala, Vātarakta, Ekāhnika Jvara, Pilla-(Netra Roga), Asthibhagna

**DOSE** - 20-50 gm powder for decoction.

## PUṢKARA (Root)

Puṣkara consists of dried root of *Inula racemosa* Hook. f. (Fam. Asteraceae), a stout herb, 0.5 to 1.5 m high, mostly found in Western Himalayas upto 2600 m.

### SYNONYMS

Sanskrit	:	Kāśmīra, Pōuṣkara
Assamese	:	Pohakarmul, Puskar
Bengali	:	Pushkara, Pushkaramula
English	:	Orris Root
Gujrati	:	Pushkarmula
Hindi	:	Pohakar Mul
Kannada	:	Pushkara Moola
Kashmiri	:	--
Malayalam	:	Puskara
Marathi	:	Pokhar Mool
Oriya	:	Puskara
Punjabi	:	Pokhar Mool
Tamil	:	Pushkarmulam
Telugu	:	Pushkara Mulamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Root available in cut pieces, upto about 15 cm long and 0.5 to 2.0 cm in dia.; cylindrical, straight or somewhat curved; surface rough due to longitudinal striations and cracks, scars of lateral rootlets and rhytidoma present, externally brownish-grey and internally yellowish-brown; fracture, short and smooth; odour, camphoraceous and aromatic; taste, bitter and camphoraceous.

### **b) Microscopic**

Mature root shows a wavy outline due to development of rhytidoma; cork composed of 8 to 12 layers of thick-walled, tangentially elongated, rectangular cells, some filled with reddish-brown contents; secondary cortex 1 or 2 layers or absent; secondary phloem consists of sieve elements and parenchyma having secretory cavities and traversed by medullary rays; cambium not distinct; wood occupies bulk of root consisting of vessels, tracheids, fibres, parenchyma, secretory cavities and medullary rays; vessel have reticulate thickenings, a few fibres occur in small patches adjacent to vessels and abundant in xylem parenchyma, thin-walled; a few small tracheids; parenchyma in general contain granular, slightly yellowish or colourless inulin granules and also a few yellowish oil globules; starch grains either absent or very rarely seen in cortical and ray cells; yellowish resinous masses present in secretory canals.

**Powder** - Reddish-brown; under microscope shows fragments of cork cells, vessels, fibres and parenchyma cells containing tannin and inulin.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Benzene: Ethylacetate (9:1) shows on exposure to Iodine vapour nine spots at Rf. 0.23, 0.28, 0.34, 0.39, 0.48, 0.51, 0.64, 0.73 and 0.94 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 105° C eight spots appear at Rf. 0.11, 0.28, 0.34, 0.39, 0.48, 0.64, 0.73 and 0.94 (all violet).

**CONSTITUENTS** - Essential oil

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphavātajit

**IMPORTANT FORMULATIONS** - Mahā Nārayaṇa Taila, Kāṅkāyana Guṭikā, Mānasa Mitra vaṭaka, Daśamūlāriṣṭa, Kumāryāsava, Lodrāsava, Rāsnādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Hikkā, Kāsa, Śvāsa, Pārśvaśūla, Śoṭha, Ardita, Pāṇḍu, Aruci, Jvara, Ādhmāna

**DOSE** - 1-3 gm of the drug in powder form.

## RUDRĀKṢA (Seed)

Rudrākṣa consists of seeds of *Elaeocarpus sphaericus* Gaertn. K. Schum (Fam. Elaeocarpaceae), a medium sized, ornamental tree, found in the lower Himalayas and in the Western ghats at higher elevation.

### SYNONYMS

Sanskrit	:	Chattu Sampangi
Assamese	:	--
Bengali	:	Rudrakya
English	:	--
Gujrati	:	Rudraksh, Rudraksha
Hindi	:	Rudraki
Kannada	:	Rudrakshi mara, Rudraksh
Kashmiri	:	--
Malayalam	:	Rudraksha
Marathi	:	Rudraksha
Oriya	:	--
Punjabi	:	Rudraksha
Tamil	:	Rudraksha
Telugu	:	Rudraksha
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seed stony, very hard, spherical, obovoid or oval, variable in size, about 1 or 2 cm in dia.; longitudinally grooved, tubercled, brown, divided into five segments.

## b) Microscopic

Seed coat consists of multilayered, oval to polygonal stone cells and internally followed by 8 to 10 layers of tangentially elongated, oval-shaped, thin-walled, parenchymatous cells, filled with reddish-brown contents, excepting the middle 2 or 3 layers; endosperm consists of oval to polygonal, thin-walled, parenchymatous cells; rosette crystals of calcium oxalate and oil globules present in this region; embryo slightly curved and consists of oval to polygonal, thin-walled, parenchymatous cells, a few having oil globules.

**Powder** - Reddish-brown; shows polygonal lignified with narrow lumened stone cells, thin-walled, parenchymatous cells with reddish-brown contents, rosette crystals of calcium oxalate and oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Nil	Appendix	2.2.2.
Total Ash	Not more than	1.2 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid : Water (4:1 :5) under U.V. (366 nm) shows one fluorescent zone at Rf. 0.91 (violet). On exposure to Iodine vapour three spots appear at Rf. 0.19, 0.31 and 0.52 (all yellow). On spraying with 5% Methnaolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes a single spot appears at Rf. 0.91(grey).

**CONSTITUENTS** - Fixed Oil and Fatty Acids.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Sthūla
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	--
<b>Karma</b>	:	Rakṣoghna, Ārogyaprada, Medhya, Hṛdyam (Saumanasya Kara)

**IMPORTANT FORMULATIONS** - Gorocanādi Vaṭī, Cukkumtippalyādi Guṭikā, Dhanvantara Guṭikā, Svarṇamuklādi Guṭikā, Mṛtasañjīvanī Guṭikā

**THERAPEUTIC USES** - Matiśuddhikara, Uccharaktacāpa, Prajñāparādha, Hṛdaya Roga, Romāntika, Mānasa Roga, Anidrā

**DOSE** - 1-2 gm internally.

## **SARJA (Exudate)**

Sarja consists of resinous exudate of *Vateria indica* Linn. (Fam. Dipterocarpaceae), a large, evergreen tree, upto 30 m high with a cylindrical bole, indigenous to the evergreen forests of the Western Ghats from North Kanara to Kerala and also extensively planted as an avenue tree in Karnataka; resinous exudate is obtained by making semicircular incisions on the stem through the cork cambium up to the surface of sapwood.

### **SYNONYMS**

Sanskrit	:	Dēvdhūpa, Kārśya, Sasyasumbara, Ajakarṇa
Assamese	:	--
Bengali	:	Shakgachha, Chandras
English	:	White Damar tree, India Cop tree
Gujrati	:	Chandras
Hindi	:	Sandras, Safed Damar
Kannada	:	Rala
Kashmiri	:	--
Malayalam	:	Payin
Marathi	:	Raal
Oriya	:	Sava
Punjabi	:	--
Tamil	:	Kungiliyam, Vellai Kuntarakam, Vellai Kundarakam
Telugu	:	Tellaguggilarnu, Telladamaramu
Urdu	:	Sandaras, Raal

### **DESCRIPTION**

#### **a) Macroscopic**

Rough, irregular, solid, brittle masses, breaking into angular pieces, upto 1.5 cm thick, light-yellow to pale yellow in colour; odour fragrant; tasteless.

### **b) Microscopic**

Slightly soluble in alcohol in which it forms a jelly-like mass; insoluble in petroleum ether (40°C-60°C), forming white precipitate; insoluble in carbon-disulphide but yields jelly-like mass, dissolves entirely and gives a dense red colour with concentrated sulphuric acid; dissolves mostly in chloroform giving white or milky solution; (Sal resin dissolves almost entirely in petroleum ether forming a pale cream solution and also dissolves entirely in carbon-disulphide).

### **Test for presence of Colophony - (Distinction from Sala and Shallaki resin)**

1. Dissolve 0.1 g in 10 ml of acetic anhydride by gentle heat, cool, and add 1 drop of sulphuric acid; a bright purplish-red colour, rapidly changing to violet, is produced.

2. Shake 0.1 g of powder with 10 ml of light petroleum (b.p. 50°-60°), and filter; shake 5 ml of the filtrate with 10 ml of dilute solution of copper acetate; the petroleum layer assumes a bright bluish-green colour.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Nil	Appendix	2.2.2.
Total Ash	Not more than	0.1 per cent,	Appendix 2.2.3.
Acid-insoluble ash	Negligible		
Alcohol-soluble extractive	Not less than	60 per cent,	Appendix 2.2.6.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' using Benzene: Methanol (95:5) shows under UV (366 nm) three fluorescent spots at Rf. 0.04, 0.28 and 0.93 (all blue). On exposure to Iodine vapour seven spots appear at Rf. 0.04, 0.28, 0.48, 0.65, 0.76, 0.85 and 0.93 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.04, 0.28, 0.48, 0.65, 0.76, 0.85 and 0.93 (all violet).

### **CONSTITUENTS - Resins.**

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Snigdha, Uṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Varnya, Vātahara, Kaphaghna, Kṛmighna, Viṣaghna, Svedahara

**IMPORTANT FORMULATIONS** - Kacchūrādi Cūrṇa Lepa, Piṇḍa Taila, Lavaṅgādi Cūrṇa

**THERAPEUTIC USES** - Pāṇḍu, Karṇa Roga, Prameha, Kuṣṭha, Bādhīrya, Vraṇa, Atīśāra, Kaṇḍū, Visphoṭa, Medoroga, Grahaṇī, Vātarakta, Kṣudraroga, Lippa, Mānasa Roga, Mūṣika Viṣa, Vidradhi, Dagdhaka, Yoni Roga, Rakta Doṣa, Kṛmiroga

**DOSE** - 1-2 gm Internal, External.

## ŚATĀVARĪ (Root)

Śtāvāri consists of tuberous roots of *Asparagus recemosus* Willd. (Fam. Liliaceae), an ascending, spinous much branched, perennial climber found throughout the country.

### SYNONYMS

Sanskrit	:	Nārāyaṇi, Vāri, Abhīru, Atirasa
Assamese	:	Satmull
Bengali	:	Satamuli, Satmuli, Shatamuli
English	:	Asparagus
Gujrati	:	Satavari
Hindi	:	Satavar, Satamul
Kannada	:	Ashadi poeru, Halavu Bau, Narayani, Makkala
Kashmiri	:	--
Malayalam	:	Satavari Kizhangu
Marathi	:	Shatavari
Oriya	:	--
Punjabi	:	Satavar
Tamil	:	Shimai-Shadvari, Nilichedi Kishangu
Telugu	:	Sima-Shatawari (Dry Root), Pippichara, Pilliteegalu (Fresh Root)
Urdu	:	Satawari

### DESCRIPTION

#### a) Macroscopic

Root tuberous, 10 to 30 cm in length and 0.1 to 0.5 cm thick, tapering at both ends with longitudinal wrinkles; colour cream; taste, sweetish.

#### b) Microscopic

Shows an outer layer of piliferous cells, ruptured at places, composed of small, thin-

walled, rectangular asymmetrical cells, a number of cells elongated to form unicellular root hairs; cortex comprises of 25 to 29 layers, distinct in two zones, outer and inner cortex; outer cortex consists of 6 or 7 layers, compactly arranged, irregular to polygonal, thick walled, lignified cells; inner cortex comprise of 21 to 23 layers, oval to polygonal, thin-walled, tangentially elongated cells with intercellular spaces; stone cells, either singly or in groups, form a discontinuous to continuous ring in the upper part of this region; raphides of calcium oxalate also present in this region; 2 or 3 layers of stone cells encircle the endodermis; endodermis composed of thin-walled parenchymatous cells; pericycle present below endodermis; stele ex arch and radial in position; xylem consist of vessels, tracheids and parenchyma; xylem vessels have pitted thickening; phloem patches consists of usual element; pith composed of circular to oval parenchymatous cells, a few cells slightly lignified.

**Powder** - Yellowish-cream; fragments of lignified, thick-walled cells; vessels with simple pits, pieces of raphides, numerous, lignified, rectangular elongated' stone cells having clear striations with wide as well as narrow lumen and groups of parenchyma.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	45	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) v/v shows on exposure to Iodine vapour three spots at Rf. 0.07, 0.50 and 0.67 (all yellow). On spraying with 5% methanolic sulphuric acid reagent and heating the plate for ten minutes at 110°C four spots appear at Rf. 0.07 (black), 0.41 (grey), 0.50 and 0.83 (both brownish yellow).

**CONSTITUENTS** - Sugar, Glycosides, Saponin and Sitosterol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta
<b>Guna</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vṛṣya, Śukraja, Balya, Medhya, Rasāyana, Kaphavātaghna, Pittahara, Vātahara, Stanyakara, Hṛdya, Netrya, Śukrala, Agnipuṣṭikara

**IMPORTANT FORMULATIONS** - Śatāvarī Guḍa, Brahma Rasāyana, Pūga Khaṇḍa, Saubhāgya Śuṅṭhi, Mahā Nārayaṇa Taila, Bṛhat Chāgalādyā Ghṛta, Śatāvarī Ghṛta, Śatāvarī Kalpa, Aśvagandhāriṣṭa, Nārasimha Cūrṇa

**THERAPEUTIC USES** - Śoṭha, Kṣaya, Pariṇāma Śūla, Gulma, Atīśāra, Raktātīśāra, Raktavikāra, Mūtrarakta, Amlapitta, Arśa, Vātajvara, Svarabheda, Naktāndhya, Vātarakta, Raktapitta, Visarpa, Sūtīkā Roga, Stanya Doṣa, Stanya Kṣaya

**DOSE** - 3-6 gm of the drug.

## ŚIGRU (Root Bark)

Śigru consists of dried root bark of *Moringa oleifera* Lam. Syn. *Moringa pterygosperma* Gaertn. (Fam. Moringaceae), a small or medium sized tree, found wild in sub-Himalayan tract, and also commonly cultivated throughout the country for its leaves and fruits used as vegetable.

### SYNONYMS

Sanskrit	:	Śōbhāñjana, Bahala, Tīkṣṇagandha, Akṣiva, Mōcaka
Assamese	:	Saijna, Sohjna
Bengali	:	Sajina, Sajna
English	:	Horse Radish Tree, Drum-stick Tree
Gujrati	:	Saragavo
Hindi	:	Sahajan
Kannada	:	Neege, Nugge Kand Chakke
Kashmiri	:	--
Malayalam	:	Muringa
Marathi	:	Sevaga, Segat Sala
Oriya	:	Sajina
Punjabi	:	Sohanjana
Tamil	:	Murungai
Telugu	:	Munaga, Mulaga
Urdu	:	Sohanjana, Sahajan

### DESCRIPTION

#### a) Macroscopic

Drug occurs in pieces of variable sizes, external surface, light greyish-brown, rough, reticulated, marked with transverse row of lenticels; outer bark, thin, peeling off in small bits, internal surface, white.

## b) Microscopic

Mature bark shows a very wide zone of cork, consisting of 25 or more rows of rectangular cells, arranged radially, a few inner layers, larger and cubicular in shape; secondary cortex composed of rectangular, thin-walled cells, a few containing starch grains and rosette crystals of calcium oxalate and a few others containing oil globules and coloured resinous matter; starch grains mostly simple and rarely compound, composed of 2 or 3 components, round to oval in shape, measuring 6 to 28  $\mu$  in dia., groups of stone cells, round to rectangular, of various sizes, present in secondary cortex; mucilagenous cavities found scattered towards inner secondary cortical region; secondary phloem appreciably wide, consisting mainly of phloem fibres and phloem parenchyma; phloem fibres in large patches, alternating with phloem parenchyma; numerous starch grains and cell contents as described above also present in phloem cells; phloem rays numerous, long, 2 to 4 seriate, consisting of radially elongated, thin-walled cells containing numerous starch grains, similar to those present in secondary cortex.

**Powder** - Pinkish-brown; shows stone cells, phloem fibres, starch grains, measuring 6 to 28  $\mu$  in dia., rosette crystals of calcium oxalate and oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	10	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.06 and 0.52 (both green). On exposure to Iodine vapour seven spots appear at Rf. 0.06, 0.33, 0.43, 0.54, 0.70, 0.78 and 0.87 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appear at Rf. 0.33, 0.43, 0.54, 0.70, 0.78 and 0.87 (all violet).

**CONSTITUENTS** - Alkaloids and Essential Oil

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Pittakara, Medohara, Śukrala, Dīpana, Pācana, Śophaghna, Cakṣusya, Saṃgrāhi, Hṛdya, Rocana, Viṣaghna

**IMPORTANT FORMULATIONS** - Prabhañjana Vimardana Taila, Sārasvata Ghṛta, Vastyāmayānaka Ghṛta, K ṣāra Taila, Maṇikya Rasa

**THERAPEUTIC USES** - Śopha, Kṛmiroga, Medoroga, Plīhā Roga, Vidradhi, Gulma, Galagaṇḍa, Mukhajāḍya, Granthi, Visarpa, Aśmarī, Vraṇa Vikāra, Mūtra Śarkarā, Kuṣṭha, Kṣata, Karṇaśūla, Antarvidradhi

**DOSE** - 25-50 gm of the drug in powder form.

## ŚIGRU (Seed)

Śigru consists of dried seed of *Moringa oleifera* Lam. Syn. *M. pterygosperma* Gaertn. (Fam. Moringaceae), a small or medium sized tree, found wild in sub-Himalayan tract, and also commonly cultivated all over the plains of the country, for its leaves and fruits used as vegetable.

### SYNONYMS

Sanskrit	:	Śōbhāñjana, Akṣiva, Mōcaka
Assamese	:	Saijna, Sohjna
Bengali	:	Sajina, Sajna
English	:	Drum-stick Tree, Horse Radish Tree
Gujrati	:	Sargavo, Sekato
Hindi	:	Sahajana, Munga,
Kannada	:	Neege, Nugge Beeta
Kashmiri	:	--
Malayalam	:	Muringa, Tiksnngandha
Marathi	:	Shevaga, Shegatabeeja
Oriya	:	Sajana, Munga, Munika
Punjabi	:	Sohaniana
Tamil	:	Muringai, Muringai Virai
Telugu	:	Munaga
Urdu	:	Sahajan, Sohanjana

### DESCRIPTION

#### a) Macroscopic

Seeds hard, trigonous, having short wings; size 0.5 to 1.0 cm long and 0.3 to 0.5 cm wide; colour greyish-cream; odour, not characteristic; taste; slightly bitter.

**b) Microscopic**

Seed shows 10 to 15 layered, tangentially elongated, thin-walled cells of the testa, followed by a wide zone of cells of cotyledons consisting of round to oval, thin-walled, parenchymatous cells with intercellular spaces and containing mucilage and oil globules.

**Powder-** Cream coloured; shows groups of elongated, round to oval, parenchymatous cells; oval to elongated, thin-walled cells of testa showing striations in surface view and oil globules.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.8 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24 per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract on Silica Gel 'G' plate using Chloroform: Toluene (75:25) as mobile phase shows under U.V. (366 nm) three fluorescent zones at Rf. 0.52, 0.59 and 0.94 (all blue). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.52, 0.59 and 0.94 (all violet).

**CONSTITUENTS** - Fixed Oil.

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Guṇa** : Laghu, Rūkṣa, Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Hṛdya, Cakṣusya, Saṃgrāhi, Dīpana

**IMPORTANT FORMULATIONS** - Sudarśana Cūrṇa, Śothagha Lepa, Sarṣapādi Pralepa, Sarvajvarahara Lauha

**THERAPEUTIC USES** - Kṛmiroga, Netraroga, Śoṭha, Vidradhi, Apacī, Medoroga, Gulma, Plīhāroga, Galagaṇḍa, Vraṇa, Mukhajāḍya, Śīroroga, Vātaroga, Atinidrā

**DOSE** - 5-10 gm of the drug in powder form.

## ŚIGRU (Stem Bark)

Śigru consists of dried stem bark of *Moringa oleifera* Lam. Syn. *M. pterygosperma* Gaertn. (Fam. Moringaceae), a small or medium sized tree, indigenous to the sub-Himalayan tract, found wild in lower Himalayas and cultivated all over the plains of India, for its leaves and fruits used as vegetables.

### SYNONYMS

Sanskrit	:	Śōbhāñjana, Bahōla, Śākhapatra
Assamese	:	--
Bengali	:	Sajina, Sajne
English	:	Horse Radish Tree, Drum-stick Tree,
Gujrati	:	Saragave
Hindi	:	Sahijana
Kannada	:	Nugge, Nuggemara, Nuggekoyimara
Kashmiri	:	--
Malayalam	:	Muringya, Murinna
Marathi	:	Shewga
Oriya	:	Munga, Munika, Sajana
Punjabi	:	Sohajana
Tamil	:	Murungai
Telugu	:	Munaga chettu, Mulaya Chetta
Urdu	:	Sahajan, Sohanjana

### DESCRIPTION

#### a) Macroscopic

Mature bark, rough, deeply cracked, grey or dark green; young bark, greenish to greenish-brown, 1 to 3 cm thick or more, depending upon the age of plant; taste, bitter and pungent.

## b) Microscopic

Cork region very wide, composed of 15 to 20 layers, thin-walled, radially arranged, rectangular cells with coloured contents; cork cambium consists of a single row of thin-walled, rectangular or tangentially elongated cells; secondary cortex very wide, composed of nearly cubical to rectangular, thin-walled parenchymatous cells containing a few rosette and cubical, rhomboidal or hexagonal crystals of calcium oxalate; several groups of thick walled, lignified, elongated to polygonal stone cells with striations and wide as well as narrow lumen present; a few small, simple, round to oval, starch grains measuring 5 to 14  $\mu$  in dia., with concentric striations and hilum, and a few oil globules scattered in cortical region; secondary phloem consists of thin-walled, oval to polygonal parenchyma, fibres, and phloem rays; phloem parenchyma cells adjoining the sclerenchyma cells containing small rhomboidal or cubical crystals of calcium oxalate and many large lysigenous mucilage cavities filled with mucilage; groups of lignified fibres form nearly concentric, discontinuous zones, separated by phloem rays; rays many, 2 or 3 seriate, occasionally uniseriate; towards the inner phloem regions they are radially elongated but, become tangentially elongated in the outer phloem; most of the cells loaded with simple, starch grains and crystals of calcium oxalate.

**Powder** - Light brown, fragments of thin-walled, polygonal, sometimes rectangular cork cells; groups or single, thick-walled, lignified, elongated to polygonal stone cells with striations and lumen; a few rhomboidal, rosette crystals of calcium oxalate; a few oil globules; a very small, numerous, simple, oval to round, starch grains measuring 5 to 14  $\mu$  in dia., with concentric striations and narrow hilum; pieces of phloem parenchyma, lignified phloem fibres and ray cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## ASSAY

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' using Chloroform : Methanol (85:15) shows under U.V. (366nm) a fluorescent zone at Rf. 0.97 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.15, 0.22, 0.49, 0.81 and 0.97 (all yellow). On spraying with 5% Methanolic- Phosphomolybdic acid reagent six spots appear on heating the plate at 105°C for about fifteen minutes at Rf. 0.15, 0.22, 0.49, 0.66, 0.81 and 0.97 (all grey).

**CONSTITUENTS** - Sterols and Terpenes.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Madhura  
**Guṇa** : Laghu, Tīkṣṇa, Rūkṣa, Picchila, Sara  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Dīpana, Hṛdya, Vidāhakṛt, Saṃgrāhi, Viṣaghna, Śukrala, Rocana, Cakṣusya, Kaphaghna, Vātaghna, Śophaghna, Śirovirecanopaga, Pittotkleśaka

**IMPORTANT FORMULATIONS** - Kārpāsāsthyādi Taila, Kṣāra Taila, Viṣatinduka Taila, Khaṇḍa Lavana, Sārasvata Ghṛta, Sarṣapādi Pralepa, Vastyāmayānaka Ghṛta, Śveta Karavīra Pallavādyā Taila

**THERAPEUTIC USES** - Kṛmi, Vidradhi, Plīhā Roga, Gulma, Hṛdaya Roga, Akṣiroga, Medoroga, Apacī, Galagaṇḍa, Vraṇa Śoṭha, Arśa, Bhagandara, Dṛṣṭi Roga, Sarvapīḍa Nivāraṇi

**DOSE** - Stem Bark juice 10-20 ml Stem Bark Powder 2-5 gm

## ŚRĪNGĀṬAKA (Dried Seed)

Śrīngātaka consists of dried seeds of *Trapa natans* Linn. var. *bispinosa* (Roxb.) Makino. Syn. *T. bispinosa* Roxb. *T. quadrispinosa* Wall. (Fam. Trapaceae), a very variable, rooted, aquatic herb occurring throughout the greater part of the country in lakes, tanks and ponds arid also extensively grown

### SYNONYMS

Sanskrit	:	Śrīngata, Jalaphala, Trikōṇaphala
Assamese	:	--
Bengali	:	Paniphal, Singade, Jalfal
English	:	Water Chestnut
Gujrati	:	Shingoda, Singoda
Hindi	:	Singhara, Singhada
Kannada	:	Singade, Gara, Simgara, Simgoda
Kashmiri	:	--
Malayalam	:	Karimpolam, Vankotta, Jalaphalam, Karimpola
Marathi	:	Shingoda
Oriya	:	Paniphala, Singada
Punjabi	:	Singhade, Gaunaree
Tamil	:	Singhara
Telugu	:	Kubyakam, Singada
Urdu	:	Singhara

### DESCRIPTION

#### a) Macroscopic

Seeds somewhat triangular to 4-angled in shape, with or without shallow groove on both surfaces, 2 to 3.0 cm long and 2.5 to 3.5 cm wide; externally reddish-brown; mostly one surface mottled, smooth in texture.

## b) Microscopic

Shows testa of three zones, outer zone consisting of tangentially elongated or somewhat crushed, 3 to 6 layered parenchymatous cells, middle zone of lignified cells, inner zone of rectangular and tangentially elongated thin-walled cells having reddish brown contents; tegmen 2 or 3 layered, comprising of tangentially elongated cells, rest of the seed consisting of thin-walled, parenchymatous cells; starch grains simple, or in groups, oval to round having distinct striations and hilum, measuring 6 to 45  $\mu$  in dia, a few vascular strands with vessels showing spiral thickening, found scattered in this region.

**Distinction from Arrow root (a possible substitute)-** Arrow root (*Maranta arundinacea* Linn.) starch is more irregular in shape, being ellipsoid, pear-shaped or even almost trigonal, occasionally showing small tuberosities; hilum stellar or cleft, slightly eccentric, being situated near the broader end; fine concentric striations are visible in most granules.

**Powder** - White; numerous simple, solitary and groups of circular to oval starch grains, having concentric striations and distinct hilum in centre, measuring upto 45  $\mu$  in dia; a few fragments of testa consisting of oval to polygonal, thin-walled, parenchyma cells in surface view.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 3 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.3 per cent, Appendix	2.2.4.
Water-soluble extractive	Not less than 8 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) v/v shows under U.V. (366 nm) one fluorescent zone at Rf. 0.60 (blue). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at Rf. 105°C three spots appear at Rf. 0.30 (grey), 0.43 (grey), and 0.93 (violet).

**CONSTITUENTS** - Starch and Protein.

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Kaṣāya

**Guṇa** : Guru

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Pittahara, Vṛṣya, Śramahara, Śukrakara, Grāhī, Stanyajanana, Rakta Stambhaka, Garbhasthāpana

**IMPORTANT FORMULATIONS** - Saubhāgya Śuṅṭhi, Amṛtaprāśa Ghṛta, Puga Khaṇḍa

**THERAPEUTIC USES** - Raktapitta, Dāha, Garbha Srāva, Śopha (external), Mūtrakṛcchra, Asthibhagna, Vātavyādhi, Prameha, Visarpa, Tṛṣṇā

**DOSE** - 5-10 mg of the drug in powder form.

## SRUVĀVRKṢA (Leaf)

Sruvavr̥kṣa consists of dried leaf of *Flacourtia indica* Merr. Syn. *F. ramontchi* L Herit. (Fam. Flacourtiaceae), a small deciduous, usually thorny tree or shrub, found in the sub-Himalayan tracts and outer Himalayas upto 1220 m and also common throughout Chota Nagpur, Deccan and South India.

### SYNONYMS

Sanskrit	:	Vikankata, Gōpakanta
Assamese	:	--
Bengali	:	Bincha, Bainchi, Bewich
English	:	Governors Plum, Madaraskara Plum
Gujrati	:	Kankata
Hindi	:	Bilangra
Kannada	:	Ilumanika, Dodda Gejjalakai
Kashmiri	:	--
Malayalam	:	Vavankataku, Vikamkath, Yaliya Nzerinigal, Loloikka
Marathi	:	Kaker
Oriya	:	Kantheikoli, Vaincha, Uincha
Punjabi	:	Kakoa, Kukoya
Tamil	:	Sottaikala, Kat Ukala
Telugu	:	Putregu, Kanavegu Chettu, Vikankata
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Leaves simple, sessile, 3 to 5 cm long and 1 to 3 cm wide, ovate to obovate, glabrous above, more or less pubescent beneath, serrate towards apex, and crenate in basal region, greenish-grey.

## **b) Microscopic**

### **Leaf-**

*Midrib* - Epidermis, single layered, covered externally with thin cuticle; followed by 1 or 2 layers of collenchyma and 3 to 5 layers parenchyma; lower epidermis with 2 or 3 layers of adjacent collenchyma and 2 or 3 layers of parenchyma; vascular bundle single, situated in the centre, covered by fibre sheath on both sides; a few unicellular, hooked, trichomes present on lower surface; a few rosette and prismatic crystals of calcium oxalate scattered in parenchyma cells.

*Lamina* - Epidermis single layered on both surfaces, covered with thin cuticle; a few simple, unicellular hairs with blunt tips present on lower surface; 2 layers of palisade cells and 2 or 3 layers of spongy parenchyma cells present; rosette and a few prismatic crystals of calcium oxalate present in epidermis, palisade and spongy parenchyma cells; a few veinlets present in between palisade and spongy parenchyma; stomata anisocytic, present on lower surface; palisade ratio 2 or 3; vein islet number 8 to 10 per sq. mm; veinlet termination number 10 to 12 per sq. mm; stomatal index 24 to 26.

**Powder** :- Greenish-grey, shows fragments of collenchymatous, and parenchymatous cells; elongated, thick -walled pointed fibres; sinuous walled epidermal cells in surface view, containing rosette and a few prismatic crystals of calcium oxalate; palisade cells, a few anisocytic stomata, and pieces of unicellular hairs present.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 9 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.6 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 12 per cent, Appendix	2.2.7.

## **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.26, 0.76, 0.88 (all blue) and 0.98 (red). On exposure to Iodine vapour four spots appear at Rf. 0.26, 0.48, 0.61 and 0.88 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C six spots appear at Rf. 0.34, 0.48, 0.61, 0.76, 0.88 and 0.98 (all grey).

**CONSTITUENTS** - Tannin and Sugar.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Amla, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Dīpana, Pācana

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Raktavikāra, Śoṭha, Kāmalā

**DOSE** - 50-100 gm for decoction.

## SRUVĀVRKṢĀ (Stem Bark)

Sruvavr̥kṣa consists of dried stem bark of *Flacourtia indica* Merr. Syn. *F. ramontchi* L Herit. (Fam. Flacourtiaceae), a small deciduous, usually thorny tree or shrub, found in the sub-Himalayan tract and outer Himalayas upto 1220 m and also common throughout Indian deciduous forests.

### SYNONYMS

Sanskrit	:	Gōpakanta, Vikankata
Assamese	:	Bainchi, Bewich, Bincha
Bengali	:	Governors Plum, Madaraskara
English	:	---
Gujrati	:	Kankata
Hindi	:	Bilangra
Kannada	:	Ilumanika, Dodda Gejjala Kai
Kashmiri	:	--
Malayalam	:	Vayankataku, Vikamkath, Yali Nzerinigal
Marathi	:	Kaker
Oriya	:	Kantheikoli, Vaincha, Vinch
Punjabi	:	Kakoa, Kukoya
Tamil	:	Kat Ukala, Sottaikala
Telugu	:	Kanavegu Chettu, Putregu, Vika

### DESCRIPTION

#### a) Macroscopic

Drug occurs in 2 to 5 cm long and 1 to 3 mm thick, curved, quilled or flat pieces; external surface smooth, reddish-grey, having lenticels, internal surface reddish-brown; fracture, short.

### **b) Microscopic**

Mature bark shows 4 to 13 layers of exfoliated cork consisting of tangentially elongated and radially arranged, thin-walled cells, a few containing reddish-brown contents; secondary cortex consisting of oval to elliptical, tangentially elongated, parenchymatous cells, followed by a zone of compactly arranged fibre and groups of stone cells; secondary phloem composed of sieve elements, parenchyma, phloem rays and phloem fibres; lignified phloem fibres oval to polygonal mostly in groups; phloem rays 1 or 2 cells wide and 3 to 10 cells deep, slightly thick-walled; prismatic crystals of calcium oxalate present in secondary cortex and phloem parenchyma; starch grains simple, round to oval measuring 3 to 11  $\mu$  in dia.

**Powder** - Creamish-brown; shows cork cells, lignified phloem fibres, prismatic crystals of calcium oxalate, numerous, round to oval starch grains measuring 3 to 11  $\mu$  in dia,

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	16 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.6 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform :Methanol (9:1) shows under U.V. (366nm) one fluorescent spot at Rf. 0.27 (Sky blue). On exposure to Iodine vapour four spots appear at Rf. 0.13, 0.20, 0.27 and 0.64 (all brownish yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C five spots appear at Rf. 0.06, 0.13, 0.20, 0.27 and 0.64 (all greyish brown).

**CONSTITUENTS** - Tannin and Flacourtin, a phenolic glucoside ester.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Dīpana

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Raktavikāra, Śopha (Śoṭha), Duṣṭa Vraṇa

**DOSE** - 50-100 gm of the drug for decoction.

## TĀLAMŪLĪ (Rhizome)

Tālamuli consists of dried rhizome of *Curculigo orchioides* Gaertn. (Fam. Amaryllidaceae), a small herb, upto 30 cm high with tuberous root stock, occurring wild in sub-tropical Himalayas from Kumaon eastwards, ascending upto 1830 m in Khasi hills, Manipur and the Eastern Ghats, also from Konkan southwards; drug is collected from two year old plants, washed well and cleared of rootlets, sliced and dried in shade.

### SYNONYMS

Sanskrit	:	Bhūmitila
Assamese	:	Talmuli, Tailmuli
Bengali	:	Talmalu, Tallur
English	:	--
Gujrati	:	Kalirnusali
Hindi	:	Syahmusali, Kalimusli
Kannada	:	Neltal, Neltathigodde, Nelatale, Nelatelegadde
Kashmiri	:	--
Malayalam	:	Nilappenea
Marathi	:	Kali musali, Bhuimaddi
Oriya	:	Talamuli
Punjabi	:	Syah musali, Musali safed,
Tamil	:	Nilappanai
Telugu	:	Nel tadigadda
Urdu	:	Musali Siyah, Kali Musali

### DESCRIPTION

#### a) Macroscopic

Drug occurs in transversely cut pieces of 2.5 to 5 cm long, cylindrical, straight to slightly curved, cut surface 1.0 to 4.5 cm in dia.; external surface blackish-brown, cut surface cream coloured; surface with numerous shallow wrinkles and transverse cracks;

with a few rootlets and root scars; nodes and internodes prominent; taste, mucilaginous and slightly bitter.

### **b) Microscopic**

Shows a narrow strip of cork, consisting of 5 to 7 rows of light brown cubical to rectangular cells; secondary cortex consists of thin-walled, parenchymatous cells, densely filled with starch grains and acicular crystals of calcium oxalate, either isolated or in bundles, in a few cells; a few small, round to tangentially elongated, lysigenous cavities also found scattered in this region; a few vascular bundles found embedded in cortical region with phloem towards outer side, and consisting of a few xylem elements; ground tissue consists of parenchymatous cells, some of which contain acicular crystals of calcium oxalate; numerous fibro-vascular bundles found scattered throughout the region, mostly towards peripheral region having phloem, almost encircled by xylem vessels having annular and spiral thickenings; starch grains simple, rounded to oval and also compound of 2 to 4 components, measuring 4 to 21  $\mu$  in dia., present in cortical and central region, a number of deep red, resin canals found throughout the region, mucilage in the form of colourless mass found in a few cortical parenchymatous cells.

**Powder** - Greyish; vessels with annular and spiral thickenings; simple, round to oval, starch grains measuring 4 to 21  $\mu$  in dia., and compound starch grains having 2 to 4 components and a few acicular crystals of calcium oxalate; mucilage in the form of colourless mass found in a few cortical parenchymatous cells

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic Acid: Water (4:1:5) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.39, 0.77, 0.90 and 0.97 (all yellow). On exposure to Iodine vapour twelve spots appear at Rf.

0.06, 0.13, 0.17, 0.25, 0.39, 0.50, 0.62, 0.70, 0.77, 0.88, 0.90 and 0.97 (all yellow). On spraying with Dragendorff reagent followed by sodium nitrite three spots appear at Rf. 0.39, 0.70 and 0.88 (all light purple).

**CONSTITUENTS** - Tannin, Resin, Sapogenin and Alkaloid

**PROPERTIES AND ACTION**

**Rasa** : Madhura, Tikta

**Guṇa** : Guru, Picchila

**Vīrya** : Uṣṇa

**Vipāka** : Madhura

**Karma** : Vṛṣya, Bṛṃhaṇa, Rasāyana, Puṣṭiprada, Balaprada, Śramahara, Pittahara, Dāhahara

**IMPORTANT FORMULATIONS** - Gandharvahastādi Kvātha Cūrṇa, Candanādi Cūrṇa

**THERAPEUTIC USES** - Arśa, Vātaroga, Kārśya, Kṣataṣṭīṇa

**DOSE** - 3-6 gm of the drug in powder form.

## TĀLĪSA (Leaves)

Tālīśa consist of dried needle like leaves of *Abies webbiana* Lindl (Fam. Pinaceae), plant is a tall, evergreen tree with thick, spreading, horizontal branches attaining a height of 60 m found in Himalayas at an altitude of 2800-10000 m.

### SYNONYMS

Sanskrit	:	Patrādhyam
Assamese	:	Talish
Bengali	:	Talish Pala, Taleesh Patra
English	:	Himalayan Siver
Gujrati	:	Talish Patra
Hindi	:	Talish Patra
Kannada	:	Tales Patra, Talisapathra, Shukodara
Kashmiri	:	--
Malayalam	:	Talisapatra, Taleesapatri
Marathi	:	Laghu Taleespatra
Oriya	:	Talis
Punjabi	:	--
Tamil	:	Talisapatra, Taleesapatri
Telugu	:	Taleesapatri
Urdu	:	Zarnab

### DESCRIPTION

#### a) Macroscopic

Leaves flat, 1 to 5.5 cm long, about 2 mm broad; shining, midrib in the upper surface channelled down the middle but raised beneath; with two faint white lines on either side of the midrib beneath, petiole very short, greyish-brown; odour, terebinthine-like; taste, astringent.

## b) Microscopic

Mature leaf shows single layered epidermis on either side covered with thick cuticle; upper epidermis followed by single layered sclerenchymatous hypodermis, lower epidermis shows papillate projections at some places followed by 1 or 2 layers sclerenchymatous hypodermis; palisade 2 layered; spongy parenchyma 4-6 layered; vascular bundle single, situated centrally, consisting of xylem and phloem, enclosed by a single layered endodermis; xylem on upper side and phloem on lower side; cambium inconspicuous; secretory cavities two in numbers, located on either side of vascular bundle, stomata sunken type, present only on the lower surface.

**Powder** - Greenish-brown; shows sclerenchymatous cells, palisade, spongy parenchyma and a few epidermal cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 14 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 15 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica Gel 'G' using Toluene: Ethylacetate (9:1) shows in visible light five spots at Rf. 0.09, 0.41, 0.59, 0.67 (all green) and 0.92 (light green). Under U.V. (366 nm) eight fluorescent zones visible at Rf. 0.05 (orange), 0.09 (blackish) 0.14 (orange), 0.43 (red), 0.54 (blue), 0.62 (blackish red), 0.67 and 0.92 (both red). On exposure to iodine vapour eleven spots appear at Rf. 0.04, 0.08, 0.12, 0.17, 0.39, 0.50, 0.57, 0.65, 0.73, 0.85 and 0.92 (all yellow). On spraying with Vanillin Sulphuric acid reagent and heating the plate at 105°C for ten minutes eleven spots appear at Rf. 0.04, 0.08, 0.12, 0.17, 0.39, 0.50, 0.57, 0.65, 0.73, 0.85 and 0.92 (all violet).

**CONSTITUENTS** - Essential Oil & Alkaloid.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Madhura
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātakaphāpaham, Śleṣmapittajit, Dīpana, Hṛdya

**IMPORTANT FORMULATIONS** - Tālīsādi Cūrṇa, Bhāskara Lavaṇa, Prāṇadā Guṭikā, Jāt īphālādi Cūrṇa, Pūga Khaṇḍa, Drākṣādi Cūrṇa, Tālīsādi Modaka

**THERAPEUTIC USES** - Śvāsa, Kāsa, Gulma, Agnimāndya, Āmadoṣa, Kṣaya, Hikkā, Chardi, Kṛmi, Mukharoga, Aruci

**DOSE** - 2-3 gm of the drug in powder form.

## **TILA (Seed)**

Tila consists of dried seeds of *Sesamum indicum* Linn. (Fam, Pedaliaceae), a herb extensively cultivated throughout the plains of India upto 1200 m for its seeds.

### **SYNONYMS**

Sanskrit	:	Tila
Assamese	:	Simmasim
Bengali	:	Tilagachh
English	:	Sesame, Gingelly-oil Seeds
Gujrati	:	Tall
Hindi	:	Tila, Teel, Tili
Kannada	:	Accheellu, Ellu
Kashmiri	:	--
Malayalam	:	Ellu
Marathi	:	Tila
Oriya	:	Til
Punjabi	:	Til
Tamil	:	Ellu
Telugu	:	Nuvvulu
Urdu	:	Kunjad

### **DESCRIPTION**

#### **a) Macroscopic**

Seed white, brown, grey or black, flattened ovate in shape, smooth or reticulate, 2.5 to 3 mm long and 1.5 mm broad, one side slightly concave with faint marginal lines and an equally faint central line; taste, pleasant and oily.

#### **b) Microscopic**

Testa of seed shows single layered palisade-like, thin-walled, yellowish coloured cells, and the rest of the testa composed of collapsed cells; endosperm 3 layered, rarely 2 layered, consisting of cellulosic polygonal cells of parenchyma containing fixed oils and small aleurone grains; cotyledons two, externally covered with thin cuticle; single layered epidermal cell, followed by a single row of palisade-like cells; rest of the tissues consist of polygonal, parenchyma cells containing fixed oil and aleurone grains.

**Powder** - Blackish coloured; shows palisade-like cells in surface view, parenchyma cells, aleurone grains and oil globules.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.
Fixed Oil	Not less than	35	per cent, Appendix	2.2.8

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.57, 0.64 (both light blue) and 0.72 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.08, 0.57, 0.64, 0.72 and 0.94 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110° C seven spots appear at Rf. 0.08, 0.57, 0.64, 0.72 (all violet), 0.76, 0.84 (both light violet) and 0.94 (violet).

### **CONSTITUENTS** - Fixed Oil

### **PROPERTIES AND ACTION**

**Rasa** : Madhura, Tikta, Kaṣāya, Kaṭu

**Guṇa** : Guru, Snigdha, Sūkṣma, Vyavayī  
**Vīrya** : Uṣṇa  
**Vipāka** : Madhura  
**Karma** : Snehana, Svarya, Snehopaga, Balya, Vātaghna, Kuṣṭhakara, Pittala, Viṭbandhaka, Mūtrabandhaka, Medhāvardhaka, Agnivardhaka, Saṃgrāhi, Keśya, Avasādakara, Keśa Kṛṣṇakara, Keśa Vardhaka, Karṇapālivardhaka, Kaphakopaka, Mṛdurecaka, Vraṇa Samśodhaka, Vraṇa Pācaka, Vraṇa Dāhanāśaka, Bhagna Prasādaka, Rasāyana, Viṣaghna, Vājīkara, Varṇya, Agnibala Vardhaka

**IMPORTANT FORMULATIONS** - Jātīphalādi Cūrṇa, Nārasimha Cūrṇa, Samaṅgādi Cūrṇa, Haridrādi Lepa, Vṛṣya Pupālika Yoga, Nāgarādi Yoga, Tilādi Upanāha, Tilādi Yoga, Priyālādi Yoga, Mustādi Upanāha, Śuṅṭhyādi Cūrṇa, Pathyādi Guṭikā, Hiṅgvādi Yoga, Pānīya Kṣāra, Bhallātakādi Modaka

**THERAPEUTIC USES** - Udāvarta, Yonīśūla, Gulma, Udara, Ānāha, Śiraḥ Śūla, Pārśva Śūla, Āmaśūla, Raktārśa, Gudabhraṃśa, Kāsa, Śvāsa, Pravāhikā, Visarpa, Hikkā, Pīnasa, Vātarakta, Pradara, Aśmarī, Nāḍī Vraṇa, Kuṣṭha, Śvitra, Granthi, Upadaṃśa, Vidāraka, Alasa, Khālitya, Pālitya, Akṣiroga, Pratiśyāya, Śaṅkhaka, Śakunī Graha, Kumāra, Piṭṛmeśagraha, Atīśāra, Raktātīśāra, Kṣaya, Kṛmi, Mūtrāghāta, Dantaroga, Dantahaṛṣa, Vātika Mukharoga, Atidagdha, Trṣṇā, Plīhāroga, Galagaṇḍa, Mūṣika Daṃśa, Karṇapāli Śoṭha

**DOSE** - Powder 5-10 gm/day.

## TULASĪ (Seed)

Tulasi consists of seeds of *Ocimum sanctum* Linn. (Fam. Lamiaceae), an erect, branched, annual herb, found throughout the country, and also cultivated

### SYNONYMS

Sanskrit	:	Surasa, Surasa, Bahumaniri, Bhūtaghn
Assamese	:	Tulasi
Bengali	:	Tulasi
English	:	Holi Basil, Sacred Basil
Gujrati	:	Tulsi, Tulasi
Hindi	:	Tulasi
Kannada	:	Tulasi, Sri tulasi
Kashmiri	:	Tulasi
Malayalam	:	Tulasi
Marathi	:	Tulasi
Oriya	:	--
Punjabi	:	Tulasi
Tamil	:	Tulasi, Thulasi, Thiruthazhai
Telugu	:	Tulasi, Manchi Tulasi, Nalla Tulasi
Urdu	:	Tulsi

### DESCRIPTION

#### a) Macroscopic

Seeds round to oval, about 0.1 cm long, brown with mucilaginous outer covering, slightly notched at the tip and broadly rounded at the base; no odour; taste, pungent, and slightly mucilaginous.

**Powder** - Brown; shows groups of polygonal, thick-walled, epidermal cells, 28 to 55  $\mu$  in size; oval to polygonal, parenchymatous cells containing oil globules and starch grains

simple as well as compound, having 2 to 5 components, single grains measuring 3 to 17  $\mu$  in dia.

**Swelling Index-** Not less than 5, when determined as follows:

Introduce the accurately weighed seeds into a 25 ml glass stoppered measuring cylinder.

The length of the graduated portion of the cylinder should be 125 mm; the internal diameter 16 mm subdivided in 0.2 ml and marked from 0 to 25 ml in up wards direction. Add 25 ml of water, and shake the mixture thoroughly at intervals of every 10 minutes for 1 hour.

Allow to stand for 3 hours at room temperature. Measure the volume in ml occupied by the seeds, including any sticky mucilage. Carry out simultaneously not less than 3 determination and calculate the mean value of the individual determinations, related to 1 g of seeds.

## **b) Microscopic**

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) as mobile phase shows under U.V. (366 nm) three fluorescent zones at Rf. 0.36, 0.56 (both red) and 0.93 (blue). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C five spots appear at Rf. 0.04, 0.23, 0.36, 0.70 and 0.93 (all violet).

**CONSTITUENTS** - Fixed Oil and Mucilage

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Kaṣāya

**Guṇa** : Laghu, Rūkṣa, Tīkṣṇa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Pittahara, Rucikṛt, Dīpana, Dāhakṛt, Kṛmighna, Viṣahara, Vraṇāśodhaka, Hṛdya

**IMPORTANT FORMULATIONS** - Mukṭādi Mahañjana

**THERAPEUTIC USES** - Śvāsa, Kāsa, Hikkā, Pārśvaśūla, Kuṣṭha, Mūtrakṛcchra, Pratiśyāya, Aruci, Pūtigandha, Garaviṣa, Śoṭha, Kṛmi, Rakta Vikāra, Jantuviṣa, Bhūtaroga

**DOSE** - 1-2 gm of the seed in powder form.

## TUMBURU (Fruit)

Tumburu consists of dried fruit of *Zanthoxylum armatum* DC. Syn. *Z. alatum* Roxb. (Farn. Rutaceae), an armed or erect shrub or small tree, found in the valleys of the Himalayas at an altitude of 1000 to 2100 m, in Khasi hills at 600 to 1800 m, and in the Ghats in peninsular India.

### SYNONYMS

Sanskrit	:	Tējōvati, Tējōvali, Tējōhva
Assamese	:	Tējōvati
Bengali	:	Tejovati, Nepali Dhania
English	:	--
Gujrati	:	Tejbal
Hindi	:	Tejbal, Nepali Dhaniya
Kannada	:	Tejapatri, Tumburu, Tejovanti
Kashmiri	:	--
Malayalam	:	Thumboonal, Thumbooni
Marathi	:	Tejbal, Tejobalee
Oriya	:	Tejbal
Punjabi	:	Tirmira
Tamil	:	Thejyovathi
Telugu	:	Tumburl
Urdu	:	Kabab-e-Khanda (Miswak)

### DESCRIPTION

#### a) Macroscopic

Reddish-brown, sub-globose, mostly dehisced, follicles, containing a single seed in each follicle; seeds, globose, glabrous, shiny black; upto 0.5 cm long, and about 0.3 cm wide; taste, pungent; odour, aromatic.

## b) Microscopic

**Fruit** - Pericarp shows large oil cavities and vascular tissues surrounded by parenchymatous cells containing irregular masses of hesperidin and followed by 2 to 5 layered palisade-like cells, hesperidin insoluble in organic solvents but soluble in potassium hydroxide.

**Seed** - Testa shows wide, very thick-walled, irregular, non-lignified cells having blackish-brown contents and numerous oil globules; tegmen shows 3 or 4 oval to polygonal tangentially elongated thin-walled parenchymatous cells, followed by 8 to 10 layers tangentially elongated tabular cells filled with reddish-brown contents; endosperm consists of thin-walled, polygonal, parenchymatous cells.

**Powder** - Dark brown to black; shows groups of thin-walled, parenchymatous cells, some filled with oil globules, and a few with hesperidin; polygonal cells of seed coat and separate globules of oil.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9: 1) v/v shows in visible light two spots at Rf. 0.18, 0.35 (both grey). Under U.V. (366 nm) five spots appear at Rf. 0.10, 0.18, (both blue), 0.38 (violet) 0.55 (violet) and 0.93 (violet). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes seven spots appear at Rf. 0.18, 0.26, 0.35, 0.48, 0.66, 0.76 and 0.96 (all grey).

**CONSTITUENTS** - Essential Oil.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Rucya, Dīpana, Pācana, Vātahara, Kaphahara, Lālapraseka, Ciñcimāyamāna, Rasana Saṃsvedaka

**IMPORTANT FORMULATIONS** - Saptaviṃśati Guggulu, Dādhika Ghr̥ta, Mahā Viṣagarbha Taila, Hīngvādi Taila

**THERAPEUTIC USES** - Śvāsa, Kāsa, Ardita, Kaphaja Roga, Hṛdroga, Kaṇṭha Roga, Arśa, Hikkā, Agnimāndya, Āsya Roga, Danta Roga

**DOSE** - 2-4 gm

## UṬĪŅANA (Seed)

Uṭīṅana consists of dried mature seeds of *Blepharis persica* (Burm. f.) O. Kuntze. Syn. *B. edulis* Pers. (Fam. Acanthaceae), a shrub, occurring in Punjab.

### SYNONYMS

Sanskrit	:	Uṭīṅana
Assamese	:	--
Bengali	:	Ucchata
English	:	--
Gujrati	:	Utingun, Chopunivel
Hindi	:	Utangan
Kannada	:	Utangana
Kashmiri	:	--
Malayalam	:	Utigana, Utungana
Marathi	:	Utangan
Oriya	:	Utingana
Punjabi	:	Uttangan
Tamil	:	Uttanjana
Telugu	:	Uttangan
Urdu	:	Utangan

### DESCRIPTION

#### a) Macroscopic

Seed occurs as entire or broken, 0.4 to 0.6 cm long, 0.3 to 0.4 cm broad; heart shaped, rough due to network of coarse hairs; cream to light yellow, flat; when soaked in water, hairs swell and produce viscid mucilage; mucilagenous on chewing.

#### b) Microscopic

Seed shows 4 to 6 layers of tangentially elongated, hyaline, thin-walled, parenchymatous seed coat, multicellular, multiseriate columnar, elongated hairs with twisted tips present towards outer side of the seed coat; embryo having two cotyledons with upper and lower epidermis; upper epidermis followed by 4 to 5 layers of oval to polygonal, thin-walled, parenchymatous cells and 2 or 3 layers more or less radially 2 elongated, thin-walled, parenchymatous cells respectively; beneath this a single layer of palisade-like cells present; lower epidermis covered with thick cuticle and consisting of rounded, isodiametric cells that are larger than those of the upper epidermis.

**Powder** - Yellowish-brown; shows fragments of hairs with mucilage, palisade-like oval to polygonal, thin-walled, parenchyma cells isolated or in larger or smaller groups.

### **IDENTITY, PURITY AND STRENGTH**

Alcohol-soluble extractive	Not less than	16	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.
Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (80:20) shows in visible light four spots at Rf. 0.17 (grey), 0.25 (light grey), 0.79 (light yellow), 0.87 (yellow). Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.09, 0.17 (both black), 0.23 (light black) 0.33, 0.69 (both light blue) and 0.90 (dark blue). On exposure to Iodine vapour seven spots appear at Rf. 0.13, 0.18, 0.26, 0.36, 0.64, 0.75 and 0.90 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid one spot appear at Rf. 0.87 (orange). On spraying with 5% methanolic sulphuric acid eight spots appear at Rf. 0.14, 0.22, 0.33 (grey), 0.64 (violet), 0.71 (yellowish), 0.75 (brownish), 0.81 (yellow), and 0.90 (brown).

**CONSTITUENTS** - Glycosides and Tannin

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guna</b>	:	Guru, Snigdha, Picchila
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vṛṣya, Mūtrala

**IMPORTANT FORMULATIONS** - Kumāryāsava

**THERAPEUTIC USES** - Mūtrakṛchra, Klaihya

**DOSE** - 3-6 gm of the drug in powder form.

## VĀRĀHI (Rhizome)

Vārāhi consists of dried cut pieces of rhizome of *Dioscorea bulbifera* Linn. (Fam. Dioscoreaceae), a large unarmed climber found throughout India ascending upto 1800 m in the Himalayas.

### SYNONYMS

Sanskrit	:	Vārāhikaṇḍa
Assamese	:	--
Bengali	:	Ratalu
English	:	--
Gujrati	:	Dukkarkanda
Hindi	:	Varahi Kanda, Genthī
Kannada	:	Kunta Genusu, Heggenusu
Kashmiri	:	--
Malayalam	:	Varahi
Marathi	:	Dukarkanda
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Kaya Pendazam
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug occurs in cut pieces, 0.5 to 0.7 cm thick, 2 to 3 cm in dia.; a few root and root scars present; outer surface dark brown, inner yellow to light brown; odour, indistinct; taste, bitter.

## b) Microscopic

Rhizome shows a cork composed of 10 to 15 layers of thick-walled, tangentially elongated rectangular cells; outer few cells filled with reddish-brown contents; cortex consists of oval to elliptical, thin-walled parenchymatous cells; ground tissue, forming major portion of drug composed of oval to polygonal cells having a few scattered closed vascular bundles; starch grains found both in cortex and ground tissues, but abundant in ground tissue, rounded to oval, three sided with rounded angles or rod-shaped, simple, solitary or in groups, 11 to 28  $\mu$  in diameter; hilum present at the narrower extremity.

**Powder** - Slightly yellowish-brown; shows parenchymatous cells; varying sizes of cone and rod-shaped starch grains measuring 11 to 28  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid: Water (4: 1 :5) shows three spots at Rf. 0.79 (light yellow), 0.85 (light yellow) and 0.92 (grey) in visible light. Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.48, 0.59, 0.73 (all light blue), 0.78 (grey), 0.85 (blue) and 0.92 (grey). On exposure to Iodine vapour seven spots appear at Rf. 0.12, 0.34, 0.59, 0.73, 0.78, 0.85 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C six spots appear at Rf. 0.34, 0.59, 0.66 (all light grey), 0.73, 0.85 and 0.92 (all grey).

**CONSTITUENTS** - Saponins-Steroidal, Saponins.

## PROPERTIES AND ACTION

**Rasa** : Madhura, Tikta, Kaṭu  
**Guna** : Laghu  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Rasāyana, Śleṣmaghna, Balya, Vṛśya, Svarya, Varṇya, Āyurvardhana,  
Agnivṛddhikara, Pittakara

**IMPORTANT FORMULATIONS** - Vastyāmayānaka Ghṛta, Nārasimha Cūrṇa, Pañcanimba  
Cūrṇa

**THERAPEUTIC USES** - Kuṣṭha, Kaṇḍū, Prameha, Kṛmi

**DOSE** - 3-6 gm

## VARṢĀBHŪ (Root)

Varṣābhu consists of dried root of *Trianthema portulacastrum* Linn. Syn. *T. monogyna* Linn., *T. obcordata* Roxb. (Fam. Aizoaceae), a prostrate, glabrous, typically post monsoon annual herb, found almost throughout the country as a weed in cultivated and waste lands.

### SYNONYMS

Sanskrit	:	Svēta Mūla, Śōthagṇi, Vrśōheev
Assamese	:	--
Bengali	:	Sabuni
English	:	Hoase Purslane
Gujrati	:	--
Hindi	:	Saphed Punamava, Bish Kharpra, Pathar
Kannada	:	Muchchugane, Sihi Punarnava
Kashmiri	:	--
Malayalam	:	Thazhuthama, Jamizhama
Marathi	:	Sweta Punarnava
Oriya	:	Sweta Puruni, Gothapurni
Punjabi	:	Sanaya
Tamil	:	Saranai, Mukuruttai
Telugu	:	Galijeru
Urdu	:	Bish Khapra

### DESCRIPTION

#### a) Macroscopic

Root mostly twisted, consisting of tap root, 8 to 21 cm long, about 0.5 cm thick, with several lateral rootlets, external surface light greyish-yellow; fracture, short; no characteristic odour and taste.

## b) Microscopic

Mature root shows anomalous secondary growth; cork 5 to 8 layered; secondary cortex narrow zone consisting of round to polygonal, tangentially elongated, thin-walled, parenchymatous cells, a few cells containing groups of prismatic crystals of calcium oxalate; below secondary cortex five concentric bands of vascular tissue; vessels of varying sizes occurring along with xylem fibres and phloem; phloem composed of thin walled cells having intercellular spaces a few cells containing prismatic crystals of calcium oxalate; a few rows of polygonal, thin walled, parenchymatous cells occur in rings; medullary rays prominent in middle of the cortical region and in the second or third vascular bundle ring; centre mostly occupied by a single vascular bundle strand with two isolated groups of phloem.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Acetone: Water: Cone. Ammonia (90 : 78 : 3) shows under U.V. (366 nm) three conspicuous fluorescent zones at Rf. 0.20, 0.33 and 0.91 (all sky blue). On exposure to Iodine vapour one conspicuous spot appears at Rf. 0.11 (yellow). On spraying with Dragendorff reagent one spot appears at Rf. 0.11 (yellow).

## CONSTITUENTS - Glycoside

## PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṣāya, Kaṭu, Madhura

**Guṇa** : Rūkṣa, Laghu

**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Dīpana, Mūtrala, Bhedana, Rucya, Hṛdya

**IMPORTANT FORMULATIONS** - Śuṣkamūlaka Taila, Kumāryāsava, Dhānvatara Ghṛta, Sukumāra Ghṛta, Punarnavādyariṣṭa

**THERAPEUTIC USES** - Śoṭha, Pāṇḍu, Arśa, Udara Roga, Gulma, Jvara, Garaviṣa, Vasti Śūla, Hṛdroga, Urahkṣata, Agnimāndya, Yakṛt Evam Plīhā Roga

**DOSE** - 2-5 gm of the drug in powder form.

## VĀSĀ (Root)

Vāsā consists of dried root of *Adhatoda zeylanica* Medic. Syn. *A. vasica* Nees (Fam. Acanthaceae); a sub-herbaceous bush, found throughout the year in plains and sub-Himalayan tracts of the country ascending upto 1200 m.

### SYNONYMS

Sanskrit	:	Vṛśa, Aṭarūśa, Vāsaka, Simhāsya, Vajidana
Assamese	:	Titabahak, Bahak, Vachaka
Bengali	:	Bakas, Basak
English	:	Vasaka, Malabar Nut tree
Gujrati	:	Ardusi, Aradusi, Araduso
Hindi	:	Adoosa, Arusa, Aduss
Kannada	:	Adusoye
Kashmiri	:	--
Malayalam	:	Adalodakam, Adarooshaka
Marathi	:	Adulsa, Vasa
Oriya	:	Vasanga, Basanga
Punjabi	:	Vishuti, Bhekar, Vansa, Arusa
Tamil	:	Adatodai
Telugu	:	Adda, Saramu
Urdu	:	Adusa(Arusa)

### DESCRIPTION

#### a) Macroscopic

Drug occurs in cut pieces of 8 to 13 cm long, 1.5 to 3.0 cm in dia.; hard, woody, almost cylindrical, tap root having lateral branches, rough due to longitudinal cracks or fissures; greyish-brown to dark brown externally; creamish-white internally; fracture, hard; taste, bitter.

**b) Microscopic**

Shows 6 to 15 layers of rectangular to slightly tangentially elongated, thin-walled cork cells; secondary cortex wide consisting of rectangular to polygonal, thin-walled parenchymatous cells a few containing oil globules, followed by more or less discontinuous, annular band of mostly rectangular groups of stone cells having distinct pits and striations; secondary phloem composed of 15 to 20 layered, rectangular, elongated, thin-walled cells having usual elements; secondary xylem composed of vessels, fibres, parenchyma and rays; vessel simple pitted; xylem rays mostly uniseriate, a few four seriate rays are also present; starch grains simple and compound, with 2 to 3 components, round to oval, 3 to 6  $\mu$  in dia., having concentric striations and hilum, present in secondary cortex and secondary phloem.

**Powder** - Brownish-grey; shows fragments of cork cells; simple pitted vessels; stone cells mostly in groups; starch grains simple and compound having 2 to 3 components, round to oval, 3 to 6  $\mu$  in dia. having concentric striations and hilum.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (80 : 20) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.57, 0.63 (both red), 0.83 (sky blue) and 0.87 (yellow). On exposure to Iodine vapour six spots appear at Rf. 0.07, 0.27, 0.52, 0.72, 0.87 and 0.93 (all yellow). On spraying with Dragendorff reagent two spots appear at Rf. 0.27 and 0.52 (both orange).

**CONSTITUENTS** - Alkaloids (Vasicine and Vasicinol) and Oil.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Raktaśodhaka, Pittahara, Kaphahara, Svava Vivardhaka, Vātakṛt, Hṛdya

**IMPORTANT FORMULATIONS** - Bṛhat Mañjiṣṭhādi Kvatha Cūrṇa, Pañcatikta Ghṛta, Cyavanaprāśa Avaleha, Kanakāsava

**THERAPEUTIC USES** - Kuṣṭha, Vāta Roga, Kṛmi, Śvāsa, Kāsa, Jvara, Chardi, Meha, Kṣaya, Raktapitta, Tṛṣṇā

**DOSE** - 3-6 gm

## VIṢAMUṢṬĪ (Seed)

Viṣamuṣṭi consists of dried seed of *Strychnos nux-vomica* Linn. (Fam. Fabaceae), a tree, upto a height of 9 to 15 m found throughout tropical parts of the country upto 360 m altitude in the moist deciduous forest. Seed is poisonous and can produce ill effects.

### SYNONYMS

Sanskrit	:	Kāraskara, Viśatindu, Kākatiṇḍuka
Assamese	:	Ajraki, Habbul gurab, Kucila
Bengali	:	Kuchila
English	:	Poison-nut tree, Nux vomica
Gujrati	:	Konchala, Jher Kochla, Kuchla, Zer Kochalu
Hindi	:	Kuchala, Kuchila, Bish tendu
Kannada	:	Kanjihemushti, Manjira, Hemmushti, Ittongi, Kasarkayi
Kashmiri	:	--
Malayalam	:	Kajjl, Kanniram
Marathi	:	Kajra, Kuchla
Oriya	:	--
Punjabi	:	Kuchla
Tamil	:	Yettimaram, Kakotee, Ettikottai, Ettikkai
Telugu	:	Mushti, Mushini
Urdu	:	Azaraqi, Kuchla

### DESCRIPTION

#### a) Macroscopic

Seeds greenish-grey to grey, extremely hard, silky to touch with a satiny sheen; disc-shaped, almost flat, umbonate but a few seeds somewhat irregularly bent, 10 to 30 mm in diameter, 4 to 6 mm thick, margin rounded or depressed; when cut open, endosperm found to be horny, having a central cavity in which the embryo is situated with two small, thin, cordate, leafy cotyledons with 5 to 7 veins and a terete radicle; odourless.

## b) Microscopic

Seed shows single layered epidermis, each epidermal cell elongated externally to form closely appressed trichomes, lignified, comprising of pitted bulbous base and a thick-walled narrowly elongated, projection; trichome slightly bent beyond the base, with about ten strongly lignified ribs of thickenings; inner testa composed of collapsed parenchymatous cells with yellowish-brown contents; outermost layer of endosperm consists of palisade-like cells while the inner layers have thick-walled, cellulosic polyhedral cells, showing plasmodesmata; endosperm cells also contain oil, and aleurone grains.

**Powder** - Greenish-grey; shows narrowly elongated and slightly bent thick-walled, lignified trichomes with bulbous base without ramification, thin-walled, parenchymatous cells filled with yellowish-brown content, oil globules and aleurone grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.
Assay	Not less than	1.2	per cent of strychnine	

## ASSAY

Weigh accurately about 109 in fine powder, add 100 ml of a 33 per cent v/v mixture of chloroform in solvent ether and set aside for ten minutes. Add 5 ml of dilute ammonia solution and shake continuously for six hours. Transfer to a continuous extraction apparatus with more of the same solvent mixture and extract for two hours. Filter the solvent extract, washing the filter with solvent ether and extract with successive quantities of 20 ml, 20 ml, 10 ml and 10 ml of 1N sulphuric acid, until complete extraction of the alkaloids is effected. Combine the acid extracts and make alkaline with dilute ammonia solution. Extract with successive quantities of 20 ml, 20 ml ml and 10 ml of chloroform until complete extraction of the alkaloids is effected. Evaporate the chloroform, add 5 ml of alcohol and evaporate to dryness. Dissolve the residue in a mixture of 15 ml of a 3 per cent w/v solution of sulphuric acid and 2 ml of nitric acid, add a few crystals of sodium nitrite and set aside at 18°C for thirty minutes. Transfer to a separator containing 20 ml of solution of sodium hydroxide, shake for two minutes and then shake with 20 ml of chloroform, separate the chloroform

solution, wash it with 5 ml of solution of sodium hydroxide and then with two quantities each of 10 ml of water. Continue the extraction with successive quantities of 10 ml of chloroform, until complete extraction of the alkaloids is effected, washing each chloroform solution separately with the 5 ml of solution of sodium hydroxide and with the two quantities of water, which were used for washing the first chloroform solution. Titrate the second wash with 0.1 N sulphuric acid using solution of methyl orange as indicator if more than 0.1 ml is required, wash the combined chloroform solutions with further quantities, each of 10 ml of water until on titration not more than 0.1 ml of 0.1 N sulphuric acid is required. Remove the chloroform, add 5 ml of alcohol, evaporate, and dry for thirty minutes, at 100°C. Dissolve the residue in 10 ml of 0.1 N sulphuric acid and titrate the excess of acid with 0.1 N sodium hydroxide, using solution of methyl orange as indicator. Each ml of 0.1 N sulphuric acid is equivalent to 0.03344 g of strychnine, multiply the result by 1.02 to correct for loss of strychnine.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' using Toluene: Ethylacetate: Diethylamine (70:20:10) shows on spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid two orange spots at Rf. 0.44 and 0.65 corresponding to that of brucine and strychnine.

**CONSTITUENTS** - Alkaloids, Indole Alkaloids, Strychnine & Brucine, Monoterpenoid Glycoside (Loganin),  $\alpha$ ,  $\beta$  -Colubrine, Vomisine.

### **PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṭu  
**Guṇa** : Rūkṣa, Laghu, Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Grāhī, Madakāraka, Vātaḥ, Kaphanāśaka, Pittanāśaka, Raktadoṣa Nāśaka, Vraṇāśodhana, Parama Vedanahara, Agnireta, Rujāhara, Jantunāśana

**IMPORTANT FORMULATIONS** - Viṣatinduka Taila, Mahā Viṣagarbha Taila, Agnitunḍi Vaṭī, Ekāṅgavīra Rasa, Viṣatinduka Vaṭī, Kṛmimudgara Rasa, Navajīvana Rasa

**THERAPEUTIC USES** - Agnimāndya, Ardita, Pakṣāghāta, Visūcika, Nāḍī Daurbalya, Kuṣṭha, Arśa, Klaibya, Gṛdhrasī, Kaṇḍū, Vraṇa

**DOSE** - 60-125 mg powder of the shodhita drug.

## VR̥ŚCIKĀLĪ (Whole Plant)

Vṛ̥ścikāli consists of dried whole plant of *Tragia involucrata* Linn. (Fam. Euphorbiaceae), a perennial, evergreen, twiner, more or less hispid with scattered stinging hairs, distributed throughout India from Punjab and Lower Himalayas eastwards to Assam and Meghalaya, ascending upto an altitude of 750 m and southwards to Kerala.

### SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Shedha Songi
English	:	Scorpion Tail Plant
Gujrati	:	Vichaati
Hindi	:	Vahanta, Vrishi-Kali
Kannada	:	Haligilu
Kashmiri	:	--
Malayalam	:	Terkkada
Marathi	:	Vrischikali
Oriya	:	--
Punjabi	:	--
Tamil	:	Thai Kodu Kkuppoondu
Telugu	:	--
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Occurs in pieces of 2 to 10 cm long and 0.3 to 1.3 cm in dia., woody, hard, cylindrical, ribbed at some places, more or less rough due to presence of secondary roots and root scars; light brown; no characteristic odour and taste.

**Stem** - Cylindrical, slender, twining 0.2 to 0.6 cm in diameter, elongated, stinging to touch,

and having fine ridges and furrows; light grey; moderately hard; internal surface whitish, composed of loosely arranged tissues; fracture, fibrous; no characteristic odour and taste.

**Leaf** - Simple, petiolate, stipulate, stinging to touch, linear-oblong to broadly ovate, cordate or oblong-lanceolate, acute or acuminate at apex, margin serrate; 1.5 to 5.5 cm long, 1 to 3 cm broad, slightly yellowish-green; no characteristic odour and taste.

#### **b) Microscopic**

**Root** - Root shows nearly circular outline; cork consisting of 3 to 10 layered, tangentially elongated, thin-walled cells; secondary cortex narrow consisting of fairly large, polygonal, thin-walled, parenchymatous cells; rosette crystals of calcium oxalate and some fibres present in the region; secondary phloem appears in form of conical caps, composed of sieve tubes, companion cells, parenchyma, fibres and phloem rays; fibres present in small groups of 2 to 4 cells arranged in tangential rows alternating with phloem elements; rosette crystals of calcium oxalate present in phloem parenchyma; secondary xylem forms major part of root composed of vessels, tracheids, parenchyma, fibres and xylem rays; vessels solitary or 2 or 3 to a group, having simple pits; fibres and tracheids having thick-walled and blunt ends; medullary rays 1 or 2 cells wide, rectangular to radially elongated and thick-walled; some cells contain starch grains and rosettes of calcium oxalate present in those towards periphery; starch grains rounded to oval in shape, measuring 4 to 9  $\mu$  in diameter.

**Stem** - Mature stem shows cork composed of 3 to 8 layered, thin-walled cells; at a few places epidermis shows the presence of glandular and stinging hairs; secondary cortex a wide zone, consisting of tangentially elongated, thin-walled, parenchymatous cells; some cells contain rosette crystals of calcium oxalate; some laticifers present scattered in this region; secondary cortex followed by zone of pericycle fibres with highly thickened walls, arranged in groups; secondary phloem composed of sieve elements, phloem fibres and phloem parenchyma; phloem fibres thick-walled, some phloem parenchyma cells contain rosette crystals of calcium oxalate; laticifers scattered in the secondary phloem similar to those found in secondary cortex; cambium narrow consisting of thin-walled, tangentially elongated cells; secondary xylem in form of continuous cylinder traversed by narrow xylem rays; xylem consists of vessels, tracheids, xylem fibres and xylem parenchyma; vessels numerous distributed uniformly in groups or singles; in macerated material vessels vary in shape and size, with transverse to oblique perforation, lignified with pitted walls; xylem parenchyma usually rectangular having simple pits, xylem rays uni to triseriate, uniseriate being more common and usually 2 to 15 cells high, having pitted walls; pits consists of large, thin-walled parenchymatous cells, some cells with rosette crystals of calcium oxalate.

#### **Leaf-**

**Petiole** - shows irregular outline due to fine ridges and furrows; epidermis single layered having some unicellular glandular and stinging hairs; collenchyma 4 to 7 layered, followed by polygonal, thin-walled parenchymatous cells containing rosette crystals of calcium oxalate; vascular bundles collateral, five in number corresponding to ridges; centre occupied by oval to angular, thin-walled parenchymatous cells containing rosette crystals of calcium oxalate.

**Midrib** - nearly biconvex in outline; epidermis consists of single layered, oval,

parenchymatous cells covered externally by a thin cuticle; some unicellular glandular and stinging hairs present on both surfaces; epidermis followed by 3 or 4 layers of collenchymatous cells; stele composed of single, collateral vascular bundle; ground tissue composed of 3 or 4 layers of thin-walled, polygonal, parenchymatous cells; rosette crystals of calcium oxalate present in parenchyma and phloem parenchyma.

*Lamina* - shows dorsiventral structure; epidermis on either side; upper epidermal cells radially elongated and larger in size; lower ones oval-shaped, tangentially elongated both covered externally by thick cuticle; glandular and stinging hairs present on both surfaces similar to those present in midrib; palisade 1 or 2 layered; spongy parenchyma 5 to 7 layered of loosely arranged cells, some contain rosette crystals of calcium oxalate; small veins found traversing spongy tissue at certain places.

**Powder** -Light greenish-yellow; shows groups of fibres, vessels with simple pits and spiral thickening, rosette crystals of calcium oxalate, simple rounded starch grains, fragments of lamina showing palisade and groups of spongy parenchyma, unicellular stinging hairs

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel G plate using Chloroform : Ethyl acetate: Formic acid (5:4:1) shows under visible light two spots at Rf. 0.92 (light grey) and 0.95 (yellowish green). Under U.V. (366 nm) two fluorescent zones are visible at Rf. 0.92 (blue) and 0.95 (pink). On exposure to Iodine vapour six spots appear at Rf. 0.08, 0.27, 0.40, 0.50, 0.92 and 0.95 (all yellow); On spraying with 5% Ferric chloride solution and heating the plate for ten minutes at 110° C two spots appear at Rf. 0.92 and 0.95 (both bluish grey).

#### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu

**Guṇa** : Uṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātakara, Śuddikṛt, Balya, Hṛtsuddhikṛt

**IMPORTANT FORMULATIONS** - Vidāryādi Kvātha Cūrṇa, Vidāryādi Ghṛta

**THERAPEUTIC USES** - Raktapitta, Vibandha, Arocaka

**DOSE** - 3-6 gm

## YAVA (Whole Plant)

Yava consists of dried whole plant of *Hordeum vulgare* Linn. Syn. *H. sativum* Pers. (Fam. Poaceae), an annual, erect, herb, 50 to 100 cm high, cultivated chiefly in North India, for its de husked fruits known as Barley in trade.

### SYNONYMS

Sanskrit	:	Divya
Assamese	:	--
Bengali	:	Jab, Jau, Yava
English	:	Barley
Gujrati	:	Jau, Java, Jau
Hindi	:	Yay, Jav, Jau
Kannada	:	Jave godi, Barli Akki
Kashmiri	:	--
Malayalam	:	Yavam, Baarli, Barley
Marathi	:	Jav
Oriya	:	Jav, Javadhana, Yava, Bansa
Punjabi	:	Jav, Jau
Tamil	:	Barliarisi, Yavam
Telugu	:	Yavalu, Barlibiyam, Tella Tumma, Barley
Urdu	:	Jau

### DESCRIPTION

#### a) Macroscopic

**Root** - Fibrous, 0.5 to 1 cm thick; cylindrical, glabrous, greyish-brown.

**Stem** - Cylindrical, 0.4 to 0.6 cm thick; hollow, slightly flattened, smooth; internode long, shining yellow; node short, bearing sheath; fracture, fibrous.

**Leaf** - Linear-lanceolate, 15 to 25 cm long, upper one dose to the spike; sheath smooth, striate; yellowish-grey.

**Inflorescence** - Spike, terminal, linear-oblong, compressed spikelet sessile, 6 to 8 cm long, 6-rowed type; dark cream.

**Fruit** - A caryopsis, elliptic, oblong, ovoid and tapering at both ends; smooth, about 1 cm long and 0.2 to 0.3 cm wide; dorsally compressed and flattened on the sides with a shallow longitudinal furrow; 3 to 5 ridged having shallow depression between them; grains tightly enclosed and adhering to the lemma and palea; a long awn present on the palea; pale greenish-yellow; taste, sweetish acrid.

#### **b) Microscopic**

**Root** - Shows single layered epidermis, covered by striated cuticle; cortex composed of about 4 to 6 layers of round to polygonal, thin-walled, parenchymatous cells having intercellular spaces; vascular bundles arranged in discontinuous ring, each having usual elements; pith very wide composed of round to polygonal thin-walled, parenchymatous cells having intercellular spaces.

**Stem** - Shows single layered epidermis, covered by thick cuticle; hypodermis composed of 5 to 6 layered, round to polygonal, lignified, sclerenchymatous cells; ground tissue consisting of 5 to 7 layered, round to polygonal, thin-walled, parenchymatous cells having intercellular spaces; vascular bundles containing of usual elements found scattered in ground tissues.

**Leaf** - Shows single layered epidermis covered by thick cuticle on either surface; a few big or bulliform cells are present in upper and lower epidermis, mesophyll not differentiated into palisade and spongy parenchyma; vascular bundles conjoint, collateral. closed, each covered by bundle sheath; stomata paracytic, present on both surfaces; stomatal number 9 to 17 per sq. mm on lower surface. 5 to 8 per sq. mm on upper surface; stomatal index 15 to 23 on lower surface, 9 to 15 upper surface.

**Fruit** -shows single layered epidermis consisting of crescent-shaped, round to oval wavy walled cells, followed by 2 or 3 layers of thick-walled, sclerenchymatous fibres; below the sclerenchyma are present irregular, square or quadrilateral, spongy parenchymatous cells, a few cell walls having silica bodies through which run the fibro-vascular bundles of the ribs, followed by more or less, polygonal inner epidermal cells, a few inner epidermal cells having unicellular claw-shaped hair and stomata; pericarp composed of cells with more or less compressed parenchymatous cells; seed coat appears as a colourless line; perisperm composed of cells with more or less wavy walls having narrow lumens; endosperm divided into two zones, 2 to 4 cells deep aleurone layers, and the rest starch layers; starch grains simple, round to oval, measuring 3 to 30  $\mu$  in dia.

**Powder** - Light creamish-yellow; shows fragments of epidermal cells, parenchyma, groups of tubular, elongated lignified cells, polygonal, thin-walled parenchymatous epidermal cells of palea with intercellular spaces, in surface view, thin-walled, conical trichomes with large lumen, measuring 30 to 180  $\mu$  in length and upto 20  $\mu$  in width and stomata, sclerenchymatous fibres, scalariform vessels, abundant round to oval, simple starch grains having concentric striations, measuring 3 to 30  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. (366nm) nine fluorescent zones at Rf. 0.15, 0.28, 0.42, 0.52, 0.59, 0.67, 0.85, 0.93 and 0.96 (all blue). On exposure to Iodine vapour nine spots appear at Rf. 0.10, 0.15, 0.39, 0.48, 0.56, 0.67, 0.85, 0.93 and 0.96 (all yellow). On spraying with 5% Phosphomolybdic acid reagent and heating the plate for fifteen minutes at 105 °C nine spots appear at Rf. 0.10, 0.24, 0.39, 0.48, 0.56, 0.67, 0.85, 0.93 and 0.96 (all blue).

**CONSTITUENTS** - Proteins, Carbohydrate, free Amino-acids, Vitamins, Tannins and Flavonoid glycosides-Luteolin and Orientin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Rūkṣa, Aguru, Mṛdu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittahara, Medhāvārdhaka, Svava Vardhaka, Varṇa Vardhaka, Lekhana, Medohara, Vātahara, Vṛṣya

**IMPORTANT FORMULATIONS - -**

**THERAPEUTIC USES - Pīnasa, Śvāsa, Kāsa, Ūrustambha**

**DOSE - 10-20 gm**

# **THE AYURVEDIC PHARMACOPOEIA OF INDIA**

## **PART- I VOLUME – V**



**GOVERNMENT OF INDIA  
MINISTRY OF HEALTH AND FAMILY WELFARE  
DEPARTMENT OF AYUSH**

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51	MEṢAŚRṄĠĪ (Leaf)	Gymnema sylvestre R.Br	110
52	MEṢAŚRṄĠĪ (Root)	Gymnema sylvestre R.Br	113
53	NANDĪ (Root)	Ficus arnottiana Miz.	115
54	NĪLAJHIṆṬĪ (Root)	Barleria strigosa Willd	117
55	NIMBA (Root Bark)	Azadirachta indica A.Juss	119
56	NIMBA (Flower)	Azadirachta indica A.Juss	121
57	NIMBA (Fruit)	Azadirachta indica A.Juss	123
58	PALĀŚAḤ (Seed)	Butea monosperma (Lam.)Kuntze	125
59	PALĀŚAḤ (Dried Flower)	Butea monosperma (Lam.)Kuntze	127
60	PĀRASĪKAYAVĀNĪ (Seed)	Hyoscyamus niger Linn	130
61	PATṬŪRA (Whole Plant)	Aerva lanata (Linn.)Juss	132
62	PĪLŪḤ (Fruit)	Salvadora persica Linn	135
63	PĪLŪḤ (Leaf)	Salvadora persica Linn	137
64	PĪLŪḤ (Root)	Salvadora persica Linn	140
65	POṬAGALA (Root)	Typha elephantina Roxb.	142
66	PUDĪNĀḤ (Aerial Part)	Mentha viridis Linn	144
67	PULLĀNĪ (Leaf)	Calycopteris floribunda Lam.	146
68	PULLĀNĪ (Root)	Calycopteris floribunda Lam.	148
69	PULLĀNĪ (Stem)	Calycopteris floribunda Lam.	150
70	PŪTĪKARAÑJA (Stem Bark)	Caesalpinia crista Linn	152
71	RĒṆUKA (Seed)	Vitex negundo Linn	154
72	RḌDDHI (Tuber)	Habenaria intermedia D.Don	157
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74	RŪMĪMASTAGĪ (Resin)	Pistacia lentiscus Linn	162
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76	SARPAGANDHĀ (Root)	Rauwolfia serpentina (Linn) Benth.ex.Kurz	166
77	ŚVETAPUNARNAVĀ (Root)	Borhaavia verticillata Poir	168
78	TAILAPARṆAḤ (Leaf)	Eucalyptus globules Labill	170
79	TINIŚAḤ (Wood)	Ougenia oojenensis (Roxb)Hochr	172
80	TINTIDĪKAḤ (Aerial Part)	Rhus parviflora Roxb	174
81	TRAPUṢAM (Seed)	Cucumis sativus Linn.	177
82	TŪNĪ (Stem Bark)	Cedrela toona Roxb.	179
83	VANDĀ (Leaf)	Dendrophthoe falcata (Linn.f.) Ettingsh.	181
84	VANDĀ (Stem)	Dendrophthoe falcata (Linn.f.) Ettingsh.	183
85	VANDĀ (Aerial Root)	Dendrophthoe falcata (Linn.f.) Ettingsh.	185
86	VANDĀ (Flower)	Dendrophthoe falcata (Linn.f.) Ettingsh.	187
87	VANDĀ (Fruit)	Dendrophthoe falcata (Linn.f.) Ettingsh.	189
88	VANYAJĪRAKA (Fruit)	Centratherum anthelminticum (L.) Kuntze	191
89	VIDĀRĪKANDA (Tuber)	Pueraria tuberosa DC	193
90	VIRALĀ (Stem Bark)	Diospyros exsculpta Buch-Ham	195
91	VIŚALĀ (Root)	Trichosanthes bracteata (Lam) Voigt	197
92	VYĀGHRANAKHA (Fruit)	Capparis horrida Linn	199

## **LEGAL NOTICES**

In India there are laws dealing with drugs that are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by these laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of the law are being complied with.

In general, the Drugs & Cosmetics Act, 1940 (subsequently amended in 1964 and 1982), the Dangerous Drugs Act, 1930 and the Poisons Act, 1919 and the rules framed thereunder should be consulted.

Under the Drugs & Cosmetics Act, the Ayurvedic Pharmacopoeia of India (A.P.I.), Part-I, Vol. II, is the book of standards for single drugs included therein and the standards prescribed in the Ayurvedic Pharmacopoeia of India, Part-I, Vol. II would be official. If considered necessary these standards can be amended and the Chairman of the Ayurvedic Pharmacopoeia Committee authorised to issue such amendments. Whenever such amendments are issued the Ayurvedic Pharmacopoeia of India, Part-I, Vol. II, would be deemed to have been amended accordingly.

## GENERAL NOTICES

**Title** - The title of the book is "Ayurvedic Pharmacopoeia of

**Name of the Drugs** - The name given on the top of each monograph of the drug is in Sanskrit as mentioned in the Ayurvedic classics and/or in the Ayurvedic Formulary of India, Part-I and Part-II will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

**Introductory Para** - Each monograph begins with an introductory paragraph indicating the part, scientific name of the drug in Latin with short description about its habit, distribution and method of collection, if any.

**Synonyms** - Synonyms of each drug appearing in each monograph in Sanskrit, English, Hindi, Urdu and other Indian regional languages have been mentioned as found in the classical texts, Ayurvedic Formulary of India, Part-I and Part-II as procured from the experts, scholars of Ayurveda and officials in the field from different states.

**Italics** - Italic type has been used for scientific name of the drug appearing in the introductory paragraph of each monograph as also for chemicals and reagents, substances or processes described in Appendix.

**Odour and Taste** - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description, as large numbers of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour.

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case of poisonous drugs, indicated in monograph.

**Mesh Number** - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

**Weights and Measures** - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gramme (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube, which delivers in 20 drops 1 gram of distilled water at 15°C.

Metric measures are required by the Pharmacopoeia to be graduated at 20°C and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

**Identity, Purity and Strength** - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects, pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive, water-soluble extractive, ether-soluble extractive, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method, which he uses, will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

**Limits for Heavy Metals** – All Ayurvedic Drugs (Single/Compound formulation) must comply with the limits for Heavy Metals prescribed in individual Monograph and wherever limit is not given then they must comply with the limits given in WHO publication "Quality Control Methods for Medicinal Plants and Material".

**Standards** - For statutory purpose, statements appearing in the API, Part-I, Vol. V, under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

**Thin Layer Chromatography (T.L.C.)** - Under this head, wherever given, the number of spots and R<sub>f</sub> values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

**Quantities to be weighed for Assays and Tests** - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

**Constant Weight** - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

**Constituents** - Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

**Percentage of Solutions** - In defining standards, the expression per cent (%), is used, according to circumstances, with one of the four meanings given below.

Per cent w/w (percentage weight in weight) expresses the number of grammes of active substance, in 100 grammes of product.

Per cent w/v (Percentage weight in volume) expresses the number of grammes of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent v/w (percentage volume in weight) expresses the number of millilitres of active substance in 100 grammes of product.

**Percentage of alcohol** - All statements of percentage of alcohol (C<sub>2</sub>H<sub>5</sub>OH) refer to percentage by volume at 15.56 °C.

**Temperature** - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

**Solutions** - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

**Reagents and Solutions** - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

**Solubility** - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities, which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that 1 gramme of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

Descriptive terms	Relative quantities of solvent
Very soluble	Less than 1 part
Freely soluble	From 1 to 10 parts
Soluble	From 10 to 30 parts
Sparingly soluble	From 30 to 100 parts
Slightly soluble	From 100 to 1000 parts
Very slightly soluble	From 1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

**Therapeutic uses and important formulations** –Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognised Ayurvedic classics and in the Ayurvedic Formulary of India, Part –I and Part-II.

**Doses** – The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in Ayurvedic texts. A conversion table is appended giving classical weights of Ayurvedic System of Medicine with their metric equivalents. Doses mentioned in the Ayurvedic Pharmacopoeia of India (A.P.I.) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

The abbreviations commonly employed are as follows:

Abbreviations of technical terms	
m	Metre
l	Litre
mm	Millimetre
cm	Centimetre
μ	Micron (0.001 mm)
kg	Kilogram
g	Gramme
mg	Milligram
ml	Millilitre
in	Normal solution
0.5 N	Half-normal solution
0.1 N	Decinormal solution
1M	Molar solution
Fam.	Family
PS	Primary Standards
TS	Transverse Section

### Abbreviations used for Languages

Sansk.	Sanskrit
Assam.	Assamese
Beng.	Bengali
Eng.	English
Guj.	Gujrati
Kan.	Kannada
Kash.	Kashmiri
Mal.	Malayalam
Mar.	Marathi
Ori.	Oriya
Punj.	Punjabi
Tam.	Tamil
Tel.	Telugu

### ABBREVIATIONS FOR PARTS OF PLANTS

Cotyledon	Cotldn.
Flower	Fl.
Fruit	Fr.
Heart Wood	Ht. Wd.
Leaf	Lf.
Pseudo-bulb	Pseudo-bulb
Root Bark	Rt. Bk.
Root	Rt.
Rhizome	Rz.
Seed	Sd.
Stem Bark	St. Bk.
Stem	St.
Tuberous Root	Tub. Rt.
Wood	Wd.
Whole Plant	Wh. Pl.

## **ĀMRA HARIDRĀ (Rhizome)**

Āmra Haridrā consists of the rhizome of *Curcuma amada* Roxb. (Fam. Zingiberaceae), a biennial with ovoid root stock, 60 to 90 cm high, grown in W. Bengal and on the hills of west coast of India.

### **SYNONYMS**

Sanskrit	:	Āmrādrakam, Āmragandha-haridrā
Assamese	:	--
Bengali	:	Aamaa Aadaa
English	:	Mango-ginger
Gujrati	:	Aambaa haldhar
Hindi	:	Aamaa-haldi, Amiyaa haldi
Kannada	:	Ambarasini, Huli Arsin
Kashmiri	:	--
Malayalam	:	Mangayinji
Marathi	:	Aambe halad, Ambaa halad
Oriya	:	--
Punjabi	:	Ambiya haladi
Tamil	:	Mankayyinji
Telugu	:	Mamidi Allamu
Urdu	:	--

### **DESCRIPTION**

#### **a) Macroscopic**

Rhizome laterally flattened, longitudinally wrinkled, 2 to 6 cm long, 0.5 to 2 cm in diameter, branched, remnant of scaly leaves arranged circularly giving the appearance of growth rings; cut pieces 1.5 to 3.5 cm in diameter, circular, punctate scars on the surface, branching sympodial, horizontal; roots long, unbranched, tapering, thread like, yellowish-

brown; rhizome buff coloured with short and smooth fracture; odour and taste like raw mango.

### **b) Microscopic**

T.S. of rhizome circular in outline; epidermal cells rectangular-oval; cuticle thick, long unicellular trichomes present, storied suberized cork cells interrupted by lysigenous oil glands; a wide cortex having irregularly scattered vascular bundles, each vascular bundle with a prominent fibrous sheath; inner limit of cortex marked by endodermis followed by pericycle; vascular bundles devoid of sheath, arranged in a ring; schizogenous canals and abundant oil cells with suberized walls found in cortex and in central region; most of the parenchymatous cells filled with starch grains, which are oval-ellipsoidal, sometimes polygonal in shape, 10 to 60  $\mu$  m, simple, hilum circular or a 2 to 5 rayed cleft, lamellae distinct and concentric; vascular bundles in the central cylinder are similar to those in the cortex, scattered, closed, collateral, surrounded by sheath of thick walled cells; secondary wall thickening reticulate; fibres thin walled lignified, lumen narrow.

**Powder** - Powder light yellow, sweet, raw mango like odour; shows fragments of storied cork, xylem vessels with reticulate thickenings, lignified xylem fibres, oil cells, patches of parenchymatous cells filled with starch grains which are oval-ellipsoidal, sometimes polygonal in shape, 10 to 60  $\mu$ m, simple, hilum circular or a 2 to 5 rayed cleft, lamellae distinct and concentric. Powder when treated with 1N aqueous NaOH becomes green with yellowish tinge under UV 254 nm; with 1N HCl and nitrocellulose in amyloacetate added one after the other, powder becomes orange in daylight.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.
Starch	Not less than	16	per cent, Appendix	2.2.13
Essential oil	Not less than	1	per cent, Appendix	2.2.10

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : methanol (5 : 0.5 : 0.05) shows fluorescent zones at Rf. 0.10 (green) and 0.34 (blue) under UV (366 nm). On spraying with anisaldehyde- sulphuric acid reagent and heating the plate for ten minutes at 120<sup>o</sup>C, spots of purple colour appear at Rf. 0.16, 0.32, 0.72 and 0.97.

**CONSTITUENTS** - Volatile oil ( $\alpha$ -pinene,  $\delta$ -camphor),  $\alpha$ -curcumene, 1- $\beta$  curcumene, phytosterol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Vṛṣya, Ruciprada, Dīpana

**IMPORTANT FORMULATIONS** - Asthisandhānaka Lepa

**THERAPEUTIC USES** - Kaṇḍū, Vraṇa, Kāsa, Śvāsa, Hikkā, Jvara, Abhighātaja Śoṭha, Karṇaśūla, Sannipāta

**DOSE** - 2- 4 g

## ANISŪNA (Fruit)

Anisūna consists of dried fruit of *Pimpinella anisum* Linn. (Fam. Apiaceae); an annual erect plant introduced and cultivated in India at Uttar Pradesh, Orissa and Punjab.

### SYNONYMS

Sanskrit	:	Śvetapuṣpā
Assamese	:	--
Bengali	:	Muhuri
English	:	Anise
Gujrati	:	--
Hindi	:	Badiyan Rume, Sauph, Anisoon
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Anisuna Shopa
Oriya	:	--
Punjabi	:	--
Tamil	:	Shombu
Telugu	:	--
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The fruits are entire cremocarp, 3 to 5 mm long and 1 to 2 mm wide, ovoid, generally attached with slender pedicel, stylopods with bifurcate short styles; greenish- yellow or greenish-brown in colour; rough to touch due to the presence of trichomes; primary ridges 8 to 12 in number with uniform width; odour characteristic and taste sweet and aromatic.

### **b) Microscopic**

T.S. of fruit shows single layered epidermis with small, numerous, conical, mostly unicellular, occasionally two celled, thick walled and warty trichomes, vascular tissues present under the ridges; about 40 vittae are present on the dorsal surface and two large vittae on commissural surface; a few of the vittae are branched; small patch of mesocarpic stone cells are present at the commissural surface; inner epidermis represented by parquetry layer consisting of tangentially elongated cells; endosperm exhibits thick walled parenchyma cells with numerous aleurone grains usually containing a minute rosette of calcium oxalate and occasionally oil globules.

**Powder** - Powder shows fragments of vascular elements with scalariform, spiral and reticulate thickening; striated epidermal cells with occasional anomocytic stomata, thin walled parenchyma cells, tangentially elongated cells of parquetry layer, thick walled cells of endosperm with aleurone grains containing minute rosettes of calcium oxalate and oil globules, scattered aleurone grains with crystals of calcium oxalate and small conical, unicellular, occasionally bicellular, warty trichomes; fibres, stone cells and vittae with underlying parquetry cells.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	30	per cent, Appendix	2.2.7.

### **ASSAY**

The drug on steam distillation yields colourless oil, not less than 1.8% v/w (Appendix 2.2.10).

### **T.L.C.**

TLC of alcoholic extract on Silica gel 'G' plates (Merck), using Toulene : Ethyl acetate (93.7) shows under UV (254nm) five spots at Rf.0.18, 0.32(both orange), 0.38(white), 0.44 (red), 0.88(violet); on exposure to iodine vapours four yellow spots appear at Rf.0.23, 0.32, 0.38 and 0.88; on exposures to with vanillin-sulphuric acid and heating the plate at 110°C for 10 minutes, six violet spots appear at Rf. 0.18, 0.23, 0.32, 0.38, 0.60 and 0.88.

**CONSTITUENTS** - Volatile oil, fixed oils and protein.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Tīkṣṇa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātānulomaka, Rakṣoghna, Kaphahara, Ārtavajanana

**IMPORTANT FORMULATIONS** - Brāhmī Vaṭī

**THERAPEUTIC USES** - Śūla, Ādhmāna, Kaphavikāra, Mūtrāghāta, Bālagraha

**DOSE** - 1-3 g

Q. S. for dhūpanārtha [fumigation].

## AÑKOLAH (Leaf)

Añkolah consist of dried leaf of *Alangium salviifolium* (Linn. F.) Wang. Syn. *A. lamarckii* Thw.; (Fam. Alangiaceae), a small tree found over the plains and foothills throughout India.

### SYNONYMS

Sanskrit	:	Añkola, Añkoṭa, Dīrghakīla, Nikochaka, Tāmraphala, Gupta Sneha
Assamese	:	--
Bengali	:	Akarkanta, Baghankura, Aankod, Angkura, Dhalakura
English	:	Sage-leaved Alangium
Gujrati	:	Ankol, Onkla
Hindi	:	Ankol, Ankora, Dhera
Kannada	:	Ankolimara, Ansaroli, Arinjil, Ankol
Kashmiri	:	--
Malayalam	:	Ankolam, Velittanti, Irinjil, Chemmaram
Marathi	:	Ankola
Oriya	:	Ankul, Baghonokhiya, Dolanku, Konkonolo
Punjabi	:	--
Tamil	:	Alangi, Ankolum, Atikoevam
Telugu	:	Ankolamu, Udagu, Urgan
Urdu	:	Ankola

### DESCRIPTION

#### a) Macroscopic

Leaves 8 to 13 cm in length and 3 to 5 cm in width, simple, petiolate, petiole 6 to 13 mm long, lanceolate, narrowly oblong or ovate, base rounded or acute, glabrous above, pubescent on the nerves, venation reticulate.

**b) Microscopic**  
**Leaf -**

*Petiole* - Epidermis single layered, covered by cuticle; nonglandular, mostly unicellular, rarely bicellular, uniseriate trichomes, measuring upto 280  $\mu$  in length and upto 16  $\mu$  in width; 7 to 10 layered collenchyma present just beneath the epidermis, followed by parenchymatous tissue; collateral vascular bundles 3 to 10 in number arranged in an arch and surrounding parenchymatous pith; vascular bundles composed of xylem and phloem; xylem consists of fibres, tracheids and xylem parenchyma; abundant rosette crystals of calcium oxalate present in the parenchyma tissue, measuring upto 45  $\mu$  in diam.; granulated pigments noticed in all tissues except in the vascular bundle.

*Midrib* - T.S. shows biconvex outline; epidermis on both surfaces covered by cuticle; abundant nonglandular, unicellular trichomes measuring upto 385  $\mu$  in length and upto 16  $\mu$  in width present on epidermis; 4 or 5 layered collenchyma situated just beneath the epidermis; collenchyma followed by 3 or 4 layered chlorenchyma; vascular bundle surrounded by sclerenchymatous tissue except on lateral sides; phloem located on the outer peripheral parts of xylem; xylem mainly consists of tracheids, vessels and fibres; central part of the midrib occupied by parenchyma cells, containing rosettes of calcium oxalate crystals, measuring upto 20  $\mu$  in diam.

*Lamina* - T. S. shows dorsiventral structure; epidermis on both the sides covered by cuticle; in surface view the lower epidermis shows straight walled, polygonal cells with prominent cuticular striations and anomocytic type of stomata; upper epidermis either devoid of stomata or with rare ones; cuticular striations also absent; nonglandular, unicellular trichomes similar to midrib abundant on lower epidermis; upper epidermis followed by a two layered palisade; mesophyll traversed by veins. Dispersed in the region are rhomboid calcium oxalate crystals, measuring 10 to 26  $\mu$  in length and 6 to 16  $\mu$  in width; palisade ratio 7 to 11; vein islet number 8 to 12; stomatal index 7 to 14.

**Powder** - Greenish brown, taste bitter; shows tracheids, vessels, lignified fibres with tapered ends measuring 40 to 280  $\mu$  in length and upto 20  $\mu$  in width, rosettes of calcium oxalate crystals, rhomboid crystals, nonglandular unicellular trichomes, groups of palisade cells, fragments of upper epidermis and lower epidermis with anomocytic stomata.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

## ASSAY

### ASSAY -

Contains not less than 0.35 per cent of alkaloid as determined by the following method :-

Soxlet extract coarsely crushed (25g) dried leaves of *A. salviifolium* with n-hexane (700 ml) for 15 hours. Leave the exhausted (defatted) plant material to dry at room temperature and then extract with methanol (500 ml) for 16 hours. Remove methanol under reduced pressure, acidify with 3 % acetic acid, wash with diethyl ether (3 x 100 ml) and make aqueous phase alkaline with 10 % aqueous sodium carbonate. Extract the liberated (free) alkaloids first with dichloromethane (3 x 100 ml) and then with ethyl acetate (5 x 100 ml). Combine both the extracts, evaporate to dryness and weigh the residue as total alkaloids.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel G plates (0.2 mm thick) using toluene: ethyl acetate: diethylamine (60:30:10) shows under UV (254 nm) six spots at Rf. 0.12 (brown), 0.17, 0.21, 0.38 (all violet), 0.60 and 0.66 (both yellowish green). Under UV (366 nm) eight fluorescent spots appear at Rf. 0.12, (yellow) 0.17, 0.21 (both faint blue), 0.24 (blue), 0.30 (pink), 0.38 (blue), 0.60 and 0.66 (both pink). On exposure to iodine vapour nine spots appear at Rf. 0.12, 0.17, 0.21 (all yellowish brown), 0.24 (reddish brown), 0.30, 0.38, 0.50 (all yellowish brown), 0.60 and 0.66 (both green). On spraying with Dragendorff's reagent six orange spots appear at Rf. 0.17, 0.21, 0.24, 0.30, 0.38, 0.50.

**CONSTITUENTS** - Alkaloids (Alangimarckine, deoxytubulosine, ankorine); campesterol, episterol, stigmast-5,22,25-trien-3  $\beta$ -ol, alangidiol and isoalangidiol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha, Tīkṣṇa, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Vāmaka, Recaka, Vraṇaśodhaka, Mūtrala, Pārada Śodhana, Jvaraghna

**IMPORTANT FORMULATIONS** - (No formulations)

**THERAPEUTIC USES** - Matsyaviṣa, Āmavāta, Jvara, Kaṇṭharoga, Śoṭha, Śopha, Śūla, Kṛmi, Visarpa, Graha Bādhā, Raktavikāra, Mūṣikāviṣa, Jantuviṣa, Lūtāviṣa, Kukkuraviṣa, Viṣrikāra

**DOSE** - 2-10 g

## ĀRAGVĀDHA (Stem bark)

Āragvadha consists of stem bark of *Cassia fistula* Linn. (Fam. Fabaceae), a medium sized deciduous tree, 6 to 9 m tall with bright yellow flowers in long pendulous racemes, and long cylindrical blackish-brown pods of 25 to 50 cm in length and upto 3 cm in width; found wild and also commonly planted as ornamental tree in most parts of the country up to an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Kṛtamāla, Vyādhighāta, Śampāka, Śamyāka, Nṛpadruma, Kṛtamālaka, Rājavṛkṣa
Assamese	:	--
Bengali	:	Sondaalee, Sonaalu
English	:	Indian Laburnum, Purging Fistula, Pudding pipe tree
Gujrati	:	Garmaalo
Hindi	:	Amaltaas, Girimaal
Kannada	:	Kakke, Kakkemar
Kashmiri	:	--
Malayalam	:	Konna
Marathi	:	Baahvaa
Oriya	:	Sunaari
Punjabi	:	Amaltaas, Kaniyaar, Girdnalee
Tamil	:	Konnai
Telugu	:	Rela
Urdu	:	Amaltaas

### DESCRIPTION

### a) Macroscopic

Drug occurs in flat or curved thick pieces; outer surface smooth to rough with warty patches; greenish-grey to red; inner surface rough, reddish with parallel striations; fracture, laminate; odour, sweet and characteristic; taste, astringent.

### b) Microscopic

Stem bark shows 5 to 8 layers of cork, composed of square to rectangular cells; cortex many layered, outer consisting of rectangular cells, middle tangentially elongated cells and inner of polygonal cells; groups of stone cells, oval to elongated arranged tangentially forming a continuous or discontinuous band; fibres present in groups in rest of the cortex; phloem shows sieve elements, phloem parenchyma and bast fibres in patches, traversed by uni to triseriate medullary rays of radially elongated oval cells; phloem parenchyma of rectangular to polygonal thin walled cells; bast fibres moderately thick walled, lignified, in groups surrounded by crystal fibres; abundant isolated calcium oxalate prism crystals present also in cells of outer cortex and inner cortex; starch grains mostly simple, but a few with 2 or 3 components in phloem parenchyma.

**Powder** -Light brown; shows thin walled parenchymatous cells; numerous bundles of lignified fibres associated with crystal fibres; sieve tubes, many, well-developed; numerous stone cells, thick walled, lumen nearly absent; abundant prismatic crystals of calcium oxalate mostly present singly in a cell and also as numerous crystal fibres; starch grains mostly simple, 2 or 3 in compound grains, hilum inconspicuous.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	25	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	18	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the diethyl ether extract on precoated silica gel 'G' plate (0.2 mm thick) using petroleum ether : ethyl acetate : formic acid (15:2.5:0.2) showed spots at Rf 0.19, 0.28, 0.54 and 0.72 (all pink) on spraying with vanillin-sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Anthraquinones, tannins, sterols.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Koṣṭhaśuddhikara

**IMPORTANT FORMULATIONS** - Avittoladi Bhasma (Kṣāra), Mānasamitra Vaṭaka

**THERAPEUTIC USES** - Gaṇḍamālā, Upadaṃśa, Kuṣṭha, Aruci, Vibandha, Śūla, Kāmalā, Hṛdroga, Raktapitta, Vātarakta, Śoṭha, Mūtrakṛcchra, Dāha, Jvara, Udaravikāra, Kṛmi, Prameha, Gulma, Vraṇa, Kaṇḍū, Grahaṇī, Aśmarī

**DOSE** - 50 - 100 ml kvātha.

## ĀSPHOTĀ (Root)

Āsphotā consists of the dried root pieces of *Vallaris solanacea* Kuntze syn. *V.heynei* Spreng. (Fam. Apocynaceae), a large woody climbing shrub, occurring wild in subtropical Himalayan forests, up to an altitude of 1500 m and on the Konkan coast and further south; often cultivated in the gardens as an ornamental plant due to its fragrant white flowers.

### SYNONYMS

Sanskrit	:	Bhadravallī, Āsphotā
Assamese	:	--
Bengali	:	Haaparmaali
English	:	--
Gujrati	:	--
Hindi	:	Dudhibel
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	--
Oriya	:	Bonokonerinoi, Haporomoli
Punjabi	:	--
Tamil	:	--
Telugu	:	Nagamalle, Nityamalle
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The dried, young and old root pieces are light, tough, cylindrical, tortuous and rarely branched. Young root about 5 to 6 cm. in length and about 1 to 2 cm. in diameter, surface smooth to faintly longitudinally wrinkled, with transversely elongated lenticels, cracks and

exfoliation at places exposing the inner wood, buff to greyish externally, pale yellowish brown internally.

Old root pieces are about 5 to 12 cm. in length and 3 to 8 cm. in diameter, surface very rough, knotty, longitudinally fissured, furrowed, cracked, prominent rootlet scars present, small rounded protuberances encircle the lenticels and exfoliation; earthy brown to grey externally, pale brown internally; transversely cut surface shows brown coloured outer bark, colourless, papery, thin inner bark and a wide zone of pale brown central wood, occupying the major area of the root; odour slightly aromatic and irritant; taste, bitter.

### **b) Microscopic**

Cork many layered, outer one lignified, inner few layers suberised, cork cambium distinct 2 to 3 layered, cortex narrow in young root and compressed in old; parenchymatous, filled with cluster crystals of calcium oxalate and simple as well as compound starch grains; pericycle is characterised by the presence of isolated groups of small, thick walled, lignified fibres; phloem many layered, characterised by two distinct zones, cells of the outer one filled with yellowish brown contents, the inner narrow zone is devoid of this; medullary rays mostly uniseriate, rarely bi to fourseriate, narrow, almost running parallel to each other but becoming wavy in the outer phloem and abruptly getting broad at its extremities especially in case of old roots; sieve tubes, companion cells and phloem parenchyma distinct, all parenchymatous cells of the phloem including medullary ray cells are filled with abundant clusters and a few prisms of calcium oxalate crystals and starch grains, microclusters of calcium oxalates arranged in rows form the characteristic feature of the phloem; thick walled, circular latex cells, rectangular, tangentially elongated oil channels filled with oil globules traverse throughout the phloem; a few thick walled, lignified, pitted stone cells are located especially in the old roots; cambium distinct, continuous; xylem very wide, lignified consisting of mostly isolated xylem vessels and tracheids, both border - pitted; fibers thin walled; parenchyma and medullary rays pitted, containing starch grains.

**Powder** - Under the microscope it exhibits polygonal lignified cork cells in surface view, parenchymatous cells of the cortex and the phloem cells with starch grains and calcium oxalate cluster crystals, pitted xylem vessels and tracheids, lignified pitted medullary rays cells; occasionally groups of lignified thick walled, pitted stone cells and thin walled xylem fibres with wide lumen are also seen.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 8 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.7 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 6 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 11 per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the methanolic extract on silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (9:1) under UV (254 nm) shows prominent spots at Rf. 0.51, 0.62, 0.68, 0.76 (all dark spot) and 0.96 (blue fluorescence). On exposure to iodine vapour spots appear at Rf. 0.12, 0.19, 0.29, 0.44, 0.50, 0.67, 0.80 and 0.95.

### CONSTITUENTS -

#### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Vraṇaśodhaka

#### IMPORTANT FORMULATIONS - Vajraka Taila, Abhayā Lavaṇa

**THERAPEUTIC USES** - Aśmarī, Śūla, Mūtrakṛcchra, Pūtanāgrahaviṣṭa-(Bālaroga), Kuṣṭha, Grahaṇī, Śvāsa, Mūṣakaviṣa vikāra, Arśa, Vraṇa

**DOSE** - 3-6 g

## BASTĀNTRĪ (Root)

Bastāntrī consist of dried root of *Argyreia nervosa* (Burm.f.) Boj. syn. *A. speciosa* Sweet. (Fam. Convolvulaceae), a woody climber with stout stems, extensively planted in garden along trellises and walls and also found wild as an escape.

### SYNONYMS

Sanskrit	:	Vr̥ddhadāru, Antaha Koṭarapuṣpī, Chāgalāntrī
Assamese	:	--
Bengali	:	Bijataadaka, Bridhadarak
English	:	Elephant Creeper
Gujrati	:	Samudara Sosha, Varadhaaro, Shamadrasosh
Hindi	:	Samandar-kaa-paat, Samundarsosh, Ghaavapattaa, Vidhaaraa
Kannada	:	Samudrapala, Samudraballi
Kashmiri	:	--
Malayalam	:	Samudra Pacchha, Samudra-Pala, Marikkunn Marututari
Marathi	:	Samudrashok
Oriya	:	--
Punjabi	:	--
Tamil	:	Samudrappachai
Telugu	:	Samudrapaala
Urdu	:	Samandarotha

### DESCRIPTION

#### a) Macroscopic

Roots of varying sizes and thickness, thin pieces show somewhat smooth brownish exterior, thick pieces tough and woody, light brown in colour, rough, longitudinally striated, lenticellate and with circular root scars; fracture fibrous; rootlets and branches, thin and somewhat fibrous; odour, nil; taste, pungent, bitter and astringent.

### **b) Microscopic**

T.S. comprises of 6 to 9 layers of cork cells, a single layer of phellogen and usually 10 to 12 layers of phelloderm; cortical cells thin walled and tangentially elongated, containing circular starch grains, rosette crystals of calcium oxalate found scattered; a wide zone of secondary phloem consisting of sieve tubes, companion cells and phloem parenchyma present, traversed by medullary rays containing circular starch grains; resin canals present; secondary xylem a wide zone comprising of xylem vessels, tracheids, fibre-tracheids and fibres.

**Powder** - Creamish brown when fresh turning greyish brown on storage; shows under microscope, cortical cells parenchymatous filled with circular starch grain measuring between 3 to 16  $\mu$  in diameter; brown colouring matter and rosette crystals of calcium oxalate present; vessels, tracheids, xylem parenchyma, fibres and fibre tracheids present; vessels, drum shaped, pitted with large end perforations; tracheids, much longer than wide with bordered pits; fibres having pointed ends; fibre tracheids, having blunt ends and a few oblique pits.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.8	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of methanolic extract of the roots on precoated silica gel G plate using methanol - chloroform (20 : 80) showed a blue fluorescent spot under UV (365nm) along with number of other spots of very weak intensity. Due to the presence of very negligible amount of alkaloids in the roots these could not be isolated. However, methanolic extract of *A. nervosa* seeds was prepared and T.L.C. compared with *A. nervosa* roots extract. The

T.L.C. pattern of root and seed extracts (prepared in methanol) was similar although the intensity of spots in case of root extracts was very poor.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Sara, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphavātahara, Adhobhāgahara, Vṛṣya, Rasāyana, Āyurvṛddhikara, Balya, Medhya, Rucya, Svarya, Kaṇṭhya, Asthisandhānakārī, Agnikara, Kāntikara, Viṣaghna

### IMPORTANT FORMULATIONS - Miśraka Sneha

**THERAPEUTIC USES** - Gulma, Mūtrakṛcchra, Aruci, Hṛdrujā, Ānāha, Udāvarta, Arśa, Udara, Grahabādhā, Śūla, Vātarujā, Raktapitta, Vātarakta, Āmavata, Śopha, Meha, Vātārśa, Śvayathu, Kṛmi, Pāṇḍu, Kṣaya, Kāsa, Unmāda, Apasmāra, Visūcī, Pratītum, Ślīpada

**DOSE** - 3-5 g

## BHŪRJAḤ (Stem Bark)

Bhūrjaḥ consists of the stem bark of *Betula utilis* D.Don syn. *B.bhojpatra* Wall. (Fam. Betulaceae), a moderate sized tree, usually with a somewhat irregular bole; occasionally a mere shrub, forming the upper limit of forest vegetation, found throughout the main Himalayan range ascending to an altitude of 4200 m.

### SYNONYMS

Sanskrit	:	Bhūrja Patraḥ, Mṛducchada, Bahulavalkala, Bhūrjagranathi, Carmī, Lekhyapatrakah
Assamese	:	--
Bengali	:	Bhoojpatra, Bhujipatra
English	:	Himalayan Silver Birch
Gujrati	:	Bhojpatra
Hindi	:	Bhojapatra
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Bhurjamaram
Marathi	:	Bhoorjapatra
Oriya	:	--
Punjabi	:	--
Tamil	:	Bhojapatram
Telugu	:	Bhurjapatri
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Broad, horizontal paper like strips, flaps or flakes of varying sizes or loosely laminated exfoliating pieces of bark; outer surface smooth silver grey or creamish-yellow with brown streaks; inner surface shining, reddish brown in colour, slightly wrinkled, more often devoid of markings; odour, slightly terbinthene; taste-none.

#### **b) Microscopic**

T.S. shows rectangular cells, 6 to 9 layers of thin walled parenchymatous cells, containing prismatic calcium oxalate crystals.

**Powder** - Light brown; parenchymatous cells, with a few prismatic calcium oxalate crystals present.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 2.1 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 19 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 0.8 per cent, Appendix	2.2.7.

### **ASSAY**

#### **T.L.C.**

T.L.C. of chloroform extract of the drug on a precoated silica gel G plate using n-hexane : ethyl acetate (9:1), on spraying with Liberman-Burchard reagent and heating the plate for about 5 minutes at 110°C, three spots appear at Rf . 0.31 (blackish-grey), 0.62 (dark pink) and 0.54 (light pink) and were comparable to the spots of betulin, lupeol and 3 β-acetoxy-12-oleanen-28-oic acid respectively.

**CONSTITUENTS** - Betulin, lupeol and 3  $\beta$  - aetoxy - 12 - oleanen - 28 - oic acid.

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Kaṣāya

**Guṇa** : Laghu

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Tridoṣaśamana, Bhūtarakṣākara, Viṣaghna, Balya, Śleṣmahara, Medohara

**IMPORTANT FORMULATIONS** - Ayaskṛti

**THERAPEUTIC USES** - Karṇaroga, Raktapitta, Kuṣṭharoga, Rakṣoghnadhūpana, Vraṇa, Aparāpātana, Garbhasaṅga, Granthivisarpa, Bālagraha

**DOSE** - 1-3 g

## CANḌĀ (Root)

Caṇḍā consists of dried root of *Angelica archangelica* Linn. (Fam. Apiaceae), a tall perennial herb with thick hollow stem bearing large bipinnate leaves and umbels of greenish-white flowers; found wild in inner valleys of Himalayas viz. Kashmir, Chamba, Kullu, Pangi, Lahaul and Kinnaur at altitudes between 3200 and 4200 m.

### SYNONYMS

Sanskrit	:	Laghu Coraka
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	--
Hindi	:	Choraka bheda, Dudhachoraa
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	--
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	--
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Tap root thick, twisted, fleshy, highly aromatic with numerous rootlets, greyish in colour; odour, musk-like; taste, sweet.

#### **b) Microscopic**

T.S. shows periderm composed of 5 to 9 layers of cork, followed by a layer of phellogen and a few layers of phelloderm, cork cells rectangular; cortex composed of thin walled parenchymatous cells, irregular in shape with intercellular spaces and contain abundant starch grains; numerous oleo-resin cells filled with oil globules are present, which, in mature roots may degenerate and form irregular cavities; vascular region and cortex traversed by biseriate medullary rays, containing circular starch grains, measuring usually upto 24  $\mu$  but some upto 65  $\mu$  in length and 45  $\mu$  in breadth; phloem a wide zone composed of sieve tubes, companion cells, phloem parenchyma and medullary rays; schizogenous oleo-resin cells lined by epithelium containing yellowish brown substances present in this zone; cambium very distinct consisting of 4 to 8 layers; xylem consists of vessels and tracheids.

**Powder** - Creamish yellow; shows under microscope drum shaped vessels with reticulate thickenings, tracheids elongated with pointed ends having reticulate thickenings; fibres narrow elongated with pointed ends; circular starch grains present.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2.0 per cent, Appendix	2.2.2.
Total Ash	Not more than	7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12 per cent, Appendix	2.2.7.
Volatile oil	Not less than	0.3 per cent, Appendix	2.2.10

#### **T.L.C.**

T.L.C. of the methanolic extract of the roots on precoated silica gel 'G' plates, using methanol : chloroform (2:98) as the mobile phase, on spraying with 2% vanillin in sulphuric

acid reagent and heating the plate for five minutes at 110°C showed an orange brown spot at Rf.0.37 (comparable to the spot of selimone) and a greyish blue spot at Rf.0.68 (comparable to the spot of archangelin).

**CONSTITUENTS** - Containing limonene,  $\alpha$ -phellandrene, pinene, p-cymene, terpinolene, myrcene, fenchone, linalool,  $\alpha$ -terpineol, cadinene, borneol,  $\alpha$ -caryophyllene, bisabolol, angelica lactone, and other mono and sesquiterpenes. Other constituents include selimone, archangelin, oxypeucedanin.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu  
**Guṇa** : Laghu, Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Śvāsahara, Mūtrala, Varṇaprasādaka, Svedaghna, Kaṇḍūghna, Viṣaghna, Daurgandhahara

**IMPORTANT FORMULATIONS** - Mañjiṣṭhādi Taila

**THERAPEUTIC USES** - Śoṭha, Śvāsa, Apasmāra, Hikkā, Arśa, Kaṇḍū, Piḍakā, Koṭha

**DOSE** - 1-3 g

## CORAKAḤ (Root Sock)

Corakah consists of dried mature root and root stock of *Angelica glauca* Edgw. (Fam. Apiaceae), a glabrous herb, upto 1.5 m tall, stem erect, grooved and fistular with pinnately divided leaves having compound umbels of white or purple flowers, found in temperate north-west Himalayas.

### SYNONYMS

Sanskrit	:	Taskarah, Ksemakah
Assamese	:	--
Bengali	:	Chorak
English	:	--
Gujrati	:	Chorak
Hindi	:	Choraa, Gandrayan, Rikha Choraa
Kannada	:	Choraka
Kashmiri	:	--
Malayalam	:	Choraka Pullu
Marathi	:	Corak
Oriya	:	--
Punjabi	:	Choraa, Churaa
Tamil	:	--
Telugu	:	Gaddi Davanamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root stock :** Small, thick pieces, 5 to 15 cm long and 1 to 3 cm in thickness; yellowish to grey in colour, rough due to the presence of deep furrows and longitudinal wrinkles; frequently crowned with leaf or stem base; fracture, hard and fibrous; odour characteristically aromatic; taste, sweet with a bitter after effect and pungent aromatic flavour.

**Root :** Small pieces of 5 to 20 mm in thickness, externally grayish-brown and spongy; surface rough due to longitudinal wrinkles, furrows and transverse cracks; internally it shows a yellow porous radiating wood surrounded by dark brown cork; fracture short, smooth and the fractured surface shows bark with numerous radially arranged schizogenous oleo-resin cavities with brown or yellow content.

#### **b) Microscopic**

**Root stock :** T.S. shows 6 to 10 layered cork of tangentially elongated cells, followed by 3 or 4 layers of phellogen and a wide zone of phelloderm consisting of thin walled parenchyma in which schizogenous cavities present; phloem, cone shaped, traversed by parenchymatous medullary rays filled with circular starch grains measuring between 3 and 23  $\mu$  in diameter; numerous schizogenous oleo-resin cells present; cambium present; xylem arranged in concentric layers and consists of vessels, tracheids, fibres and xylem parenchyma and traversed by medullary rays; pith consists of thin walled parenchymatous tissue in which schizogenous oleo-resin cavities, filled with yellowish contents of resin are present.

**Root :** T.S. shows periderm consisting of 5 to 8 layers of thin walled yellowish - brown cork, a layer of phellogen and phelloderm, composed of thin-walled parenchyma cells, irregular in shape with intercellular space and containing abundant starch grains measuring upto 20  $\mu$  in diameter; some of these cells disintegrate in the mature roots and give rise to some irregular cavities; schizogenous type of oleo-resin cavities in this region contain oil globules and resin; phloem a wide zone and traversed by medullary rays, consisting of phloem parenchyma, sieve tubes and companion cells; numerous radially arranged schizogenous oleo-resin cavities present in phloem parenchyma, containing yellowish or yellowish-brown contents; cambium present; xylem diarch and radiating wood traversed by parenchymatous, multiseriate medullary rays filled with starch grains measuring upto 20  $\mu$  in diameter; wood consists of vessels, tracheids, wood parenchyma and wood fibres; vessels

large, drum - shaped or elongated, reticulately thickened having oblique or transverse perforation.

**Powder** - Yellowish - brown, shows under microscope, parenchymatous cells filled with yellow or reddish-brown colouring matter and oil globules; schizogenous cavities and vessels with reticulate thickenings present; starch grains simple, oval to circular, upto 25 $\mu$  approximately.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	6.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	30 per cent, Appendix	2.2.7.
Volatile oil	Not less than	0.4 per cent, Appendix	2.2.10

### **T.L.C.**

T.L.C. of essential oil of the drug on precoated silica gel G plate using ethyl acetate : hexane (3:97) shows under UV light (365 nm) four spots at Rf. 0.48, 0.40 & 0.29 (yellowish blue fluorescence) and 0.25 (blue fluorescence). On spraying with dragendroff's reagent two spots at Rf. 0.48 and 0.40 appeared as orange coloured. On spraying with 2% vanillin-sulphuric acid appears four spots at Rf 0.48 & 0.40 (greyish-purple), 0.29 (cremish) and 0.25 (pinkish-purple).

The methanol extract of the drug on precoated silica gel G plate, using methanol-chloroform (2: 98) shows one spot at Rf. 0.71, and ethyl acetate : hexane (5:95) appear single spot at Rf. 0.21 (yellowish-blue colour) under UV light (365 nm) and was comparable to the spot of oxypeucedanin.

**CONSTITUENTS** - Oxypeucedanin, 3-butyridene phthalide, 3-butyridene dihydrophthalide [(E-and (Z)-ligustilide] and dimers of butyl phthalides [angiolide, angelicolide].

## PROPERTIES AND ACTION

**Rasa** : Madhura, Tikta, Kaṭu

**Guṇa** : Laghu, Rūkṣa, Tīkṣṇa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Medohara, Svedahara, Hṛdya, Saṃjñasthāpana, Dīpana, Pācana, Varṇaprasādana, Vāmaka

**IMPORTANT FORMULATIONS** - Guḍūcyādi Modaka, Balāśvagandhalākṣādi Taila, Mahā Nārāyaṇa Taila

**THERAPEUTIC USES** - Kaṇḍū, Piṭikā, Koṭha, Kuṣṭha, Jvara, Viṣaroga, Vraṇa, Raktadoṣa, Agnimāndya, Śiraḥ Śūla, Unmāda, Apasmāra, Hikkā, Śvāsa, Pratiśyāya, Śītajvara, Bālaroga

**DOSE** - 3-6 g

## DARBHA (Root)

Darbha consists of root of *Imperata cylindrica* (Linn.) Beauv. (Fam. Poaceae), a perennial, erect, 30 to 90 cm tall tufted grass, distributed in the hotter parts of India from Punjab southwards.

### SYNONYMS

Sanskrit	:	Yajñamūla, Ulu, Kutuka, Kharadarbha, Śvētadarbha
Assamese	:	--
Bengali	:	Ulu
English	:	Thatch grass, Cogon grass
Gujrati	:	Daabhdo, Darabh
Hindi	:	Daabha, Siru, Ulu
Kannada	:	Sanna dabbac hullu
Kashmiri	:	--
Malayalam	:	Vidulam
Marathi	:	Darsnaa, Dhub
Oriya	:	--
Punjabi	:	Daaba, Sil
Tamil	:	Darbhaipul, Nanal
Telugu	:	Darbalu, Darbha gaddi, Modewa gaddi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The roots are fibrous, upto 2 mm. in diameter, arising from the nodes of stolons; surface uneven, with fine wrinkles, light brown to dark brown in colour; fracture, fibrous; taste and odour-indistinct.

## b) Microscopic

T.S. shows single layered epidermis with a few long root hairs, followed by cortex which can be differentiated into outer and inner regions; outer cortex represented by 3 to 5 layers of circular to oval-shaped thin walled parenchyma cells; inner cortical region exhibits numerous air cavities lined by thin walled radially elongated parenchymatous cells forming the trabeculae; the central region of the root exhibits a typical monocotyledonous structure having 10 to 15 bundles of xylem elements alternating with small patches of phloem and surrounded by rings of endodermis and pericycle; except those of phloem elements all the cells from metaxylem to pericycle region are thick walled and lignified; the centre of the vascular cylinder is occupied by pith consisting of thin walled parenchymatous cells; the vessels are border pitted; tracheids exhibit bordered pits as well as reticulate thickening; parenchyma of vascular region are pitted and fibres are thick walled with pointed to tapering ends.

**Powder - The powder exhibits fragments of hairs, thin walled parenchyma cells, thick walled fibres with tapering or pointed ends; border pitted vessels, elongated tracheids with tapering to blunt ends exhibiting reticulate thickening or bordered pits and rectangular, thick walled, pitted parenchyma cells.**

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

## T.L.C.

TLC of alcoholic extract on pre-coated Silica 'G' plates (Merck), using Chloroform: Toulene:Ethanol:Acetic : Water (22:8:1:0.5:1, lower phase), shows under U.V. (254 nm) two white fluorescent spots at Rf.0.72 and 0.42; on exposure to iodine vapours six spots appear at Rf. 0.94, 0.85, 0.72, 0.45, 0.39 (all yellow) and 0.36 (orange); after spraying with 5% ethanolic-sulphuric acid and heating the plate at 110<sup>0</sup>C for 30 minutes, ten spots appear

at Rf. 0.94 (dark brown), 0.85 (light brown), 0.76 (faint brown), 0.72 (brown), 0.52 (light brown), 0.45 (light brown), 0.39 (violet), 0.36 (yellow), 0.26 (orange) and 0.21 (faint brown).

**CONSTITUENTS** - Contains five triterpenoids viz. cylindrin, arundoin, fernenon, isoburneol and simiarenol.

### **PROPERTIES AND ACTION**

**Rasa** : Madhura, Kaṣāya  
**Guṇa** : Laghu, Snigdha  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Tridoṣahara, Rasāyana, Mūtravirecanīya, Stanyajanana, Pipāsāhara, Kuṣṭhaghna, Dāhapraśamana, Vāmaka

**IMPORTANT FORMULATIONS** - Karpūrādyārka, Brāhma Rasāyana, Traikaṇṭaka Ghṛta, Sukumāra Ghṛta

**THERAPEUTIC USES** - Mūtrakṛcchra, Aśmarī, Mūtrāghāta, Bastiśūla, Tṛṣṇā, Dāha, Raktapradara, Raktārśa, Pradara, Raktapitta, Jvara, Visarpa, Pittabhiṣyanda

**DOSE** - 10-20 g for decoction.

## DHANVAYĀSAḤ (Whole Plant)

Dhanvayāsaḥ consists of dried whole plant of *Fagonia cretica* Linn. Syn. *F. arabica* Linn., *F. bruguieri* DC. (Fam. Zygophyllaceae), a small spiny under shrub with stiff, more or less prostrate branches found in north-west India and Deccan.

### SYNONYMS

Sanskrit	:	Duhsparśā, Durālabhā, Dhanvayāsakah, Virupā, Durālabhā, Uṣṭrabhakṣyā
Assamese	:	--
Bengali	:	Duralabha
English	:	Khorasan thorn
Gujrati	:	Dhamaaso
Hindi	:	Damahan, Dhamaasa, Hinguaa, Dhanhare
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Kodittuva
Marathi	:	Dhamaasaa
Oriya	:	--
Punjabi	:	Dama, Dhamah, Dhamaha
Tamil	:	Tulganari
Telugu	:	Chittigava, Gilaregati
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap root externally brownish green, rough, with longitudinal striations, core yellowish-green; fracture, fibrous.

**Stem** - Stem pieces 0.5 to 1.5 cm thick, of variable lengths; young green, mature brown; spiny, two pairs of spines present at each node, spines sharp, slender, 1.5 to 2 cm in length; external surface of stem green, whitish brown when dry, striated; transversely smoothed surface showing a thin bark and prominent wood, bark peeling from stem; fracture, short.

**Leaf** - Small, subsessile, linear, oblong, leaflets entire, green or blackish brown, 0.5 to 1.5 cm in length and 0.05 to 0.1 cm in width, without any prominent midrib region projected above the level of lamina.

**Flower** - Flowers small, pale rose or purple, pedicels slender, 6 to 12 mm long; sepals 3 to 4 mm long, ovate, aristate; petals twice as long as the sepals, spatulate, claw long; ovary hairy, style tapering.

**Fruit** - Pentagonous schizocarp, composed of five compressed, two valved cocci.

#### **b) Microscopic**

**Root** - T.S. shows outermost cork represented by 4 or 5 layers of small, narrow, tangentially elongated cells; phelloderm composed of 6 to 10 layers of somewhat tangentially elongated, thin walled parenchymatous cells, some cells having rhomboid crystals of calcium oxalate measuring 10 to 15  $\mu$  in length and 8 to 10  $\mu$  in width; outer part of secondary phloem characterised by the presence of abundant, but small patches of 2 or 3 thick walled phloem fibres; wood composed of vessels, xylem fibres and traversed by 1 to 3 seriate medullary rays; vessels arranged in singles or doubles; fibres long, thick walled with tapering ends and measuring upto 500  $\mu$  in length and about 25  $\mu$  in width.

**Stem** - T.S. shows more or less circular outline; single layered epidermis with thick cuticle; unicellular trichomes occasionally present; cortex consisting of 7 to 10 layers of parenchymatous cells showing large patches of fibres; sclereids with narrow lumen occurring singly or in groups in the cortex, measuring upto 50  $\mu$  in diam.; several cortical cells contain tannins; secondary phloem consisting of thin walled cells; vascular cambium composed of 3 to 4 layers of thin walled tangentially elongated cells; secondary xylem composed of fibres, tracheids, vessels, xylem parenchyma; fibres long, thick walled with tapering ends and measuring 260 to 950  $\mu$  in length and upto 20  $\mu$  in width; medullary rays mostly uniseriate or sometimes biseriate; pith composed of large thin walled parenchymatous cells, some cells containing tannins; rhomboid crystals measuring 18 to 30  $\mu$  in length and 12 to 20  $\mu$  in width present in cortex and pith.

**Leaf** - Isobilateral; single layered epidermis consisting of mostly tangentially elongated cells covered with thick cuticle. In surface view both upper and lower epidermii show anomocytic type of stomata, epidermal cells polygonal in shape; 2 or 3 layered palisade cells present on both the sides, adjacent to the epidermis; vascular bundles show xylem towards lower side and phloem towards upper side; sclerenchyma tissue occur as a bundle cap just above the phloem; small lateral vascular bundles also present in lamina; vein-islet number 11 to 14; stomatal index 16 to 17 on lower epidermis and 5 to 7 on upper epidermis; palisade ratio 2 or 3 on upper epidermis and 2 to 4 on lower epidermis.

**Powder** Yellowish-white, bitter taste, showing groups of fibres, bordered pitted vessels, fragments of palisade tissue, sclereids, rhomboid crystals of calcium oxalate, cork cells, and unicellular glandular and nonglandular trichomes (both from fruit epicarp), epidermal cells (cubical, rectangular or polygonal) with slightly wavy walls and anomocytic stomata.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 10 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 10 per cent, Appendix	2.2.7.

#### **ASSAY**

#### **T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' plates (0.2 mm thick) using chloroform : methanol: acetic acid (70:30:0.2) shows under UV (254 nm) four spots at Rf. 0.14, 0.32, 0.46 (all violet) and 0.72 (yellowish green). Under UV (366nm) six fluorescent spots appear at Rf. 0.14, 0.32 (both brown), 0.39, 0.51, 0.61 and 0.72 (all pink). On exposure to iodine vapour nine spots appear at Rf. 0.14, 0.19, 0.28, 0.35 (all yellow), 0.46 (faint orange), 0.51, 0.61 and 0.72 (all yellow). On spraying with vanillin sulphuric acid reagent and heating the plate at 110°C for 10 min. ten spots appear at Rf. 0.06 (bluish grey), 0.14 (violet), 0.19 (brown), 0.28 (violet), 0.35 (brown), 0.39 (violet), 0.46 (brown), 0.51 (violet), 0.61 (brown) and 0.72 (violet).

**CONSTITUENTS** - Alkaloids (Harmine); amino acids (alanine, glycine, leucine, arginine, isoleucine, lysine, phenylalanine, proline, tyrosine and valine); terpenoids of oleanane group.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphahara, Vātahara, Pittahara, Medohara

**IMPORTANT FORMULATIONS** - Durālabhādi Kvātha, Durālabhādi Kaṣāya, Rāsnādi Kvātha Cūrṇa (Mahā), Tiktaka Ghṛta, Usīrāsava, Kaṇṭakāryavaleha, Mahāpañcagavya Ghṛta, Daśamūlāriṣṭa, Punarnavāsava

**THERAPEUTIC USES** - Atīsāra, Grahaṇī, Dāha, Jvara, Viṣamajvara, Tṛṣṇā, Prameha, Moha, Mūrccā, Madaroga, Raktapitta, Raktavikāra, Kuṣṭha, Visarpa, Vātarakta, Bhrama, Gulma, Chardi, Kāsa, Mūtrāghāta

**DOSE** - 5-10 g powder,  
40-80 ml phāṇṭa.

## DRAVANTĪ (Seed)

Dravantī is the dried seeds of *Jatropha glandulifera* Roxb. (Fam. Euphorbiaceae), an evergreen shrub with stout branches and a smooth papery bark, found mostly in the black cotton soil of Deccan but also found in plains of northern India.

### SYNONYMS

Sanskrit	:	Bṛhaddantī, Vyāghrairaṇḍa, Putraśreṇī
Assamese	:	--
Bengali	:	--
English	:	Purging nut
Gujrati	:	Ratanjota
Hindi	:	Laal Bagharend, Jangali erandi
Kannada	:	Erandane danti, Totla
Kashmiri	:	--
Malayalam	:	Katalaavanakku
Marathi	:	Thoradanti, Mogali eranda
Oriya	:	--
Punjabi	:	--
Tamil	:	Kattamanakku, Adalai
Telugu	:	Adavi Amadam, Vatti amudamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seeds 6 mm long, 4 mm broad and 2 to 3 mm thick, ellipsoid, oblong, light brown in colour, surface smooth with median sutures on both sides, with a small hard brownish white and minutely lobed caruncle round the micropyle, weight of 100 seeds are 1 to 2 g.

## b) Microscopic

Subtrigonus to oval in transverse section; outer epidermis of testa single layered, thick walled, pitted narrow columnar cells with dark brown contents; mesophyll parenchymatous with intercellular spaces and schizogenous latex tubes; the inner epidermis has short palisade of narrow thin walled cells, tegmen 16 to 20 cells thick, the outer layer straight or curving, malpighian cells 2 or 3 with finely pitted yellowish brown walls followed by reddish-brown elongated single celled sclereids; the lower layer consists of large parenchymatous cells 12 to 16 layers deep with the inner cells radially elongated and crushed; inner epidermis not characteristic; endosperm composed of cells filled with starch grains and oil globules, starch grains spherical to oval, 5-20  $\mu\text{m}$  in diameter, simple, hilum circular or indistinct, crescent shaped leucoplast at one side of the grains, lamellae indistinct.

**Powder** - Powder of seeds creamish-brown, mucilagenous in taste without any odour, shows the presence of parenchymatous patches; cells filled with starch, spherical to oval, 5 to 20  $\mu\text{m}$  in diameter, simple, hilum circular or indistinct; lamellae indistinct; sclereids upto 160  $\mu$  long and 30  $\mu$  broad, oil globules, laticifers, vessels, elongated thick walled palisade cell, malpighian cells, and aleurone grains are observed; the powder when treated with 1N HCl on a microscope slide, becomes pink when observed in day light and pinkish red under UV light 254 nm.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.
Fatty oil	Not less than	9	per cent, Appendix	2.2.15

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : methanol (80 : 20 : 0.4) on spraying with anisaldehyde-sulphuric acid reagent and heating the plate for ten minutes at 120°C, spots appear at Rf. 0.45, 0.53, 0.84 (all brown) and 0.31 (pink).

**CONSTITUENTS** - Jatrophin, jatropholone A, fraxetin, coumarino-lignan (I).

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Tīkṣṇa, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Recaka, Viḍbhedana, Dīpana, Viṣaghna

**IMPORTANT FORMULATIONS** - Miśraka Sneha

**THERAPEUTIC USES** - Raktavikāra, Kaṇḍū, Kuṣṭha, Śoṭha, Pāṇḍu, Gulma, Udara, Ānāha, Udāvarta, Ajīrṇa, Śūla, Hṛdroga, Grahaṇīroga, Tṛṣṇā, Jvara, Garaviṣa, Prameha, Bhagandara, Āmavāta, Pakṣāghāta, Ūrustambha, Granthi, Pārśvaśūla, Plīhāroga, Duṣṭavrāṇa, Duṣṭa-apacī

**DOSE** - 250 - 500 mg after purification.

## DUGDHIKĀ (Whole Plant)

Dugdhikā consists of whole plant of *Euphorbia prostrata* W. Ait. (Fam. Euphorbiaceae), an accepted substitute for *E. thymifolia*, the official drug; it is a small more or less pubescent, much branched prostrate annual, found throughout India as a naturalized weed.

### SYNONYMS

Sanskrit	:	Svāduparṇī, Kṣīrinī, Laghudugdhikā, Nāgārjunī, Gorakṣadugdhī
Assamese	:	--
Bengali	:	Bara, Kharui, Kerai, Dudiya, Shwet Keruee
English	:	--
Gujrati	:	Raati Dudhelee, Naagalaa dudhelee
Hindi	:	Dudhi, Duddhi, Dudhdee, Chhotidudhi
Kannada	:	Kempu nene hakki
Kashmiri	:	--
Malayalam	:	Nilappal
Marathi	:	Lahaan naaytee, Naayeti, Lahaandudhi
Oriya	:	--
Punjabi	:	Dodhak, Hajardana, Baradodk, Hazardana
Tamil	:	Sittirappaladi, Sittirappaladi
Telugu	:	Peddivari manubaala
Urdu	:	Dudhi

### DESCRIPTION

#### a) Macroscopic

Branched prostrate with many stems spreading from the roots, slender upto 20 cm long; leaves green but occasionally purplish red, opposite, 2.5 to 5 mm long and 2 to 4 mm broad, oblong or subquadrate, tip mucronate, base symmetric and more or less cordate, margin serrulate in upper portion, glabrous above, slightly pubescent beneath especially on the apex; petiole short, 1 mm or even less in length; tap root 1 to 3 mm in diameter; inflorescence cyathium in short axillary racemiform clusters, involucre lobes 5, deltoid ovate, ciliate; nectary gland 4, minute; ovary tricarpellary, suborbicular, stipitate, narrowly limbed long styles; stigma three branched, each bifid; capsule 1 to 1.5 mm long, densely hairy on ridges, hairs occasionally present on the surface; fruit subglobose trigamous, long stalked; seeds 0.6 to 0.8 mm long, oblong, 4 angled, smooth with 5 to 7 transverse ribs, reddish brown and bluntly pointed; smell oily; no characteristic taste.

#### **b) Microscopic**

**Root** - T. S. of young root circular in outline, endodermis without casparian bands; triarch stele; mature roots phelloderm 6 to 8 layers, outer most layer thickly suberized; cork cells obliterated; cambium indistinct; broad xylem vessels solitary or in a group of 2 or 3, surrounded by a number of radially arranged narrow vessels and tracheids; medullary rays short, one or two seriate and extend upto phloem.

**Stem** - Cross section of stem circular in outline, thick, non striated cuticle, interrupted by unicellular or multicellular uniseriate trichomes upto 185  $\mu$  long and 15  $\mu$  broad; paracytic stomata at some places; cortex with a few latex canals; pericyclic fibres in groups; cambium not discernible; medullary rays narrow, 1 or 2 cell wide, parenchymatous pith with intercellular spaces.

**Leaf** - Two types of hairs present (a) multicellular, multiseriate glandular hairs with single apical cell at leaf margins only, (b) uniseriate 1 to 3 celled hairs on the margins, at abaxial side and in apex; cross section shows dorso-ventral structure, single layered upper and lower epidermis, mesophyll and vascular bundles; in surface view, the abaxial epidermal cells angular with straight cell walls, stomata anomocytic to anisocytic, stomatal indices 17.6 to 26.3 and density 60 to 130; adaxial epidermal cell walls slightly wavy with globular thickening at the angles; stomata anisocytic, stomatal indices 11.4 to 18.7 and stomatal density 25 to 60; palisade ratio 3 to 6; vascular bundles collateral, with bundle sheath; laticiferous canals observed; vein islet 1 to 5 and vein termination numbers is 3 to 13.

**Powder** - Powder yellowish-green, tasteless with oily odour; on microscopical examination it shows angular and slightly wavy epidermal cells with stomata, uniseriate, 1 to 3 celled trichomes or hairs and some pieces of glandular hairs parenchymatous patches, laticiferous canals, pollen grains, pieces of nectary glands, fragments of vessels, tracheids, fibres and stomata; when treated with 1N NaOH in methanol shows purple colour with yellowish tinge, and in acetic acid reddish yellow colour under UV - 254 nm.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	11 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	11 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	27 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate (80 : 20) shows under UV (366 nm.) fluorescent zones at Rf. 0.05 (Maroon), 0.15 (light blue) and 0.66 (red). On spraying with anisaldehyde-sulphuric acid reagent and heating the plate for ten minutes at 120<sup>0</sup>C, spots appear at Rf. 0.12 (bright green), 0.23 (pinkish blue), 0.32 (pink), 0.38 (grey), 0.48 (dark greyish blue), 0.52 (pink), 0.61 (magenta), 0.66 (magenta) and 0.94 (blue).

**CONSTITUENTS** - Glucoside, Galactoside,  $\beta$ -sitosterol, Compesterol, Stigmasterol, Cholesterol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Madhura, Lavaṇa
<b>Guṇa</b>	:	Guru, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Garbhakāraka, Mūtrala, Viṣṭambhinī, Grāhī, Malastambhaka, Dhātuvṛddhikara, Vṛṣya, Hṛdya

**IMPORTANT FORMULATIONS** - Gaganasundara Rasa

**THERAPEUTIC USES** - Kuṣṭha, Kṛmi, Śvāsa, Pravāhikā, Raktapitta, Prameha, Raktārśa, Palita, Danta-ghuna, Dadru, Sphoṭa

**DOSE** - 5-10 g

## ELAVĀLUKAM (Seed)

Elavālukam consists of dried mature seed of *Prunus avium* Linn.f. (Fam. Rosaceae), a tree cultivated in Kashmir and lower Himalayas of Uttar Pradesh and W. Bengal; seeds available in the market are enclosed in hard woody endocarp.

### SYNONYMS

Sanskrit	:	Aileyah, Elavālūh, Elukākhyah
Assamese	:	--
Bengali	:	Elavaaluka
English	:	Sweet Cherry
Gujrati	:	--
Hindi	:	Aaluvaalu, Gilaas, Krusabala
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	--
Oriya	:	--
Punjabi	:	Aaluvaalu
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Brown kernel, ovoid, with pointed apical end and blunt opposite end, with ridges on the surface, measuring 0.8 to 1 cm in length, weighing about 300 mg each; similar to a tiny almond kernel, having same taste and smell.

### **b) Microscopic**

**Seed** - T.S. of seed shows the outermost uneven layer of stone cells interrupted by longitudinally running spirally thickened vascular element; stone cells oval to circular, thick walled, pitted, pit canal clear, lumen narrow (distinction from stone cell of *P. amygdalus*, where stone cells are squarish, with large lumen, showing pit occasionally and from stone cell of *P. domestica*, where stone cells are very thick walled, closely striated with small or obliterated lumen); size varies greatly; stone cell layer intermingled with very conspicuous pigment layer which contains hexagonal cells in surface view with well marked pits on the walls followed by 2 or 3 layers of disintegrated cells; thick, brown inner epidermal layer covers the parenchymatous cells of cotyledon which are angular, thick walled, completely filled with protein granules and oil globules; provasculature can be seen in the cotyledon.

**Powder** - White, oily with brown pieces of seed coat, stone cells oval to circular thick walled with pit canals, spirally thickened vascular elements, parenchymatous cells containing oil and protein granules.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract of the drug on silica gel 'G' plate (0.2 mm thick) using toluene : dichloro methane : ethanol : formic acid (10:5:3:1) as mobile phase shows seven bands on exposure to Iodine vapour at Rf. 0.17 (dark brown), 0.30, 0.46, 0.60, 0.67, 0.71, 0.77 (all light brown). On spraying with 5% Ethanolic sulphuric acid reagent and heating the plate for 10 minutes at 105°C eight bands appear at Rf. 0.17, 0.30 (both dark brown), 0.46, 0.52, 0.58, 0.67, 0.71, 0.77 (all light brown).

**CONSTITUENTS** - Prunasin (D-mandelonitrile- $\beta$ -glucoside), Quercetin-3-0- rutinosyl-7, 3-0-biglucoside, Kaempferol-3-0-rutinosyl-4'-di-0-glucosideand 6-ethoxykaempferol.

**PROPERTIES AND ACTION**

**Rasa** : Kaṣāya

**Guṇa** : Laghu, Rūkṣa

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Kaphahara, Yonidoṣahara, Varṇya, Stambhana, Śukraśodhaka, Vedanāsthāpana, Viṣaghna

**IMPORTANT FORMULATIONS** - Aśvagandhā Taila

**THERAPEUTIC USES** - Kaṇḍū, Vraṇa, Chardi, Aruci, Kāsa, Hṛdroga, Raktapitta, Kuṣṭha, Kṛmiroga, Mukharoga, Medroga, Tṛṣṇā, Arśa, Pāṇḍu, Unmāda, Jvara, Dāha

**DOSE** - 3 - 6 g

## GAᅇDĪRA (Root)

GaᅇdĪra consists of dried mature root of *Coleus forskohlii* Briq. syn. *C. barbatus* Benth. (Fam. Lamiaceae), a perennial branched aromatic herb; found in subtropical western Himalayas, Nilgiri hills, Gujarat and Bihar, and also cultivated in Maharashtra.

### SYNONYMS

Sanskrit	:	GaᅇdĪra (Sthalaja)
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	Garmar, Garmal
Hindi	:	Garmar
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	--
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Roots light in weight, light brown, longitudinally wrinkled, tapering, with a few rootlets, cut surface yellowish-white; fracture, short, characteristic pleasing odour; taste, slightly bitter and pungent.

## b) Microscopic

T.S. of root is irregular in outline, epidermal cells not discernible due to secondary growth; outermost multilayered storied cork of rectangular cork cells, below which is 1 or 2 layered cork cambium, followed by rectangular parenchymatous secondary cortical region in which oval stone cells with narrow lumen and walls with radiating canals and containing rhomboidal calcium-oxalate crystals present; vascular cambium in the form of continuous ring; phloem consists of sieve tubes, companion cells and phloem parenchyma; medullary rays well developed, radiating, varying in size, heterogenous as seen in tangential section; thin walled; in young root these are very broad as compared to the older ones; xylem represented by diffuse porous vessels, mostly solitary; xylem parenchyma surrounding the tracheids and vessels, filled with starch grains of 20 to 60  $\mu$  m in diameter, hilum distinct, star-shaped central cleft, lamellae occasionally observed; xylem parenchyma well developed in the young root, however in the older one fibres abundant; central zone comprises of compactly arranged vessels, fibres and fibre tracheids, oil cells with oil globules present in cortical phloem and xylem regions.

**Powder** - Powder yellowish-brown with pleasant aromatic smell, bitter in taste; powder shows numerous simple circular, ovoid, elliptical simple starch grains, 20 to 60  $\mu$  m in diameter, hilum distinct, star-shaped central cleft, occasionally lamellae observed; oil cells with oil globules, tracheids and vessels, parenchymatous cells filled with starch, tailed vessels, fibre tracheids, prismatic calcium oxalate crystals; powder becomes greenish-brown under UV 254 nm with nitrocellulose in amyloacetate and also with 50% KOH.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	16	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.
Essential oil	Not less than	0.1	per cent, Appendix	2.2.10
Coleonol	Not less than	0.15	per cent, Appendix	2.2.17A

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plates (0.2 mm thick) using toluene : ethyl acetate : methanol (80 : 20 : 0.5) shows under UV (366 nm) fluorescent spots at Rf. 0.14 (brick red), 0.20 (red), 0.25 (pink), 0.32 (brick pink), 0.46 (blue), 0.55 (brick red), 0.59 (brick red), 0.67 (blue), 0.87 (green) and 0.95 (blue). On spraying with anisaldehyde-sulphuric acid reagent and on heating the plate for ten minutes at 120°C, spots appear at Rf. 0.14 (brown), 0.2 (brown), 0.25 (light brown), 0.46 (grey), 0.55 (orangish brown), 0.59 (brown) and 0.87 (yellow).

**CONSTITUENTS** - Diterpene, coleonol, coleosol, deoxy-coleonol, forskohlin, naphthopyrone, coleoforsine.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya, Tikta
<b>Guṇa</b>	:	Rūkṣa, Tīkṣṇa, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Tridoṣahara, Vraṇaśodhana, Vidāhī

**IMPORTANT FORMULATIONS** - Kṛmighna Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Śoṭha, Arśa, Kāsa, Kṛmi, Kuṣṭha, Duṣṭa Vraṇa, Hutaviṣa, Gulma, Udara, Plīhāroga, Śūla, Mandāgni, Mūtrabandha, Malabandha

**DOSE** - 3-5 g

Remarks: Being a controversial drug, at present, the above species may be accepted as Sthalaja Gaṇḍīra. Others are Jalaja and a tree (Sara-taru) species.

## GAVEDHUKA (Root)

Gavedhuka consists of the dried root of *Coix lachryma-jobi* Linn. syn. *C. lachryma* Linn. (Fam. Gramineae), a perennial or annual grass found in India, widely distributed throughout the plains and warm slopes of hills upto 1500 m.

### SYNONYMS

Sanskrit	:	Gavedhu, Gavedhuka
Assamese	:	--
Bengali	:	Gadagad, Dedhaan, Devaan
English	:	Adlay, Jobs tears
Gujrati	:	Kasai
Hindi	:	Kasai, Garheduaa, Garahedu, Gargari
Kannada	:	Manjutti
Kashmiri	:	--
Malayalam	:	Kaatugotampu, Kaakkappalunku
Marathi	:	Kasai
Oriya	:	--
Punjabi	:	--
Tamil	:	Kaattukuntumani
Telugu	:	Adaviguruginja
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Roots fibrous, 1 to 3 mm in thickness, present in tufts, unbranched with tapering ends, hollow in centre, straw coloured, woody smell and pungent taste.

## b) Microscopic

T.S. of root shows presence of ruptured piliferous layer consisting of closely packed elongated cells; below the epidermis one layered exodermis, a well developed cortex, with several layers of parenchymatous cells, mostly oval or rounded with intercellular spaces present; exodermal cells are lignified; cortex consists of 4 or 5 layered thick walled sclerenchymatous cells towards periphery; middle region consists of large thin walled parenchymatous cells and the inner region is made up of air spaces traversed by broad trabeculae; endodermis characterised by the presence of casparian strips on both transverse and radial walls, pericyclic fibres thick walled; vascular bundles polyarch, composed of alternating strands of xylem and phloem, both with their usual elements; parenchymatous pith present, starch absent.

**Powder-** Powder light brown in colour, woody smell and pungent taste; shows thick walled fibres with broad lumen, tracheids with dense helical thickenings and border pits; shows hexagonal striated epidermal cells; double walled hexagonal sclerenchymatous cells of exodermis.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the methanolic extract on silica gel 'G' plate (0.2 mm thick) using toluene: ethyl acetate: methanol (85:15:0.5) shows under UV (366 nm) spots at Rf. 0.33 (greenish blue) and 0.71 (light blue). After spraying with anisaldehyde-sulphuric acid reagent, spots appear at Rf. 0.34 (green) and 0.42 (purple).

**CONSTITUENTS** - Benzoxazolinones, amino acids (leucine, tyrosine, histadin, arginine and coicin).

**PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Madhura  
**Guna** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Kaphahara, Pittahara, Mūtrala, Kārśnya

**IMPORTANT FORMULATIONS** - Viṣṇu Taila

**THERAPEUTIC USES** - Mūtrakṛcchra, Netra-Masūrikā, Pittaja Chardi, Sthaulya

**DOSE** - 3-6 g

## GHONṬĀ (Fruit)

Ghonṭā consists of fruit of *Ziziphus xylopyrus* Willd. (Fam. Rhamnaceae), a straggling shrub distributed in North-West India, U.P., Bihar and South India, in moist deciduous forests.

### SYNONYMS

Sanskrit	:	Ghoṭī, Goṭikā
Assamese	:	--
Bengali	:	Kulphal
English	:	Jujab
Gujrati	:	Gatbadar, Gatabordi
Hindi	:	Ghunṭa, Kakora, Kaathabera
Kannada	:	Yeranu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Ghoti, Bhorghoti
Oriya	:	--
Punjabi	:	--
Tamil	:	Kottai, Mulkottai
Telugu	:	Gotti, Got, Gotiki
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Fruit is a drupaceous berry, globular or rounded, diameter 1.2 to 1.8 cm; surface rough, warty; colour dark brown; point of detachment of stalk marked by a rounded concave depression upto 2 mm in diameter and a raised ring along the circumference; a pointed beak at the opposite end; occasionally seen; pericarp leathery and hard; endocarp stony; fruit 3-

celled, each locule with one dark brown, orbicular, compressed, beaked, seed 5 to 8 mm across; cotyledons creamish yellow; odour not very distinct; taste, slightly astringent.

#### **b) Microscopic**

A transverse section of the fruit reveals a thick cuticle followed by epidermis consisting of unevenly arranged rounded cells; scattered thick-walled, uniseriate, multicellular trichomes present on epidermis; mesocarp with three zones - narrow outer and inner zones of small, compactly arranged parenchyma cells; a third wide middle spongy zone composed of thin walled parenchyma cells, lacunated and containing scattered vascular strands; endocarp consisting of thick walled stone cells, narrow fibres and a few lacunae, some stone cells containing prismatic crystals of calcium oxalate up to 12  $\mu$  in size; occasional inroads of mesocarp into the endocarp also seen; epidermis and a few outer layers of mesocarp adjacent to it contain abundant brown substances.

A section through the testa shows radially elongated, narrow, translucent cells, followed by a subepidermal zone of crushed, thin walled, parenchyma cells demarcated inside by a reddish brown lining.

A section through the cotyledons shows an outermost epidermal layer of small, squarish cells and a ground tissue composed of rectangular thin walled, prominently nucleated cells rich in fixed oil.

**Powder** - Thick walled uniseriate, multicellular, 200 to 260  $\mu$  long trichomes; fibres (upto 50  $\mu$  in width) and angular stone-cells with radial canals and circular striations, 40 to 170  $\mu$  in size are seen- tissue fragments of epidermis in surface view present.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (95:5) as mobile phase shows on spraying with methanolic: sulphuric acid reagent and on heating the plate for ten minutes at 110°C spots at Rf. 0.24 (Pink), 0.39 (Pinkish orange), 0.48 (Yellow), 0.61 (Pink), 0.71 (Blue).

**CONSTITUENTS** - The pulp of the fruit contains reducing sugars, sucrose, citric acid, carotene, vitamin C and tannins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Kaṭu, Madhura
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātakaphahara, Viṣaghna

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Vraṇa, Kaṇḍū, Kuṣṭha, Raktavikāra, Śvayathu, Prameha, Nāḍīvraṇa, Duṣṭavrāṇa, Vamana, Jvara

**DOSE** - 3-6 g.

## GUNDRĀḤ (Rhizome and Fruit)

Gundrāḥ consists of rhizome with root of *Typha australis Schum. And Thonn. Syn. T. angustata Bory and Chaub.*, (Fam. Typhaceae), a hardy perennial, monoecious plant, often growing gregariously in fresh water and marshy places, commonly found throughout India, upto 1730 m.

### SYNONYMS

Sanskrit	:	Guṇṭhaḥ, Guṇṭhaḥ
Assamese	:	--
Bengali	:	Hogalap
English	:	Lesser Indian Reed-mace
Gujrati	:	Ghaabaajariyu
Hindi	:	Pater, Gondpater
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Ramban, Paankanis
Oriya	:	--
Punjabi	:	Gundra
Tamil	:	--
Telugu	:	Jammugaddi, Enugajamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Rhizome** - 1 to 5 cm. long and 1 to 2.5 cm. wide pieces, external surface light brown, core yellowish-brown, transverse ridges on external surface, small roots and scaly leaves present attached on runners; fracture, hard, fibrous.

**Root** - Adventitious, rootlets present, 2 to 15 cm long, yellowish-brown; fracture, fibrous.

#### b) Microscopic

**Rhizome** - T.S. shows circular outline; single layered epidermis consisting of tangentially elongated cells, covered with thin cuticle; cortex divided into two parts - outer cortex comprising of 7 to 11 layers of thin walled parenchymatous cells, oval to polygonal in shape, having intercellular spaces; patches consisting of 10 to 35 fibres distributed in the entire outer cortex; fibres thick walled with tapering tips, varying in length from 160 to 930  $\mu$  and in width from 10 to 30  $\mu$ ; inner cortex consisting of aerenchyma; endodermis single layered; vascular bundles 35 to 42 in number, collateral, conjoint, vessels prominent; pith consisting of thin walled parenchymatous cells with intercellular spaces; starch grains in pith region, single or compound, spherical to oval and measuring from 5 to 25  $\mu$  in diam.; pith mucilaginous, as seen when mounted in Ruthenium red treated with a few drops of 10% lead acetate solution.

**Root** - T.S. shows epiblema followed by a 4 to 6 layered hypodermis of thin walled cells and a broad cortex consisting of radially elongated air spaces separated by trabeculae; a few layers of cells forming the innermost layer of cortex, in contact with endodermis; vascular bundles with xylem vessels forming a circle; fibres thick walled with tapering tips, varying in length from 260 to 1480  $\mu$  and in width from 10 to 24  $\mu$ .

**Powder** - Brown, no specific odour and slightly acrid taste; shows abundant starch grains measuring 5 to 25  $\mu$  in diam., fragments of fibres, parenchyma cells and bordered pitted vessels.

#### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.

Water-soluble extractive

Not less than 8 per cent, Appendix 2.2.7.

### T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plates (0.2 mm thick) using chloroform : methanol (80:20) shows under UV (254nm) three spots at Rf. 0.30, 0.58 and 0.72 (all violet). Under UV (366nm) three fluorescent spots appear at Rf. 0.58, 0.62 and 0.72 (all blue). On exposure to iodine vapour five spots appear at Rf. 0.14, 0.30, 0.40, 0.58 and 0.72 (all yellow). On spraying with 10% ethanolic potassium hydroxide and then observing under UV (366nm) shows two fluorescent spots at Rf. 0.58 (green) and 0.62 (blue). On spraying with 10% methanolic-sulphuric acid and heating the plate at 110°C for ten minutes six spots appear at Rf. 0.18 (brown), 0.40 (purple), 0.58 (brown), 0.62, 0.67 (both purple) and 0.76 (brown).

**CONSTITUENTS** - Flavonoids (Quercetin, isorhamnetin-3-O-rutinoside); sterols ( $\beta$ -sitosterol, lanosterol, cholesterol).

### PROPERTIES AND ACTION

**Rasa** : Kaṣāya, Madhura

**Guṇa** : Guru

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Pittasaṃśamana, Vātahara, Stanyaśodhaka, Stanyajanana, Śukraśodhaka, Rajośodhaka, Mūtravirecanīya, Mūtraśodhaka

**IMPORTANT FORMULATIONS** - Mūtravirecanīya Kaṣāya Cūrṇa, Stanyajanana Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Aśmarī, Śarkarā, Mūtrāghāta, Mūtrakṛcchra, Stanya Kṣaya

**DOSE** - 3-6 g

## HIMSRĀ(Root)

Himśrā consists of root of *Capparis spinosa* Linn. (Fam. Capparidaceae), a thorny shrub distributed in the plains, lower Himalayas, and Western Ghats.

### SYNONYMS

Sanskrit	:	Ahiṃsrā, Kaṇṭhārī, Tīkṣṇa, Kaṇṭakā Tikṣṇagandhā
Assamese	:	--
Bengali	:	--
English	:	Ceper Plant
Gujrati	:	Kabaree
Hindi	:	Kabara, Hainsaa, Kanthara
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Kabar
Oriya	:	--
Punjabi	:	Barar, Kaur
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	Kabar

### DESCRIPTION

#### a) Macroscopic

Root pieces are upto 5.5 cm in thickness; bark rough to touch, thick showing longitudinal lenticels; freshly broken surface light yellowish; wood hard and compact; remnants of robust and slender rootlets present on the bark; colour varies from pale yellow to reddish-brown; no particular odour or taste.

## b) Microscopic

A transverse section of root characterised by outermost layer of slightly suberised corky zone of several layers showing irregular and broken outline; cork cambium made of 4 or 5 layers of thin walled, small, squarish cells; cortex consisting of thin walled, irregular or somewhat tangentially elongated cells; angular sclereids in groups of 2 to 3 and upto 30  $\mu$  in size scattered in cortex; phloem in the form of multiple layers of cells forming a continuous cylinder around inner vascular zone, separated from the xylem by 4 to 5 layers of vascular cambium; wedges of vascular elements with thick walled cells span the centre of the root and the outer zone; vessels isolated or in groups of two, distributed uniformly among xylem parenchyma, which has granular contents; medullary rays of thin walled, mostly uniseriate, rectangular cells, often having granular contents; pith absent.

**Powder** - Powder shows vessel fragments with simple pitted thickenings and tracheids with tapering or blunt ends; sclereids upto 30  $\mu$  size and in groups of 2 or 3.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcohol soluble extract of the drug on precoated silica gel 'G' plate (0.2 mm thick) using chloroform:methanol (95:5) under UV (366nm) shows spots at Rf 0.01 (Blue), 0.11 (Blue); 0.93(Blue).On spraying with anisaidehyde: sulphuric acid reagent and heating the plate for ten minutes at 110° C three spots appear at Rf 0.32(Orange), 0.62 (Purple), 0.68 (Cream).

**CONSTITUENTS** - The roots contain alkaloid stachydrine. Glucobrassicin, neoglucobrassicin and 4-methoxyglucobrassicin have also been identified in the roots.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Rucya

**IMPORTANT FORMULATIONS** - Amṛtādi Taila, Kuṭikhādi Vaṭikā, Himśrādyā Ghṛta

**THERAPEUTIC USES** - Vātavikāra, Kāsa, Śvāsa, Galagaṇḍa, Gulma, Arśa, Āmavāta, Gṛdhrasī, Vātarakta, Raktagranthi, Vātikayoniroga, Vātaśopha, Vraṇa, Granthi

**DOSE** - 1 - 3 g

## HINGUPATRĪ (Leaf)

HingupatrĪ consists of dried leaf of *Ferula jaeschkeana* Vatke (Fam. Apiaceae), a perennial herb, producing a bunch of radical leaves around the base of the flowering axis and distributed in north-western Himalayas, on dry sunny slopes between 2000 and 3900 m; abundant in Kashmir, Ladakh and Lahaul & Spiti in Himachal Pradesh.

### SYNONYMS

Sanskrit	:	Hinguparṇī, Hingupatrikā, Bāṣṭikā
Assamese	:	--
Bengali	:	Hing, Desaj Hing
English	:	--
Gujrati	:	Hing, Hingro, Hinglavadharni, Hingupatri
Hindi	:	Hingupatri
Kannada	:	Doddahingina Balli
Kashmiri	:	--
Malayalam	:	Kayam, Penungayam, Perungkayam
Marathi	:	Hing Patree
Oriya	:	Hengu
Punjabi	:	Hinge, Hing
Tamil	:	Inguva, Perungayam
Telugu	:	Hingo Patramu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Leaf upto 50 cm long, green, both radical and cauline, cauline are alternately arranged on the axis, 2 or 3 lobed, pubescent when young, petiole of cauline leaves broadly sheathing, decurrent, lobe oblong, upto 10 cm long, margin of the lobes distinctly serrate; odour, nil; taste, slightly spicy.

### **b) Microscopic**

T.S. of cauline leaf shows midrib prominent below, isobilateral with a single layer each of upper and lower epidermis of slightly thick walled cells and somewhat drum shaped in nature; anomocytic stomata present on both surfaces; simple unicellular trichomes present only on the lower epidermis; lamina wavy in outline with ridges and grooves, each groove containing a patch of collenchymatous cells below epidermis; secretory canals present below the collenchymatous patches, lined by 8 to 10 parenchymatous cells; two layers of palisade cells present on both surfaces, spongy tissue composed of somewhat elongated cells; vascular bundles collateral with xylem above and phloem below; stomatal index 13 to 17; palisade ratio of 5 to 7 and vein-islet number 2 or 3.

**Powder** - Yellowish green; shows under microscope, epidermis with anomocytic stomata, epidermal cells with unicellular trichomes, palisade cells, numerous isolated trichomes and vessels with spiral thickenings.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 13.0 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1.10 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 30 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the methanolic extract on precoated silica gel G plate using methanol : chloroform (40: 60); shows under UV (365 nm) three fluorescent zones at Rf. 0.52 (blue fluorescence), 0.39 (quenching brownish-purple) and 0.12 (blue fluorescence). On

exposure to iodine vapour three zones appeared as brown colour spots. On spraying with 2% vanillin sulfuric acid reagent shows three spots at Rf. 0.52 (Pink), 0.39 (cream coloured) and 0.12 (brownish with blue tinge).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guna</b>	:	Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pācana, Hṛdya, Vātakaphahara, Rucikara

### IMPORTANT FORMULATIONS - Kumāryāsava

**THERAPEUTIC USES** - Hṛdroga, Bastiśūla, Vibandha, Garbhinī, Arśa, Gulmaroga, Kṛmi, Pīhāroga, Apasmāra, Unmāda

**DOSE** - 3-6 g

## ITKAṬA (Root)

Itkaṭa consists of dried root of *Sesbania bispinosa* W. F. Wight (Fam. Fabaceae) an erect 1.5 to 2.5 m tall, annual, shrub with minute prickles on rachis and young branches, usually found as a weed in the rice fields or water logged areas in the plains of India.

### SYNONYMS

Sanskrit	:	Utkāṭa, Vanajayantī
Assamese	:	--
Bengali	:	Dhanicha, Dhunsha
English	:	--
Gujrati	:	Sasee Ikad, Ikad
Hindi	:	Ikkada
Kannada	:	Mullu jinangi
Kashmiri	:	--
Malayalam	:	Kitamu
Marathi	:	Raanshevari, Chinchani
Oriya	:	Tentua
Punjabi	:	Jhanjhan
Tamil	:	Mudchembai, Nirchembai
Telugu	:	Ettejangaa
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Chopped pieces of roots of variable sizes and thickness usually irregular in shape and with thick and thin rootlets, main roots 0.2 to 2.0 cm in diam. solid, no root nodules observed, outer surface light brown, smooth; wood cream in colour, odourless and tasteless.

### **b) Microscopic**

T.S. shows discontinuous cork, compressed and broken, 3 to 6 cells deep, thin walled; cortical cells parenchymatous, some containing prismatic crystals of calcium oxalate of about 16 to 25  $\mu$  size and some containing tannins; towards the inner side of the cortex conical patches of sclerenchymatous fibre present, broader towards inner side and narrower towards the outside, phloem is about 5 cell deep, thin walled; cambium compressed, not very distinct; xylem vessels; usually with scalariform thickenings; ray cells uniseriate, with simple starch grains of 10 to 40  $\mu$  size and occasionally prismatic crystals of calcium oxalate; pith absent.

**Powder** - Yellowish brown, fibrous, free flowing, characterized by the presence of large cells filled with tannins, some small parenchymatous cells containing tannins, long fibres, simple starch grains, tracheids and vessels with scalariform thickenings.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of methanol extract on silica gel 60 F 254 plate using Toluene : Acetone (90:10) shows eight spots at Rf 0.15, 0.24, 0.38, 0.46, 0.58, 0.61, 0.74 and 0.78 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Amino acids such as lysine, arginine, histidine.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Vātahara, Mūtravirecanīya, Stanyajanana

**IMPORTANT FORMULATIONS** - Mūtravirecanīya Cūrṇa, Stanyajanana Kaṣāya Cūrṇa

**THERAPEUTIC USES** - Kāsa, Pratiśyāya, Jvara, Netraroga, Aśmarī, Pittāśmarī, Śarkarā, Mūtrakṛcchra, Mūtrāghāta, Mūtrarujā

**DOSE** - 3-6 g

## ITKAṬA(Stem)

Itkaṭa consists of dried stem of *Sesbania bispinosa* W. F. Wight (Fam. Fabaceae) an erect 1.5 to 2.5 m tall, annual, shrub with minute prickles on rachis and young branches, usually found as a weed in the rice fields or water logged areas in the plains of India.

### SYNONYMS

Sanskrit	:	Utkāṭa, Vanajayantī
Assamese	:	--
Bengali	:	Dhanicha, Dhunsha
English	:	--
Gujrati	:	Ikad, Sasee Ikad
Hindi	:	Ikkada
Kannada	:	Mullu jinangi
Kashmiri	:	--
Malayalam	:	Kitamu
Marathi	:	Chinchani, Raanshevari
Oriya	:	Tentua
Punjabi	:	Jhanjhan
Tamil	:	Mudchembai, Nirchembai
Telugu	:	Ettejangaa
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug consists of chopped pieces of stem, 0.2 to 2.5 cm in diam. with fine striations; size and thickness variable, minute prickles observed only on thin young branches;

greenish-brown externally and cream coloured internally; pith soft and white; odourless and tasteless.

### **b) Microscopic**

T.S. shows wavy outline, epidermal cells tabular with moderately thick cuticle; some containing granular substances; cortex 5 to 7 cells deep, composed of thin walled cells; some of those present below the epidermis contain tannins; endodermis present; pericycle composed of 3 to 6 cell layers of discontinuous patches of sclerenchymatous fibres about 20 to 33  $\mu$  in diam.; towards the inner side of the sclerenchymatous fibre patches, tannin filled ducts of different sizes present; phloem 3 to 6 cells deep; cambium 3 to 5 cells deep, made up of compressed thin walled cells; xylem forms a closed ring around the central pith, showing secondary growth; the number of primary xylem equal to the ridges present on the outer surface of the stem; xylem vessels range from 24 to 82  $\mu$  in diam.; towards the inner side of the primary xylem, a cavity filled with tannins is present similar to that beneath the phloem; ray cells show starch grains; pith parenchymatous.

**Powder** : Yellowish-brown, fine fibrous, free flowing, characterized by the presence of large thin walled cells filled with tannins, thin walled parenchymatous cells abundant, tissues with stomata present, tracheids and fibre cells are also found.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of methanol extract on silica gel 60 F 254 plate using Toluene : Acetone (90:10) shows seven spots at Rf 0.15, 0.23, 0.28, 0.31, 0.38, 0.55 and 0.91 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Amino acids such as lysine, arginine, histidine.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Śleṣmaprakopaka, Stanyajanana, Mūtravirecanīya

**IMPORTANT FORMULATIONS** - Candanādi Taila (Caraka)

**THERAPEUTIC USES** - Kāsa, Pratiśyāya, Jvara, Netraroga, Aśmarī, Pittāśmarī, Śarkarā, Mūtrakṛcchra, Mūtrāghāta, Mūtrarujā

**DOSE** - 3-6 g

## JALAPIPPALĪ (Whole Plant)

Jalapippalī consists of the dried whole plant of *Phyla nodiflora* Greene syn. *Lippia nodiflora* Mich. (Fam. Verbenaceae) a small creeping perennial herb found commonly in sandy wet, grassy places along bunds of irrigation channels, canal edges and river banks almost throughout greater part of India and up to 900 m on the hills.

### SYNONYMS

Sanskrit	:	Jalapippalikā, Toyavallarī, Śaradī, Matsyādanī, Matsyagandhā
Assamese	:	--
Bengali	:	Bukkana, Kaanchadaa
English	:	Purple Lippia
Gujrati	:	Rataveliyo
Hindi	:	Jalpipali, Panisigaa, Bhuiokaraa
Kannada	:	Nelahippali
Kashmiri	:	--
Malayalam	:	Nirtippali, Podutalai (Siddha)
Marathi	:	Jalpippali, Ratavel
Oriya	:	--
Punjabi	:	--
Tamil	:	Potuttali
Telugu	:	Bokkena
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Fibrous, branched, brown in colour, 2 to 10 cm in length and 1.0 to 1.5 mm in diam., nodal roots are smaller, 0.5 to 1.0 cm in length and unbranched.

**Stem** - Much branched, sub quadrangular, 1 to 2 mm in diam., rooting at nodes, more or less clothed with appressed, two armed, white hairs when seen under 10x, brownish-green, length of internode 5.0 to 9.0 cm.

**Leaf** - Opposite, sub-sessile, 1.5 to 3.7 cm long and 1 to 2 cm broad, spatulate, cuneate at the base, deeply and sharply serrate in the upper part, appressed by two armed, white minute hairs on both sides.

**Flower** - Sessile, densely packed in long pedunculate axillary spikes, mature ones 1.0 to 2.0 cm long and 0.4 to 0.5 cm broad, flowering densely becoming oblong during fruiting; peduncles 2.5 to 7.5 cm long, bracts about 2.5 mm long, broadly elliptic or obovate, cuneate at base, mucronate, glabrous; calyx 2.0 mm long, membranous, bilobed, compressed, mitre-shaped, pubescent underneath with ordinary trichomes closely covering the fruit, the acuminate lobes projecting beyond it; corolla 2.5 to 3.0 mm long, white or light pink, bilipped, upper lip erect and bifid, lower lip 3 lobed of which the middle lobe largest, falling off as a calyptra when fruits ripens; stamens 4, didynamous, anthers 2-celled, dehiscing longitudinally, dorsifixed; ovary superior, bicarpellary, ovules in each cell solitary; style short, stigma oblique, subcapitate.

**Fruit** - Small, 1.5 to 2.0 mm long, globose, oblong, splitting into two, 1-seeded plano-convex pyrenes; seeds exalbuminous about 1 mm in size.

#### **b) Microscopic**

**Root** - T.S. shows slightly wavy outline composed of a single layered epiblema; cortex 6 to 9 cells deep, most of the outer cortical cells in the nodal roots contain chloroplast; some of the cortical cells towards the inner side are thick walled; phloem cells are irregularly thick walled consisting of sieve tubes, companion cells and phloem parenchyma; xylem composed of vessels, tracheids, parenchyma and fibers; vessels are variable in size, range in diameter from 16 to 65  $\mu$ ; medullary rays about 2 or 3 cells in width, cells are pitted; pith absent.

**Stem** - T.S. shows a nearly quadrant outline with ridges and deep furrows, striated cuticle, a single layer of epidermis with cells longer than broad; surface possesses unicellular trichomes with two unequal arms which usually gets detached; cortex is about 7 cells deep in the furrows, mainly chlorenchyma while those of ridges are of collenchyma; a few cells contain amorphous inclusions and many inner cells contain chloroplast; endodermis observed; pericycle 2 or 3 layers of cells, thick walled; phloem compressed and 5 or 6 cells deep; xylem a continuous ring, broader at the troughs. Pith large, composed of thin walled

parenchymatous cells; central cells usually degenerated, but several others may occasionally contain a few chloroplasts.

**Leaf** - Isobilateral, epidermis single layered followed by a layer of palisade cells; occasionally, a layer palisade also occurs adjacent to the lower epidermis; in surface view, the epidermal cells have straight walls; stomata diacytic, present on both lower and upper surface, but more in number on lower surface, covering and glandular trichomes occur on both the surfaces; unicellular, 2 unequally armed warty trichomes, with pointed tips are frequent on both the surfaces; midrib vascular bundle possesses xylem on dorsal side and phloem on ventral side; stomatal index of upper and lower surface 11 to 18 and 18 to 30 respectively; the palisade ratio of upper surface 6 to 11 and that of lower 8 to 13.

**Powder:** Greenish-brown, fibrous, free flowing, characterized by the presence of glandular hairs, 2 armed trichomes which are usually attached to a epidermal cell from the slightly protruded stalk present in the middle, trichomes warty, leaf epidermis characterized by the presence of circular trichome scars, vessels and palisade cells.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	27	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of methanol extract on silica gel 'G' plate using Chloroform : Methanol (95:05) shows five spots at Rf 0.21, 0.26, 0.34, 0.40 and 0.79 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Flavonoids namely nodiflorin A and nodiflorin B, nodifloretin, lippiflorins A and B.

## PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta, Kaṣāya

**Guṇa** : Rūkṣa, Tīkṣṇa

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Pittahara, Kaphahara, Mūtrala, Jvaraghna, Śukrala, Mukhaśodhanī, Dīpana, Hṛdya, Cakṣuṣya, Saṃgrāhī, Rucya, Viṣaghna

**IMPORTANT FORMULATIONS** - Akīka Piṣṭī, Akīka Bhasma

**THERAPEUTIC USES** - Raktaroga, Dāha, Vraṇa, Śvāsa, Bhrama, Mūrcchā, Tṛṣṇā, Raktadoṣa, Kṛmi, Jvara, Pittātisāra, Visarpa

**DOSE** - 2 to 3 g powder

1/2 to 2 ml juice.

## JĪVAKAḤ (Pseudo Bulb)

JĪvakaḥ consists of dried and fresh pseudo-bulb of *Malaxis acuminata* D. Don syn. *Microstylis wallichii* Lindl. (Fam. Orchidaceae), a short stemmed terrestrial herb up to 25 cm in height, distributed throughout India on hills at an altitude of 2000 -3000 m.

### SYNONYMS

Sanskrit	:	JĪvya, DĪrghāyu, CirajĪvĪ
Assamese	:	--
Bengali	:	--
English	:	Jeevak
Gujrati	:	--
Hindi	:	Jeevak
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Jeevakam
Marathi	:	--
Oriya	:	--
Punjabi	:	--
Tamil	:	Jeevakam
Telugu	:	Jeevakamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Fresh pseudo bulb conical in shape, fleshy, green, smooth, shining, 1 to 9 cm long and 1 to 3 cm broad, slightly mucilagenous, covered with shining, translucent light green,

membraneous, 3 or 4 sheathing leaves arranged alternately and having parallel venation; stem rudimentary; roots arising at the union of stem and bulb.

Dried pseudo bulbs conical, translucent, reddish-brown in colour, measuring 2 to 5 cm long and 0.25 to 1 cm wide, covered with sheathing leaves, which are light brown, membraneous with parallel venation; surface rough, punctated, fracture hard; cut surface dark brown, coarsely granulated with irregular margins and white spots; pleasant smell; astringent, slightly mucilagenous in taste.

#### **b) Microscopic**

T.S. of pseudo bulb oval to circular in outline; section passing through scaly leaves which exfoliate, showing a single layered, thick walled, sclerified epidermis having acicular crystals of calcium oxalate, followed by mesophyll adjacent to the upper epidermis composed of 2 to 4 layers of elongated cells with lignified reticulate thickening the lignification was confirmed with phloroglucinol and Conc. HCl, devoid of chloroplast; vascular bundles prominent, phloem well developed with large sieve plates, surrounded by sclerenchymatous bundle sheath; section passing through bulb shows a single layer of cuticle and a layer of thick walled sclerified epidermal cells; below this lie 1 or 2 layers of large sclerified cells and these extend unevenly into ground parenchymatous tissue; ground parenchyma irregular, with large air spaces with passage cells in the form of small protuberances at some places; vascular bundles scattered throughout the ground tissue surrounded by thick walled sclerenchymatous cells, which occasionally extend into intercellular spaces.

**Powder** - Yellowish-brown in colour, pleasant smell, slightly bitter and astringent in taste, shows groups of mesophyll cells with reticulate thickenings inside; vessels with spiral, scalariform and reticulate thickening; fibre tracheids of about 600  $\mu\text{m}$  long upto 80  $\mu\text{m}$  broad, and tracheids (about 19  $\mu\text{m}$  long and 40  $\mu\text{m}$  broad); groups of parenchyma with accicular crystals of calcium oxalate, sieve plates, sieve tubes and angular parenchymatous cells. Powder when treated with conc.  $\text{HNO}_3$  on microscopic slide emits light green fluorescence under UV 365 nm.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.

Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12 per cent, Appendix	2.2.7.
Starch	Not less than	19 per cent, Appendix	2.2.13

### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate (90 : 10) [double run] shows spots after spraying with anisaldehyde-sulphuric acid reagent and heating the plate for ten minutes at 120°C at Rf. 0.12 (orange), 0.18 (purple), 0.29 (grey), 0.38 (orange) and 0.59 (brown).

**CONSTITUENTS** - Alcohol (ceryl alcohol), glucose, rhamnose and diterpenes.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Picchila
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Dhātuvardhaka, Śukrala, Bṛṃhaṇa, Balya, Snehopaga, Jīvanīya, Rasāyana

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Cyavanaprāśa, Brāhma Rasāyana, Śiva Guṭikā, Amṛtaprāśa Ghr̥ta, Aśoka Ghr̥ta, Dhānvantara Taila, Balā Taila, Mānasamitra Vaṭaka, Guḍūcyādi Taila, Bṛhat Aśvagandhā Ghr̥ta

**THERAPEUTIC USES** - Raktapitta, Dāha, Kṣaya, Raktavikāra, Kārśya, Śvāsa, Kāsa, Śoṣa

**DOSE** - 5-10 g

## KADARAḤ (Heart Wood)

Kadaraḥ consist of dried pieces of heart wood of *Acacia suma* Buch.-Ham. (Fam. Mimosaceae), a medium sized tree with white bark exfoliating in papery flakes with horizontal patches of darker colour, found in W. Bengal, Bihar and Southern Western Ghat.

### SYNONYMS

Sanskrit	:	Somavalkaḥ, Śvetakhadirāḥ
Assamese	:	--
Bengali	:	Shvet Khadir
English	:	White Cutch tree, White Catechu
Gujrati	:	Gorada, Gordio baaval
Hindi	:	Safed Khair
Kannada	:	Kandarah
Kashmiri	:	--
Malayalam	:	Venkarinnali, Somarayattoli
Marathi	:	Paandharaa Khair
Oriya	:	--
Punjabi	:	--
Tamil	:	Kovil, Shilaiyunchai
Telugu	:	Tellatumma, Tellasundra, Tellachandra
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Heart wood in cut rectangular pieces showing knots; pale yellow, rough; fracture, hard, emits faint odour of wood, almost tasteless.

## b) Microscopic

**Heart wood** - Transverse section shows diffuse porous wood, indistinct growth rings; vessels occasionally occur in pairs or in group of 3; paratracheal parenchyma abundant, vasicentric, filled with starch granules and prismatic calcium oxalate crystals, medullary rays wide, straight, multiseriate.

A tangential section shows heterocellular, multiseriate; medullary rays 5 to 7 times higher than the breadth; that is upto or over 50 cells vertically and about 10 to 12 cells across at their widest level; medullary rays are surrounded by crystal sheath with prismatic crystals; fibres are aseptate pitted; compactly arranged narrow squarish lignified tracheids; vessels with simple bordered pits; xylem parenchyma contain prismatic crystal of calcium oxalate; gums and tannins.

**Powder** - Yellow coloured, coarse, not free flowing; under microscope shows a number of fibres, vessels, thick walled cells of medullary rays, occasional crystals of calcium oxalate and thick lignified tissues and starch grains, fluorescence test negative, when an extract in alcohol / water is examined under 366 nm and 254 nm.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' (0.2 mm thick ness) plate using toluene : methanol (7:3) shows ten bands at Rf. 0.13, 0.26, 0.34, 0.38 (all yellow), 0.43 (purple), 0.47 (light brown), 0.51 (sky blue), 0.61 (pinkish brown), 0.69 (pink with blue border) 0.78 (grey). On spraying with 5% Ethanolic-sulphuric acid reagent and on heating the plate for ten minutes at 105°C, ten bands appear at Rf. 0.11, 0.21, 0.29, 0.53 (all purple), 0.66, 0.71 (both brown), 0.78 (purple core with blue border), 0.83, 0.90, 0.99 (all grey).

**CONSTITUENTS** - An alkaloid diaboline,  $\beta$ -sitosterol, stigmasterol, oleanolic acid and its 3 $\beta$ -acetate, a saponin containing oleanolic acid, galactose, mannose.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guna</b>	:	Viśada
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Varṇya, Pittahara, Raktaśodhaka

**IMPORTANT FORMULATIONS** - Ayaskṛti

**THERAPEUTIC USES** - Madhumeha, Mukharoga, Udarda, Kaṇḍū, Medodoṣa, Vraṇa, Pāṇḍu, Kuṣṭha, Śvitra, Raktadoṣa

**DOSE** - 2-6 g

## KĀKAJAṄGHĀ (Seed)

Kākajaṅghā consists of dried mature seed of *Peristrophe bicalyculata* (Retz.) Nees (Fam. Acanthaceae), an erect hispid herb 60 to 180 cm tall, found in forests and waste lands almost throughout the country.

### SYNONYMS

Sanskrit	:	Naḍīkāntā, Kākatiktā, Prācībala, Sulomaśā, Vāyasajaṅghā
Assamese	:	--
Bengali	:	Naaskaaga
English	:	--
Gujrati	:	Kaaliaghedi, Kariaghedi, Aghedi
Hindi	:	Atrilal, Masi, Kaakjanghaa
Kannada	:	Cibigid, Cibirsoppu
Kashmiri	:	--
Malayalam	:	Raankiraayat
Marathi	:	Ghaatipittaapapadaa, Raankiraayat
Oriya	:	--
Punjabi	:	--
Tamil	:	Chebira
Telugu	:	Chebira
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Black, orbicular, 1.7 to 2 mm, slightly rugose, bitter with oily feeling on tongue and no special odour.

## b) Microscopic

**Seed** :Transverse section of seed shows testa having single layered epidermis, cells appearing straight walled and angular in surface view producing short stout unicellular hairs having recurved hooks and dark contents; tegmen 2 layered, parenchymatous; cotyledon has outer most epidermis and inner single layer of palisade like parenchyma and 4 or 5 layers of shorter cells; cotyledon shows provasculature at some places; cells contain protein aleurone grains and oil at some places.

**Powder** :The powder is blackish-yellow in colour; it shows hairs, a few cells of palisade parenchyma and cells of cotyledon with oil can also be seen, straight walled packed angular epidermal cells of testa with scars of hairs.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 20	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' (0.2 mm thick ness) plate using toluene : dichloromethane : ethanol : formic acid (10:3:3:1) shows under U.V. (366 nm) five greenish blue fluorescent bands at Rf. 0.14, 0.18, 0.22, 0.39, 0.54. On exposure to Iodine vapour six bands appear at Rf. 0.18 (greenish brown), 0.22, 0.37 (both light brown), 0.53, 0.68, 0.74 (all yellow). On spraying with 5% Ethanolic-sulphuric acid reagent and heating the plate for ten minutes at 105°C, eleven bands appear at Rf. 0.14, 0.22, 0.30, 0.37 (all light brown), 0.48 (greenish brown), 0.53 (yellowish brown), 0.56 (brown), 0.59 (pinkish brown), 0.68 (lower half blue and upper half pink), 0.74, 0.87 (both pinkish brown).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Sara, Picchila
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphapittanut, Kṛmighna, Varṇya, Vraṇahara, Viṣaghna

## IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila

**THERAPEUTIC USES** - Viṣamajvara, Bādhīrya, Raktapitta, Pāṇḍu, Pradara, Jvara, Kaṇḍū, Śoṣa, Kṣata, Jantukṛmi, Grahaṇī, Duṣṭavrāṇa, Ślīpada, Sidhma, Sarpaviṣa, Śastrakṣata, Galagaṇḍa, Apacī, Bālagraha, Pratiśyāya

**DOSE** - 1- 3 g

## KĀKANAJA (Fruit)

Kākanaja consists of dried mature fruit of *Physalis alkekengi* Linn. (Fam. Solanaceae), it occurs in S. Europe through China to Japan; it does not occur in India, but fruits are available in the Indian bazaar, in the name of kakanaja.

### SYNONYMS

Sanskrit	:	Rajaputrika
Assamese	:	--
Bengali	:	Kakanaja
English	:	Winter cherry, Bladder cherry
Gujrati	:	Kakanaja
Hindi	:	Kakanaja
Kannada	:	Kakanaja
Kashmiri	:	--
Malayalam	:	Kakanaja
Marathi	:	Kakanaja
Oriya	:	--
Punjabi	:	Kaaknaj
Tamil	:	Sisayakkaali, Tottakkaali
Telugu	:	Kupante
Urdu	:	Kakanaj

### DESCRIPTION

#### a) Macroscopic

Red coloured berry, globose, about 1 to 1.5 cm in diameter, outer surface wrinkled, with dried flesh; unilocular, completely packed with seeds, overlapping, centrally oriented,

insignificant placenta present; seeds 1.8 to 2.2 mm, numerous, flat, with curved embryo, hilum in the concavity; fruit sweet and sour in taste.

#### **b) Microscopic**

**Fruit** - Cuticle present; fruit wall not distinguishable as epicarp, mesocarp and endocarp clearly; the outer layer consists of a single layer of non lignified, thin walled cell with brown contents; below this are a few layers of horizontally oriented cells with orange contents and loosely arranged layers of parenchyma, with mucilage cells; inner layers of the fruit wall and the placentae proliferate into the locule packed with minute seeds.

**Seed** - T.S. is elongated with a projection at both ends; testa has an outermost papillose thin walled cells followed by thickened sclereids, which appear bone shaped at the projected parts, the latter showing pits on their walls; below are 2 or 3 layers of thin walled cells followed by a thick cuticle and inner lignified single layered tegmen; endosperm contains thin walled polygonal parenchymatous cells filled with aleurone grains, oil globules and occasional sandy calcium oxalate crystals; embryo curved if present.

**Powder** - The powder is brownish-orange in colour; shows sclereids, parenchymatous cells, endospermic parenchymatous cells rich in oil and aleurone grains.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.

#### **ASSAY**

#### **T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' (0.2 mm thick ness) plate using toluene : methanol (7:3) shows eleven bands at Rf. 0.11 (dark brown), 0.38, 0.44, 0.46, 0.52, 0.56 (all light grey), 0.66 (dark brown), 0.72, 0.78, 0.83, 0.88 (all light grey), on spraying with 5% Ethanolic-sulphuric acid reagent and heating the plate for ten minutes at 105°C.

**CONSTITUENTS** - Auroxanthin, mutatoxanthin, phydalein, zeaxanthin,  $\beta$ -Cryptoxanthin from the calyx of the fruit; glycoalkaloids detected in the seeds but alkaloids were absent in the fruit.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Dāhaśāmaka, Balya, Mūtrala, Virecana, Śūlanāśinī, Raktavidrāvaṇī

**IMPORTANT FORMULATIONS** - Lauha Rasāyana

**THERAPEUTIC USES** - Pūyameha, Tamakaśvāsa, Vraṇa, Visarpa, Kaṇḍū, Śopha, Kāsa, Śvāsa, Jvara

**DOSE** - 5-10 g in the powder form.

## KĀLĪYAKA (Root and Stem)

Kālīyaka consists of the dried root & stem of *Coscinium fenestratum* (Gaertn.) Colebr. (Fam. Menispermaceae), a large woody climber with stout stem and branches, occurring in the Western Ghats.

### SYNONYMS

Sanskrit	:	Kalambaka, Kālīya, Kālīyākhyā, Kāleyaka
Assamese	:	--
Bengali	:	--
English	:	False Calumba
Gujrati	:	--
Hindi	:	Jhaar-ki-hald
Kannada	:	Mardaa arashinaa
Kashmiri	:	--
Malayalam	:	Maramanjā
Marathi	:	Venivel
Oriya	:	--
Punjabi	:	--
Tamil	:	Atturam, Kadari, Manjalkoid
Telugu	:	Manu pasupu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - 5 to 30 cm or more in length, 2 to 5 cm. in diameter, somewhat longitudinally grooved, transversely cut surface smooth, yellow; texture rough and fibrous; acrid in taste; no particular odour.

**Stem** - 15 to 30 cm. or more in length, 2 to 8 cm. in diameter, straight or occasionally slightly twisted, pale grey or greyish yellow with a fairly smooth surface, marked with longitudinal striations spaced about a mm apart, cut surface yellowish-green to yellow in colour showing wedge shaped areas, fissured with shallow vertical slits of varying length; texture, hard; acrid in taste.

#### **b) Microscopic**

**Root** - Transverse section circular in outline; cork cream coloured, 20 to 30 or more rows of uniform rectangular cells with 1 to 2 stone cells; outer cortical tissue characterized by the presence of very prominent yellowish band almost in the form of ring of thick walled, pitted stone cells; prismatic crystals of calcium oxalate found in the thick walled cells; sieve tubes with simple perforation plate; evident in L.S.; narrow radiating wedge shaped xylem strips; alternating with wedge shaped, broad, multiseriate medullary rays with thick walled cells filled with rod shaped crystals of calcium oxalate and starch grains which are circular, appearing lenticular on edge view, simple, 30-45  $\mu\text{m}$  in diameter; hilum indistinct or dot-like, centrally placed if present, lamellae indistinct; vessels filled with tyloses and in mature root these tyloses become thick walled giving the appearance of stone cells; fibres long, lignified.

**Stem** - The transverse section circular in outline, shallowly crenate; cork 20 to 40 cells thick; cortex 5 to 8 layers of tangentially elongated parenchymatous cells having very conspicuous yellowish crenate bands of hard tissue or stone cells with radiating canals and filled with dark yellow contents, almost capping the wedge shaped medullary rays and phloem; sclerotic elements cubical to oval with very thick pitted walls filled with prismatic crystals of calcium oxalate; phloem distinct; xylem narrow, radiating, wedge shaped as in root, vessels 70 to 160  $\mu\text{m}$  in diameter, solitary, pitting reticulate with small lenticular orifices, occluded with thick walled tyloses; fibres septate to nonseptate, septate fibres having 2 to 5 septa, 270 to 400  $\mu\text{m}$  long and 12  $\mu\text{m}$  in diameter; medullary rays extend from pith to periphery, broad, multiseriate, 15 to many cells high and 2 to many cells wide; pith consist of two regions: (i) 4 to 6 layers of smaller collenchymatous cells in the periphery; (ii) parenchymatous cells circular to polyhedral in shape with intercellular spaces, cells larger towards the centre.

**Powder** - Powder of both root and stem yellow with greenish tinge, bitter and odourless. Microscopical examination shows the presence of fibres, tyloses, stone cells containing prismatic crystals of calcium oxalate, starch grains circular appearing lenticular shaped on edge view, simple, 30-45  $\mu\text{m}$  in diameter hilum indistinct or dot like centrally placed if present, lamellae indistinct, fragments of vessels, tracheids and parenchymatous cells; when treated on microscopic slide with 1N NaOH aqueous solution and mounted in nitrocellulose in amyloacetate emits very characteristic canary yellow colour under UV-365 nm.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	11	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.
Total alkaloid as berberine chloride	Not less than	2	per cent, Appendix	2.2.18

## ASSAY

### Stem -

**Foreign matter** : Not more than 1 percent, Appendix 2.2.2.

**Moisture content** : Not more than 6 percent, Appendix 2.2.9.

**Total ash** : Not more than 3 percent, Appendix 2.2.3.

**Acid insoluble ash** : Not more than 2 percent, Appendix 2.2.4.

**Alcohol soluble extractive** : Not less than 3 percent, Appendix 2.2.6.

**Water soluble extractive** : Not less than 8 percent, Appendix 2.2.7.

**Total alkaloid as berberine chloride** : **Not less than 1 percent, Appendix 2.2.18.**

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using isopropanol : formic acid : water (45 : 0.1 : 0.4) shows under UV (366 nm) fluorescent spots at Rf. 0.10, 0.17, 0.24, 0.34, 0.39, 0.5, 0.56, 0.78 at similar Rf. On spraying with modified Dragendorff's reagent orange spots appear at Rf. 0.10, 0.24, 0.34, 0.83 and 0.89.

**CONSTITUENTS** - Alkaloids-berberine, palmitine, jatrorrhizine, proto-berberine, N, N-dilindacarpine, thalifendine and columbamine.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Stem : Tikta  
**Guṇa** : Laghu, Rūkṣa, Stem : Laghu, Rūkṣa  
**Vīrya** : Śīta, Stem : Śīta  
**Vipāka** : Kaṭu, Stem : Kaṭu  
**Karma** : Śleṣmasaṃśamana, Pittahara, Dīpana, Pācana, Anulomaka, Raktaśodhaka, for Stem : Śleṣmasaṃśamana, Pittahara, Kaphamedohara, Dīpana, Pācana, Kaphamedohara

**THERAPEUTIC USES** - Root :, Raktapitta, Jīrṇa Jvara, Prameha, Kṛmi, Ajīrṇa, Ādhmāna, Kāmalā, Agnimāndya, Vraṇa, Vyaṅga, Stem :, Kuṣṭha, Prameha, Pāṇḍuroga, Jvara, Ajīrṇa, Agnimāndya, Ādhmāna Yakṛt-Vikāra, Kṛmi, Dāha, Aśmarī, Upadaṃśa, Vraṇa, Yuvānapīḍakā, Vyaṅga

## KAPĪTANA (Stem Bark)

KapĪtana consists of stem bark of *Thespesia populnea* (L.) Soland. ex Correa syn. *Hibiscus populneus* Linn. (Fam. Malvaceae), a fast growing, medium-sized evergreen tree, upto 10 m tall with yellow, cup-shaped flowers having maroon centre and distributed throughout coastal forests of India and also largely grown as a roadside tree.

### SYNONYMS

Sanskrit	:	Pāriṣah, Kandarala, Phalīśah, Gardabhāṇḍah
Assamese	:	--
Bengali	:	Gajashundi, Paraasapipula
English	:	Portia tree, Umbrella tree
Gujrati	:	Paaraspipalo
Hindi	:	Paaraspipal
Kannada	:	Huvarasi
Kashmiri	:	--
Malayalam	:	Punavasu, Pupparrutti
Marathi	:	Parasa pimpala
Oriya	:	--
Punjabi	:	--
Tamil	:	Chilanti, Punarasu
Telugu	:	Ganyaraavi, Munigangaraavi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark occurs in flat to slightly curved pieces, varying in thickness according to age and parts of tree from where it is taken; external surface rough due to numerous irregularly scattered lenticels, fissured, exfoliating in irregular scales, greyish-brown; inner surface, laminated, foliaceous, reddish-brown; fracture, fibrous; no characteristic odour; taste, astringent.

**b) Microscopic**

Shows outer exfoliating layer in hard, woody, older barks; cork cells, thin-walled, 10 to 20 layered, rectangular; cortex many layered, outer cortex consisting of closely packed, small, polygonal cells, inner cortex composed of large, rectangular to polygonal cells; bast fibres, abundant in groups, outer groups radially elongated and inner tangentially; medullary rays of two types, narrow, uni to triseriate of slightly elongated rectangular cells and wide, multiseriate, irregularly arranged; large ducts in cortex filled with yellow to orange contents; yellow inclusions present in the cells of outer cortex; rosette calcium oxalate crystals scattered in cortex and medullary rays; starch grains, simple or compound in phloem region.

**Powder** -Reddish-brown; shows stratified cork tissue, numerous fibres in groups with narrow lumen and bluntly pointed ends; phloem parenchyma cells with large single rosette calcium oxalate crystal; starch grains, simple to 2 or 3 compound; hilum, distinct.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

**ASSAY**

## T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : methanol : formic acid (100:2.5:1) shows spots at Rf. 0.12 (brown), 0.18 (brown), 0.29 (brown) and 0.61 (reddish when hot turns yellowish on cooling) on spraying with vanillin-sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Flavonoids, steroids and sesquiterpenoidal quinines.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Mūtrasaṅgrahaṇīya, Stambhana, Medohara, Sandhānīya, Śukrala, Saṅgrāhī, Bhagnasandhānakṛt, Puṃsavanam

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Prameha, Raktavikāra, Yoniroga, Dāha, Tṛṣṇā, Medoroga, Vraṇa, Śoṭha, Tvagroga, Bālavisarpa, Pāmā, Kaṇḍū, Dadru

**DOSE** - 100 ml kvātha.

## KARKAŚĀ (Root)

Karkaśa consists of the root of *Momordica dioica* Roxb. ex Willd. (Fam. Cucurbitaceae) a vine found throughout India up to an altitude of 1500 m, also cultivated for its fruits, which are used as vegetables.

### SYNONYMS

Sanskrit	:	Karkoṭakī, Vandhyā Karkoṭakī
Assamese	:	--
Bengali	:	Titkaankarol
English	:	--
Gujrati	:	Baanjhakartolaa, Kankodi
Hindi	:	Vanakakodaa, Baanja, Khekhassaa, Kakodaa
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Vaanjh-Kartoli, Kartole
Oriya	:	Kaankada
Punjabi	:	--
Tamil	:	Paluppakai
Telugu	:	Aagaakar
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Finely chopped pieces of tuberous roots, outer surface rough and greyish-brown, central portion white to cream, starchy, friable; fracture, fibrous; odourless and slightly bitter taste.

### b) Microscopic

T.S. shows cork 6 to 9 cells deep, cells brick-shaped and arranged in rows with greyish-brown contents; cork cambium cells similar in structure and size followed by a zone of compressed cells 2 to 4 cells deep; cortex composed of about 10 layers of cells, thin walled, irregular in shape and parenchymatous, towards the inner side of the cortex, scattered solitary or groups of sclerenchymatous cells are present; phloem 6 to 8 cells deep, phloem parenchyma usually filled with starch grains of about 16 to 25  $\mu$  in diam.; xylem composed of scattered vessel strands and xylem parenchyma; most of the vessels are usually solitary or found in groups of 2 or 3; xylem parenchyma contains round or oval starch grains similar to that in phloem.

**Powder: Whitish-brown, free flowing, characterized by the presence of sclerenchymatous cells, showing radial pit canals and narrow lumen; starch grains, cork cells and parenchymatous cells are also present.**

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	31	per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of water extract on silica gel 'G' plate using n-butanol : Acetic acid : Water (40:10:50) shows nine spots at Rf 0.19, 0.23, 0.24, 0.27, 0.36, 0.40, 0.53, 0.72 and 0.89 on spraying with 10% alcoholic sulphuric acid and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** -  $\alpha$ - eleostearic acid, 2-acetyl-5-chloropyrrole.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Pittahara, Vraṇaśodhaka, Rucikara, Rasāyana

**IMPORTANT FORMULATIONS** - Hīraka Rasāyana, Visanāśaka Yoga (Ayurveda Prakāśa), Kākādanī Taila, Kālāgnīrudra Rasa, Sannīpāta Vidhvaṃsa Rasa, Candrarudra Rasa

**THERAPEUTIC USES** - Visarpa, Sarpaviṣavikāra, Mūtrakṛcchra, Sarpaviṣa, Jvara, Kāsa, Śvāsa, Hikkā, Arśa, Kṣaya, Raktārśa, Madhumeha, Netraroga, Śīroroga, Kāmalā, Aśmarī

**DOSE** - 3-6 g

## KARṆASPHOTĀ (Seed)

Karṇasphoṭā consists of the seed of *Cardiospermum halicacabum* Linn. (Fam. Sapindaceae), commonly found as a weed throughout India, ascending upto 1,200 m. in the North West Himalayas.

### SYNONYMS

Sanskrit	:	Śakakralata (S.y.), Kākādanī, Kākamardanikā, Kākatiktā
Assamese	:	--
Bengali	:	Jyotishmati (of Bengal)
English	:	Ballon Vine, Heart's Pea
Gujrati	:	Bodha, Kapaalphodi, Nayaphatki, Shivajaala
Hindi	:	Kaanphuti, Lataaphataki
Kannada	:	Kanakayya
Kashmiri	:	--
Malayalam	:	Ulinna
Marathi	:	Fatphati, Kaanphuti, Khiljala
Oriya	:	--
Punjabi	:	--
Tamil	:	Modikkottan, Mudukkottan, Mudakkarutana(Siddha)
Telugu	:	Vekkudutiga
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seeds are about 4 to 6 mm, subglobose, black, shiny with a whitish scar of aril, nutty flavour; no odour.

## b) Microscopic

T.S. shows an outermost thick yellowish layer of cuticle; testa shows a single layer of radially elongated, brown and thick walled palisade like cells showing lineae lucida and with stellately lobed lumen as seen in surface view; a wide zone of sclereids with thick walled highly sinuous, light yellow to yellowish-brown lignified cells showing radiating canals on their walls in surface view; tegmen consists of parenchymatous cells; ground tissue of the embryo consists of angular to hexagonal parenchyma cells with oil globules; starch grains absent.

**Powder** - Powder light brown in colour, with black fragments of the seed coat and has the taste and odour of cucurbitaceous seed with a nutty flavour; shows surface view of palisade layer with hexagonal outline and stellately lobed lumen, surface view of the much sinuous sclereid layer and oil globules.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	21 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5 per cent, Appendix	2.2.7.
Fixed oil	Not less than	20 percent, Appendix	2.2.8

## T.L.C.

T.L.C. of methanolic extract on silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : diethyl amine (85:15:0.5) shows under UV (366 nm) fluorescent spots at Rf. 0.10 (white), 0.21 (blue) and 0.70 (blue). After spraying with anisaldehyde-sulphuric acid reagent and heating the plate at 105°C for ten minutes spots appear at Rf. 0.15 (blue), 0.34 (greenish blue), 0.44 (bluish black), 0.64 (blue) and 0.71 (blue). T.L.C. of the methanolic extract using butanol : acetic acid : water (6:1:2) after spraying with anisaldehyde-sulphuric

acid reagent shows spots at Rf. 0.08 (green), 0.15 (green), 0.23 (green), 0.28 (purple), 0.38 (green), 0.47 (pink), 0.53 (yellowish green), 0.83 (purple) and 0.93 (purple).

**CONSTITUENTS** - Fixed oil.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Mūtrala, Keśya, Medhya, Viṣaghna

**IMPORTANT FORMULATIONS** - Āmātisāranāśaka Yoga, Vāsādilepa, Nāgarādi Taila, Laśunādi Kaṣāya

**THERAPEUTIC USES** - Jvara, Śopha, Pāṇḍu, Śūla, Vṛddhi, Sandhi-Vata, Graha Bādhā, Bhūtabādhā, Viṣabādhā

**DOSE** - 1-2 g

## KARṆASPHOTĀ (Root)

Karṇasphoṭā consists of the root of *Cardiospermum halicacabum* Linn. (Fam. Sapindaceae), commonly found as a weed throughout India, ascending upto 1200 m. in the North Western Himalayas.

### SYNONYMS

Sanskrit	:	Śakakralata (S.y.), Kākādanī, Kākamardanikā, Kākatiktā
Assamese	:	--
Bengali	:	Jyotishmati
English	:	Ballon Vine, Heart's Pea
Gujrati	:	Bodha, Kapaalphodi, Shivajaala, Nayaphataki
Hindi	:	Kaanphuti, Lataaphataki
Kannada	:	Kanakayya
Kashmiri	:	--
Malayalam	:	Ulinna
Marathi	:	Fatphati
Oriya	:	--
Punjabi	:	--
Tamil	:	Modikkottan, Mudakkarutana(Siddha), Mudukkottan
Telugu	:	Vekkudutiga
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Tap root, thick, reddish-brown, hard, woody, branched rootlets, 2 to 5 mm thick.

**b) Microscopic**

T.S. shows outermost 3 or 4 layers of cork, cells of which are flattened and crushed, followed by a single layered cork cambium, followed by a cortex 10 to 15 layers deep, with cells compactly arranged and laterally elongated; endodermis single layered; phloem present, cambium 2 or 3 layered thick, xylem contain vessels of various diameters, medullary rays uniseriate, protoxylem points discernible among collapsed cells of pith.

**Powder-** Light brown. Fibres and pitted vessels are seen.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	9	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

**ASSAY****T.L.C.**

T.L.C of methanolic extract on silica gel 'G' plate (0.2 mm thick) using phenol : water (3:1) shows spots at  $R_f$  0.06 (pinkish brown), 0.17 (pinkish brown), 0.22 (greyish green), 0.29 (brown), 0.34 (greyish green) and 0.46 (purple) after spraying with 10% ethanolic-sulphuric acid reagent.

**CONSTITUENTS -**

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Tīkṣṇa, Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphaśāmaka, Rasāyana, Keśya, Medhya, Vāmaka, Mūtrala, Virecaka, Viṣaghna

## IMPORTANT FORMULATIONS - Āragvadhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Jvara, Pāṇḍu, Kāmalā, Śūla, Vṛddhi, Smṛti Kṣaya, Sandhivāta, Kuṣṭha, Sarpaviṣa, Mūṣikāviṣa, Jvarayukta-Kāsa , Indralupta, Sannipātodara, Aśmarī, Śopha, Bhūtabādhā, Grahabādhā

**DOSE** - 1-3 g

## KATTRŪNA (Whole Plant)

Katṛṇa consists of the whole plant of *Cymbopogon citratus* (DC.) Stapf syn: *Andropogon citratus* DC. (Fam. Poaceae), a tall tufted perennial grass cultivated in various parts of India.

### SYNONYMS

Sanskrit	:	Bhūṛṇaḥ, Jambīratṛṇaḥ, Guhyabīja, Bhutīka
Assamese	:	--
Bengali	:	Gandhatrun, Gandhabenaa
English	:	Lemon grass
Gujrati	:	Lilichaa
Hindi	:	Gandhatrun, Harichaaya
Kannada	:	Majjigahullu
Kashmiri	:	--
Malayalam	:	Chennanampullu, Incippullu, Vasanaipullu
Marathi	:	Hirvaa Chahaa, Olaa Chahaa, Paatichahaa
Oriya	:	--
Punjabi	:	Gandhatrun, Sharbaan
Tamil	:	Vasanaipillu
Telugu	:	Nimmagaddi, Vasana gaddi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Fibrous, adventitious, 5 to 10 mm in length, 0.2 to 0.7 mm in thickness.

**Rhizome** - Irregular, dark brown in colour, narrow internodes present 4 to 9 cm in length, 1.5 to 2 cm in diameter.

**Stem** - Pale yellow, hollow, 4 to 10 cm in length, 1 to 3 cm in diameter.

**Leaf** - Leaves glaucous, linear, parallel veined, about 90 cm in length, 2 to 3 cm in width, conspicuous midrib present, apex pointed, margin entire, with sheathing base and a ligule at its base; lemon odour, taste bitter.

#### **b) Microscopic**

**Root** - Epiblema or piliferous layer uniseriate with compact tabular cells; unicellular root hairs present; beneath epidermis 1 to 3 layered exodermis of cells with thick walls present; cortex cells with intercellular spaces; barrel shaped cells of endodermis and several layered sclerified pericycle; vascular tissue with alternating strands of xylem and phloem, xylem exarch; pith parenchymatous with intercellular spaces.

**Rhizome** - T.S. shows outer epidermal layer of rectangular parenchymatous cells followed by 5 to 7 layered sclerenchymatous hypodermis; lysigenous cavities present in the hypodermis; below the hypodermis, a broad zone of ground tissue consisting of thin walled parenchymatous cells with small intercellular spaces; vascular bundles scattered in the ground tissue; concentric, amphivasal, enclosed by sclerenchymatous sheath; rosette shaped calcium oxalate crystals present in the cortex.

**Stem** - T.S. shows thick cuticle followed by uniseriate epidermis and a cortex several layers deep; scattered concentric, amphivasal vascular bundles present in the ground tissue, with the larger ones towards centre, and smaller ones towards periphery; cortical bundles present.

#### **Leaf -**

**Midrib** - T.S. shows an upper and lower epidermis consisting of a single layer of cells with stomata and trichomes; regularly distributed sclerenchymatous patches present adjacent to both epidermis; ground tissue consist of non-uniform angular cells with intercellular spaces; vascular bundles surrounded by one or two layered bundle sheath and parenchymatous cells storing starch; phloem towards the lower epidermis and xylem towards the upper epidermis; phloem has sieve-tubes and companion cells; xylem consists of pitted metaxylem vessels which are oval in shape; tracheids present, xylem parenchyma scanty.

**Lamina** - T.S. shows a cuticle, an upper and lower epidermis composed of single layer of cells with bulliform cells, stomata and bristly trichomes; mesophyll with only spongy parenchyma; the narrow guard cells of the stomata are associated with subsidiary cells. Small silica cells filled with silica, solidified into bodies of various shapes, and cells with

suberised walls called cork cells occur in pairs which alternate with elongated epidermal cells; lower epidermis with oval shaped stomata arranged in a parallel manner.

**Powder** - Powder green in colour with strong lemon odour and bitter taste, shows oil cells, fibres, rosette shaped calcium oxalate crystals, pitted and reticulate vessels, pitted and scalariform vessels, surface view of epidermis with stomata, trichome, cork cells, bristle and silica cells.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

### **ASSAY**

#### **T.L.C.**

T.L.C. of essential oil extracted by Clevenger apparatus on silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate (93:7) shows under UV (254 nm) spots at Rf. 0.07 (light green) and 0.47 (dark green). After spraying with anisaldehyde-sulphuric acid reagent spots appear at Rf. 0.05 (blue), 0.08 (bluish yellow), 0.19 (dark blue), 0.47 (blue), 0.52 (pink), 0.60 (light pink), 0.70 (purple) and 0.74 (purple).

**CONSTITUENTS** - Essential oil containing citral as major component besides geraniol and other terpenes.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta  
**Guṇa** : Tīkṣṇa, Laghu, Rūkṣa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Śītapraśamana, Stanyajanana, Dīpana, Recana, Viṣaghna, Mukhaśodhana, Avṛṣya, Cakṣuṣya, Rūcikāraka, Vamihara

**IMPORTANT FORMULATIONS** - Māṣabalādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Kuṣṭha, Kṛmi, Arocaka, Santāpa, Dāha, Vami, Kāsa, Śvāsa, Dadru, Udara, Bhūtabādhā, Grahabādhā, Udarda

**DOSE** - 3-6 g

## **KEBUKA (Rhizome)**

Kebuka consists of the dried rhizome of *Costus speciosus* (Koerning ex Retz.) Smith. (Fam. Zingiberaceae), a herb commonly found in sub-Himalayan tract extending between Kangra to Arunachal Pradesh and also in Western Ghats.

### **SYNONYMS**

Sanskrit	:	Kembuka, Kebuka, Kemuka, Kembu
Assamese	:	--
Bengali	:	Kevu
English	:	--
Gujrati	:	--
Hindi	:	Kebu, Kemuk, Kemuaa
Kannada	:	Chenglavaa-Koshtu, Changalvakoshtu
Kashmiri	:	--
Malayalam	:	Channakkilannu, Channakkuvva
Marathi	:	Pevaa
Oriya	:	--
Punjabi	:	--
Tamil	:	Koshtam
Telugu	:	Chenglavaa-Koshtu
Urdu	:	--

### **DESCRIPTION**

#### **a) Macroscopic**

Tuberous rhizome, horizontally branched, 4 to 6 cm long and 2 to 3 cm thick; outer surface grey to dark brown, longitudinal wrinkles and small circular leaf scars on upper surface; numerous nipple-shaped buds present throughout its length; numerous slender roots

occurs along with rhizome, possesses rootlets which makes it slightly rough; fracture, short fibrous and hard, odourless and tasteless.

#### **b) Microscopic**

**Rhizome-** Rhizome consists of 6 to 10 layers of stratified cork cells, followed by ground tissue; 10 to 12 layers of cortex below the cork layers are more compactly arranged than the remaining layers; cells of the cortex filled with sac-shaped starch grains; starch grain measuring about 35 to 68  $\mu\text{m}$  long and 26 to 38  $\mu\text{m}$  wide, hilum eccentric, striations not visible; endodermis well marked. A large number of vascular bundles scattered throughout the ground tissue, but within the endodermis vascular bundles are closer to each other; each bundle has xylem almost surrounded by phloem; sclerenchymatous, fibrous sheath surrounds each of the vascular bundles; clusters of calcium oxalate found in some cells of the ground tissue.

**Powder-** Light to dark brown, easily flowable with fine to coarse texture; crystals of calcium oxalate prismatic and clusters; granules of sac-shaped starch are mostly simple but rarely compound form also found; thick walled fibres, both simple and septa, several show marks and adjacent cells appressed against them; tips blunt in shorter, and pointed in longer fibres; vessels both pitted and reticulate.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 20 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 12 per cent, Appendix	2.2.7.

#### **ASSAY**

#### **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Glacial acetic acid : Methanol : Water (5:2:2:1) shows under UV light (365 nm) a fluorescent zone at Rf. 0.95 (greenish yellow). On sparying with Anisaldehyde-Sulphuric acid reagent and heating the plate for ten minutes at 105°C, nine spots appear at Rf. 0.11, 0.22, 0.33, 0.49, 0.59, 0.72, 0.79, 0.87 (all green) and 0.95 (blue)

**CONSTITUENTS** - Steroidal Saponins such as (Tigogenin and diosgenin).

### **PROPERTIES AND ACTION**

**Rasa** : Tikta  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Pittahara, Kaphahara, Dīpana, Pācana, Grāhī, Kṛmighna, Hṛdya, Raktaśodhaka, Garbhāśāya Saṅkocaka

**IMPORTANT FORMULATIONS** - Kṛmighna Kvātha Cūrṇa

**THERAPEUTIC USES** - Kaphapittaja Vikāra, Agnimāndya, Grahaṇī, Kṛmiroga, Raktavikāra, Ślīpada, Prameha, Śvītra, Kuṣṭha, Jvara, Kāsa, Kāmalā, Arśa, Kaphaja, Mūtrakṛcchra

**DOSE** - 3-6 g (after purification).

## **KHAKHASA (Seed)**

Khakhasa consists of seed of *Papaver somniferum* Linn. (Fam. Papaveraceae), a glaucous erect annual herb cultivated under State control in certain areas of Rajasthan, Madhya Pradesh and Uttar Pradesh.

### **SYNONYMS**

Sanskrit	:	Khasatilaḥ, Āphūkam, Khākhasatilaḥ, Khākhasaḥ
Assamese	:	--
Bengali	:	Aaphim, Postadaanaa, Postabeej
English	:	Opium, Poppy Seeds
Gujrati	:	Khaskhas
Hindi	:	Apheem, Postadaanaa, Khaskhas, Khasabija
Kannada	:	Gasgase, Aapheen, Aphini
Kashmiri	:	--
Malayalam	:	Avin, Karappu, Kashkash, Aalan
Marathi	:	Khaskhas
Oriya	:	Aapu
Punjabi	:	--
Tamil	:	Kasakash, Posttakkaai, Avinee
Telugu	:	Gasgashaalu, Nallamandu
Urdu	:	Apheem

### **DESCRIPTION**

#### **a) Macroscopic**

Seeds are small, about 1.0 to 1.15 mm long, round to reniform or kidney shaped, generally dirty white, occasionally found mingled with a few brownish or greyish coloured seeds; surface coarsely reticulated, larger network enclosing within, numerous irregular

smaller reticulations; hilum and micropyle are situated in the notch on the lateral side near the smaller end; seeds are inodorous and oily in taste.

#### **b) Microscopic**

Testa is composed of 5 distinct cell layers, outermost layer of epidermal cells corresponding to the surface reticulations; the next layer consists of polygonal or elongated cells containing minute microsphenoidal crystals of calcium oxalate and below there is a single layer of thick walled un lignified elongated cells; this layer is followed by a single layer of thin walled cells; testa is limited internally by a single layer or elongated palisade like cells with reticulately thickened walls; central portion of the seed is occupied by polygonal parenchymatous cells of endosperm containing abundant oil drops and aleurone grains; embryo is slightly curved, radicle rod like, bearing 2, or rarely 3, cotyledonary leaves, embedded in the oily endosperm; contents of the cotyledon are similar to those of endosperm.

**Powder** - Light brown, coarse, not free flowing, clot or ball forming, under microscope exhibits large fatty oil droplets, characteristic penta to hexagonal testa cells, endosperm and reticulate layer cells; cells containing characteristic crystal and fibres also present.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.
Fixed oil	Not less than	19	per cent, Appendix	2.2.8

#### **T.L.C.**

T.L.C. of hexane extract on silica gel 60 F 254 plate using Toluene : Acetone (93:07) shows five spots at Rf 0.25, 0.39, 0.50, 0.76 and 0.83 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Fixed oil containing esters of linoleic, palmitic, oleic acids.

#### **PROPERTIES AND ACTION**

**Rasa** : Madhura

**Guṇa** : Guru

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātahara, Rucya, Stambhana, Vedanāsthāpana, Vṛṣya, Balya, Varṇya

**IMPORTANT FORMULATIONS** - Abhayādi Guṭīkā, Abhrakādi Vaṭī, Aśvanī Kumāra Rasa

**THERAPEUTIC USES** - Kāsa, Atīsāra

**DOSE** - 5-10 g

## **KHATMĪ (Root)**

Khatmī consists of the root of *Althaea officinalis* Linn. (Fam. Malvaceae) a perennial, uniformly downy herb, occurring in Kashmir region.

### **SYNONYMS**

Sanskrit	:	Khatmī
Assamese	:	--
Bengali	:	--
English	:	Marsh Mallow
Gujrati	:	--
Hindi	:	Khatmi
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Khatmi
Oriya	:	--
Punjabi	:	--
Tamil	:	Khatmi
Telugu	:	Khatmi
Urdu	:	Aslua Khatmi, Reshah-e-Khatmi

### **DESCRIPTION**

#### **a) Macroscopic**

Roots 0.2 to 3 cm in diameter, light brown in colour, strongly longitudinally furrowed, often spirally twisted; fracture, short, texture rough, internally yellowish white; odour, pleasant; taste, sweet and mucilaginous.

## b) Microscopic

T.S. root circular in outline; cork 8 to 12 cells broad, radially arranged flattened cells; cortex broad, loosely arranged, parenchymatous, cells filled with mucilage; small patches of lignified fibres present; large number of schizogenous and lysigenous mucilage canals present; phloem well developed consisting of sieve tubes, companion cells and phloem parenchyma filled with mucilage; cambium 2 to 3 celled, xylem diffuse porous, made up of vessels, tracheids, fibres, and tracheidal fibres, vessels mostly solitary - filled with tyloses at some places, medullary rays 3 to 5 cells deep; rosette crystals of calcium oxalate present in cortical, phloem and xylem region; cells contain mucilage, stained red with 1% ruthenium red, and deep yellow with potassium hydroxide solution; most of the parenchymatous cells contain starch grains, polygonal to rounded, 5 to 20  $\mu\text{m}$ , most grains less than 12  $\mu\text{m}$  in diameter, simple, hilum circular or a 2 to 5 rayed cleft lamellae indistinct.

**Powder** - Powder white to light yellow, sweet in taste; under the microscope numerous fragments of parenchyma, the cells containing mucilage and starch grains polygonal to rounded, 5-20  $\mu\text{m}$ , most grains less than 12  $\mu\text{m}$  in diameter, simple, hilum circular or a 2-5 rayed cleft lamellae indistinct; occasionally small rosette crystals of calcium oxalate, group of sclerenchymatous cells, vessels measuring 113 to 262  $\mu\text{m}$  long, fibres measuring 519 to 1038  $\mu\text{m}$  long and 9 to 19  $\mu\text{m}$  broad; mucilaginous canals; when treated with 50%  $\text{HNO}_3$  turns yellowish-orange and emits yellow fluorescence under UV 254 nm; with 50% KOH, it emits light yellow fluorescence under UV 254 nm, while with 1 N-NaOH in methanol orangeish brown colour is seen in day light.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Moisture content	Not more than	8	per cent, Appendix	2.2.9.
Total ash	Not more than	7	per cent, Appendix	2.2.3.
Acid insoluble ash	Not less than	1.5	per cent, Appendix	2.2.4.
Alcohol soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water soluble extractive	Not less than	21	per cent, Appendix	2.2.7

## ASSAY

## **T.L.C.**

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : methanol (80 : 20 : 0.05) shows under UV (366 nm) fluorescent zones at Rf. 0.12, 0.27, 0.33, 0.82. On spraying with anisaldehyde-sulphuric acid and heating for ten minutes at 120°C, shows spots at Rf. 0.12, 0.18, 0.43, 0.47, 0.69 and 0.82.

**CONSTITUENTS** - Galacturonic acid, galactose, glucose, xylose & rhamnose, polysaccharide althaea mucilage-O, asparagine, betaine, lecithin and phytosterol, polysaccharides.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Picchila, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Śleṣmasāraka, Mūtrala, Vedanāsthāpana, Kaphaghna

**IMPORTANT FORMULATIONS** - Gojihvādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Kāsa, Pratiśyāya, Mūtradāha, Mūtrāśayaśoṭha, Kaṇṭharoga, Mūtrakṛcchra, Āntrāśoṭha, Dāha, Raktapitta

**DOSE** - 3 -6 g

## KHATMĪ (Seed)

Khatmī seeds or Tukhm-e-khatmi, consist of dried seeds of *Althaea officinalis* Linn. (Fam. Malvaceae), a perennial, uniformly downy herb occurring in Kashmir region.

### SYNONYMS

Sanskrit	:	Khatmī
Assamese	:	--
Bengali	:	--
English	:	Marsh Mallow
Gujrati	:	--
Hindi	:	Khatmi bija
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Khatmi
Oriya	:	--
Punjabi	:	--
Tamil	:	Khatmi
Telugu	:	Khatmi
Urdu	:	Bajrul Khatmi, Khatmee, Tukhma-e-Khatmee

### DESCRIPTION

#### a) Macroscopic

The seeds are small to moderate size, approximately 6 mm, usually brownish-black, reniform, rugose, hairy at margins; become mucilagenous when soaked in water.

## b) Microscopic

T.S. shows testa - an outer multicellular layer comprising of outer most thick walled epidermis with multicellular, 2 to 6 armed stellate and some unicellular hairs, longest being near the micropyle; this is followed by 4 to 10 layers of parenchymatous cells several with rosette crystals of calcium oxalate, interrupted by schizogenous mucilage canals; the inner epidermis of testa is also thick walled. Tegmen two layered; outer tegmen - 4 to 6 cells deep, lignified 2 to 6 armed stellate hairs present also on it, this easily detached from the inner tegmen; inner tegmen - 4 to 6 cells deep, the outer being a row of palisade-like malpighian cells followed by a slightly thick walled, non-lignified two layered hypodermis of cells with their inner periclinal walls concave (i); 2 to 3 layered parenchymatous mesophyll; the inner epidermis is a layer of thin walled cells with rod like lignified thickening scattered on the anticlinal walls; endosperm cells filled with starch grains which are polygonal to rounded, 5 to 20  $\mu$  m in size, hilum circular or showing a 2 to 5 rayed cleft, lamellae indistinct; ovule campylotropous; seeds of *Althaea rosea* do not show the type of hairs present in *A. officinalis*, but have mostly unicellular hairs.

**Powder** - Powder brownish-black in colour, odourless, mucilaginous and sweetish in taste; shows elongated thick walled ridged malpighian cells; in surface view they are hexagonal showing wall thickenings; patches of parenchyma with mucilage and starch grains, polygonal to rounded, 5 to 20  $\mu$  m, hilum circular, or with a 2 to 5 rayed cleft, lamellae indistinct; rosette crystals of calcium oxalate and stellate hairs; a small amount of powder on microscopic slide turns maroon with 50 %  $H_2SO_4$  and black with 1N-NaOH in amylacetate. When treated with 1% ruthenium red, powder becomes pink in colour showing the presence of mucilage.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	18	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : methanol (85 : 15 : 0.5) shows under UV (366 nm) blue fluorescent at Rf. 0.18, 0.33 and 0.67. On spraying with Anisaldehyde-Sulphuric acid and heating the plate for ten minutes at 120°C, spots appear at Rf. 0.10 (grey), 0.18 (grey), 0.32 (green), 0.37 (navy blue), 0.57 (greyish blue) and 0.67 (greyish blue).

**CONSTITUENTS** - Glucose, sucrose, galactose & mannose, linoleic acid; isobutylalcohol, limonene, phellandrene,  $\gamma$ - toluerldehyde, citral, terpenol,  $\beta$ - sitosterol.

### **PROPERTIES AND ACTION**

**Rasa** : Madhura  
**Guṇa** : Snigdha, Picchila, Guru  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Vātahara, Pittahara, Sāraka, Mūtrala, Vedanāsthāpana, Śleşma Kalā  
Snehakara

**IMPORTANT FORMULATIONS** - Gojihvādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Pratiśyāya, Kāsa, Mūtrakṛcchra, Mūtradāha, Kaṇṭharoga

**DOSE** - 3-6 g

## **KHŪBKALĀN (Seed)**

Khūbkalān is the seed of *Sisymbrium irio* Linn. (Fam. Brassicaceae), an annual or biennial herb found in Kashmir, Punjab and Haryana and from Rajasthan to U.P. especially on moist soil.

### **SYNONYMS**

Sanskrit	:	--
Assamese	:	--
Bengali	:	--
English	:	Hedge-Mustard, London Rocket
Gujrati	:	--
Hindi	:	Khub Kalaan, Khaaksee
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Ranteekhee
Oriya	:	--
Punjabi	:	Janglisarson, Maktrusa, Maktaroosaa
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	Khubakalan

### **DESCRIPTION**

#### **a) Macroscopic**

Seeds more or less ellipsoid, minute, size about a mm, orangish-brown, mucilaginous with warty surface; odour, pungent like mustard oil and taste like bitter mustard oil.

### **b) Microscopic**

T.S. of seed shows seed coat with six layers, outermost a single layer of epidermis of rectangular, flattened and thin walled cells ranging from 30 to 50  $\mu$  in length containing colourless, concentrically striated mucilage; a two-cell deep layer of parenchymatous cells, a single row of sclerenchymatous cells with their radial and inner tangential walls thickened, a single-cell layer of pigment, a single cell layer of aleurone grains, followed by crushed parenchymatous cells; cotyledons contain aleurone grains and oil globules; embryo folded; starch absent.

**Powder** - Brown, with pungent mustard oil smell, shows oil globules; aleurone grains containing crystalloids, globoids and sclerenchymatous cells; with ruthenium red mucilage turns pink.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	22	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.
Fixed oil	Not less than	20	per cent, Appendix	2.2.8

### **T.L.C.**

T.L.C. of the methanolic extract on silica gel 'G' plate (0.2 mm thick) using butanol : acetic acid : methanol (60:10:20) shows under UV (254 nm) green spots at Rf. 0.07, 0.17, 0.23, 0.29, 0.55 and 0.87. After spraying with anisaldehyde-sulphuric acid reagent and heating the plate at 105°C for ten minutes spots appear at Rf. 0.05 (green), 0.09 (green), 0.13 (light green), 0.21 (dark green), 0.28 (purple), 0.40 (purple), 0.76 (light purple) and 0.93 (dark purple). After spraying with Dragendorff's reagent, one spot appears at Rf. 0.24 (bright orange).

**CONSTITUENTS** - Fixed oil and Isorhamnetin.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Snigdha, Picchila, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Balya, Svedakara, Śothahara

**IMPORTANT FORMULATIONS** - Gojihvādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Jvara, Kāsa, Vātajanya Vikāra, Śvāsa, Svarabheda, Daurbalya, Kaphavikāra

**DOSE** - 3-6 g

## **KODRAVAḤ (Grain)**

Kodravaḥ consists of dehusked and well-matured caryopsis of *Paspalum scrobiculatum* Linn. (Fam. Poaceae), an annual grass 60 to 90 cm tall, cultivated in the plains of India for its grains; newly gathered grains with husks are poisonous; husks are removed prior to use or powdering.

### **SYNONYMS**

Sanskrit	:	Koradūṣah, Koradūṣakaḥ
Assamese	:	--
Bengali	:	Kodo aadhaan
English	:	Kodo Millet
Gujrati	:	Kodro, Kodaraa
Hindi	:	Kodon, Kodava, Kododhaam
Kannada	:	Harak, Harike
Kashmiri	:	--
Malayalam	:	Varaku
Marathi	:	Kodra, Harik, Kodru
Oriya	:	Kodua
Punjabi	:	Kodon, Kodra
Tamil	:	Varagu
Telugu	:	Arikelu, Kiraruga
Urdu	:	Kodon

### **DESCRIPTION**

#### **a) Macroscopic**

Grain oval to rounded in shape, plano-convex and up to about 4 mm in length; pericarp brown, adherent to seeds, can be removed by rubbing; as seen under hand lens, on the convex side of caryopsis, there is one central line, and on the plane surface, three lines; inside pericarp is a shiny brown seed; seeds possess three prominent ridges on the convex side and in between these ridges, fine striations are present; plane side of the seed shows finely striated oval central depression, apical side pointed.

#### **b) Microscopic**

T.S. shows thick pericarp composed of 6 to 10 layers of cells; outermost layer elongated with outer and inner walls lignified; below this, cells have thickened walls, and a much-reduced lumen; testa not well defined and composed of crushed cells; cells of scutellum irregular in shape and usually contain oil droplets; outer cells of endosperm contain aleurone grains; endosperm cells thin walled, polygonal, large and fully packed with penta to hexagonal starch grains, usually 8 to 20  $\mu$ .

**Powder - Brown, fine, free flowing, characterized by the presence of characteristic thick walled, pericarp cells, penta to hexagonal starch grains, which are isolated, or in groups.**

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of ethanol extract on silica gel 'G' plate using Chloroform : Methanol (95:05) shows five spots at Rf 0.25, 0.38, 0.55, 0.67 and 0.89 on spraying with 10% alcoholic sulphuric acid and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Hydrocarbons hentriacontanol, hentriacontanone; sterols such as  $\beta$ -sitosterol, campesterol.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Madhura
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Grāhī, Lekhana, Viṣaghna

**IMPORTANT FORMULATIONS** - Nāḍīvraṇahara āturyādi Lepa, Nāḍīvraṇahara āturyādi Taila

**THERAPEUTIC USES** - Raktapitta, Vraṇa, Atisthauilya, Annadravaśūla, Prameha, Medovṛddhi, Nāḍīvraṇa, Jalodara

**DOSE** - 50-100 g

## KṢĪRAKĀKOLĪ (Bulb)

Kṣīrakākoli consists of the dried whole bulb of *Fritillaria roylei* Hook. (Fam. Liliaceae), a glabrous herb 6-24 m in height, found in Western temperate Himalayas from Kumaon to Kashmir at an altitude of 2500-4000 m; processed by boiling.

### SYNONYMS

Sanskrit	:	Śuklā, Kṣīrvallikā
Assamese	:	--
Bengali	:	--
English	:	Fritillary
Gujrati	:	--
Hindi	:	Kshira, Kakoli
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Kshira, Kakoli
Oriya	:	--
Punjabi	:	--
Tamil	:	Kshira, Kakoli
Telugu	:	Kshira, Kakoli
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Whole bulbs are hard, conical 1.5 to 2.5 in width and 3 to 3.5 cm in length, translucent with slight longitudinal ridges, covered with hard membranous scales arranged

in a concentric manner and breaking readily with a short fracture; cut surface white to creamish-yellow and starchy; scars of adventitious roots seen; odour, pleasant; taste, bitter.

#### **b) Microscopic**

T.S. of bulb shows concentric layers of scale leaves; axis of bulb show three concentric layers of scale leaves, with an outer and inner epidermis consisting of single layered parenchymatous cells with mucilage; cuticle of both epidermis is slightly wavy and horny, mesophyll consists of 6 to 9 layered hexagonal parenchyma cells; starch grains gelatinised; raphides ranging from 100 to 230  $\mu$  in length are also present in the mesophyll; surface view of upper epidermis show compactly arranged rectangular, elongated thin walled cells.

**Powder-** Powder creamish with pleasant smell; raphides present; powder treated with ruthenium red, mucilage turns bright pink.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C of the methanolic extract on silica gel 'G' plate (0.2 mm thick) using butanol : acetic acid : water (6:1:2) shows under UV (366 nm) spots at Rf. 0.11, 0.18, 0.29, 0.33, 0.37, 0.45, 0.49, 0.62 and 0.93 (all fluorescent blue) under UV 254 nm spots at Rf. 0.33, 0.37, 0.62 and 0.93 (all green). After spraying with Dragendorff's reagent orange spots appear at Rf. 0.33 and 0.37.

**CONSTITUENTS** - Alkaloids Kashmirine (imperialine), peimine, Peimisine, Propeimine, Peimiphine and Peimitidine.

**PROPERTIES AND ACTION**

**Rasa** : Madhura

**Guna** : Guru, Snigdha

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Vātahara, Pittahara, Rasāyana, Bṛmhaṇa, Śukravardhaka, Vṛṣya, Stanyajanana, Kaphakara, Tṛṣṇāhara, Basti Viśodhanī, Viṣaghna

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Śiva Guṭikā, Bṛhatphala Ghr̥ta, Bṛhat-Guḍūcī Taila, Bṛhatmāṣa Taila, Mānasamitra Vaṭaka, Rasarāja Rasa

**THERAPEUTIC USES** - Raktapitta, Dāha, Śoṣa, Jvara, Kṣaya, Raktadoṣa, Raktaroga, Hṛdroga, Śvasā, Kāsa, Vātarakta, Yonivyāpat, Vātavyādhi, Vātapittarujā

**DOSE** - 3-5 g in the powder form.

## KṢHĪRAVIDĀRĪ (Root)

Kṣhīraavidārī is the dried root of *Ipomoea digitata* Linn. syn. *Ipomoea paniculata* (Linn.) R. Br. (Fam. Convolvulaceae); a perennial climber, distributed throughout the warm and moist regions of India.

### SYNONYMS

Sanskrit	:	Ikṣugandhā, Ikṣuvallī, Payasvini, Dīrghakandā
Assamese	:	--
Bengali	:	Bhuh Kumdaa, Bhooi Kumhdaa
English	:	Giant potato
Gujrati	:	Vidaaree Kand
Hindi	:	Vidaaree Kanda, Bhuh Kumdaa, Bhui Kumbhadaa
Kannada	:	Nelkumbal, Naadakumbala
Kashmiri	:	--
Malayalam	:	Paalmutakku
Marathi	:	Bhui Kohalaa
Oriya	:	Bhuin Kakhaaru
Punjabi	:	--
Tamil	:	Nilappuchani, Paalmudamgi
Telugu	:	Paalagummudu, Nelagummudu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The root consists of thick pieces of different sizes, usually 2 to 8 mm in diameter; outer surface brownish and rough due to the presence of longitudinal fissures, ridges and

numerous circular lenticels; core light brown and fibrous; fracture, fibrous, odourless and sweetish in taste.

#### **b) Microscopic**

**Root-** Root shows 6 to 9 layers of thin walled cork cells, externally covered by rhytidoma; phelloderm composed of 8 to 10 layers of cells, thin walled and filled with starch grains, individual starch grain rounded to irregular in shape, variable in size measuring about 13 to 24  $\mu\text{m}$ , with distinct centric hilum; rosettes of calcium oxalate present; secondary phloem consists of companion cells, sieve tube elements and phloem parenchyma, traversed by uni- or biseriate medullary ray; numerous resin ducts and starch grains occur in the secondary phloem; secondary xylem consists of xylem parenchyma, xylem vessels, xylem fibres and tracheids; vessels large in size and numerous.

**Powder-** Light to dark brown, fine to coarse texture; simple and compound starch grains of variable size, crystals of calcium oxalate in prismatic and cluster form; pitted vessels; tracheids; parenchymatous cells with simple pits and long fibres with wide lumen and pointed ends.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of the alcoholic extract of dried root powder on Silica gel 'G' plate (0.2 mm thick) using Petroleum ether: Diethyl ether: Glacial acetic acid (8: 2: 0.1) under UV light (365 nm) shows two fluorescent zones at Rf. 0.24 and 0.42 (both green). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 105°C, three spots appear at Rf. 0.18, 0.55 and 0.95 (all black).

**CONSTITUENTS** - Glycosides, steroids, tannins and fixed oil.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta
<b>Guṇa</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Vṛṣya, Bṛṃhaṇa, Atimūtrala, Balya, Svarya, Varṇya, Stanyajanana, Rasāyana, Jīvanīya

**IMPORTANT FORMULATIONS** - Śīvā Guṭikā

**THERAPEUTIC USES** - Stanyavikāra, Pittaja Śūla, Raktavikāra, Mahāvātavyādhi, Mūtraroga, Vraṇa, Bhagna

**DOSE** - 5 - 10 g

## KULANĀJANA (Rhizome)

Kulanājana consists of dried rhizome of *Alpinia galanga* Willd. (Fam. Zingiberaceae), a plant upto about 2.0 m high bearing perennial rhizome, growing in eastern Himalayas and southwest India.

### SYNONYMS

Sanskrit	:	Sugandhamūla, Malaya Vacā, Sthūlagranthiḥ, Mahābharī Vacā, Rāsnā (South)
Assamese	:	Khulanjaana
Bengali	:	Kulanjan, Kurachi Vach
English	:	Greater galangal, Javagalangal
Gujrati	:	Kulinjan Jaanu, Kolinjan
Hindi	:	Kulanjan, Kulinjan
Kannada	:	Doddarasagadde, Dhoomraasmi
Kashmiri	:	--
Malayalam	:	Aratta, Ciffaratta
Marathi	:	Kulinlan, Koshta Kulinjan, Mothe Kolanjan
Oriya	:	--
Punjabi	:	--
Tamil	:	Arattai, Sittarattai
Telugu	:	Dumparaastramu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - The roots are adventitious, in groups, fibrous, persistent in dried rhizomes, about 0.5 to 2 cm long and 0.1 to 0.2 cm in diameter and yellowish-brown in colour.

**Rhizome** - Rhizome cylindrical, branched, 2 to 8 cm in diameter, longitudinally ridged with prominent rounded warts (remnants of roots) marked with fine annulations; scaly leaves arranged circularly; externally reddish-brown, internally orange yellow in colour; fracture, hard and fibrous; fracture, surface rough; odour, pleasant and aromatic; spicy and sweet in taste.

#### **b) Microscopic**

**Root** - T.S. of root circular in outline, single layered epidermis with barrel shaped cells having unicellular root hairs, hypodermis 3 or 4 cells deep and sclerenchymatous, cortex parenchymatous, many cells deep, with well developed intercellular spaces; endodermis showing prominent casparian strips and 'v' shaped thickening, followed by many celled sclerenchymatous pericycle; xylem and phloem in separate radial strands; centre occupied with a parenchymatous pith.

**Rhizome** - T.S. of young rhizome circular in outline; epidermal cells small and angular, thick cuticle present, rhizome differentiated into a wide cortex and a central cylinder, both regions having irregularly scattered vascular bundles, each vascular bundle with a prominent fibrous sheath; inner limit of cortex marked by rectangular parenchymatous cells; stele with irregular, closely placed vascular bundles towards periphery, root traces present, schizogenous canals and oil cells with suberized walls found in cortex and in central region; most of the parenchymatous cells filled with starch grains which are ellipsoidal to ovoid, sometimes beaked, simple, 10 to 64  $\mu\text{m}$ , hilum eccentric, circular or crescent shaped at the broad end, the narrow beak-like end become black when stained with dil. iodine water and chlor-zinc iodide but the remaining part become light blue or brown. Macerated preparation shows vessels 95 to 710  $\mu\text{m}$  long and 19 to 190  $\mu\text{m}$  broad, tracheidal fibres 68 to 920  $\mu\text{m}$  long and 19 to 30  $\mu\text{m}$  broad.

**Powder** - Powder is orange brown in colour, spicy and sweet in taste, shows parenchymatous cells containing starch (as described under microscopy of rhizome), oil cells, schizogenous canals, vessels with scalariform and reticulate thickenings and tracheidal fibres.

#### **IDENTIFICATION TEST -**

One drop of an extract of 1 g dried powdered material with ethanol placed on filter paper and observed under UV light does not show fluorescence; (distinction from 'lesser galangal' *Alpinia officinarum* which gives bluish fluorescence).

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.
Starch	Not less than	22	per cent, Appendix	2.2.13.
Essential oil	Not less than	0.4	per cent, Appendix	2.2.10.

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plates (0.2 mm thick) using toluene : ethyl acetate : methanol (80:20:0.4) shows under UV (366 nm) blue fluorescent zones of yellow, green and blue at Rf. 0.15, 0.25, 0.69 respectively. On spraying with anisaldehyde-sulphuric acid reagent and heating the plate for ten minutes at 120°C, spots appear at Rf. 0.15 (greyish green), 0.35 (violet), 0.48 (greyish green), 0.63 (greyish green), 0.69 (green) and 0.91 (violet).

**CONSTITUENTS** - Essential oil, containing  $\alpha$  - pinene,  $\beta$  - pinene, limonene, cineol, terpinen - 4 - ol and  $\alpha$  - terpineol.

## PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta

**Guṇa** : Guru

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Pācana, Rucya, Svarya, Hṛdya, Kaṇṭhya, Mukha Śodhaka, Viṣaghna

**IMPORTANT FORMULATIONS** - Brāhmī Vaṭī, Rāsnādikaṣāya, Rāsnādārvādi Kaṣāya, Rāsnāpañcakam, Rāsnā Saptakam, Rāsnāśunṭhyādi Kaṣāya, Rāsnairanḍādi Kaṣāya

**THERAPEUTIC USES** - Pratiśyāya, Śvāsa, Hikkā, Śopha, Vātaja Śūla, Udararoga, Kampa, Viṣamajvara, Kaphajakāsa, Aśīti Vātavyādhi, Mahākuṣṭha

**DOSE** - 1-3 g powder.

## KUMBHĪKAḤ (Seed)

Kumbhīkaḥ consists of dried seed of *Careya arborea* Roxb. (Fam. Lecythidaceae), a medium sized deciduous tree attaining a height of 9 to 18 m. occurring throughout India upto an altitude of 1,500 m.

### SYNONYMS

Sanskrit	:	Svādupuṣpa, Viṭapī, Sthala Kumbhī, Romaśā
Assamese	:	--
Bengali	:	Kumbhi
English	:	Kumbi
Gujrati	:	--
Hindi	:	Sthala Kumbhi
Kannada	:	Daddala, Gudda, Daddippe
Kashmiri	:	--
Malayalam	:	Pezuntol
Marathi	:	Kumbhaa
Oriya	:	--
Punjabi	:	--
Tamil	:	Kumbi
Telugu	:	Dudippi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seeds, exalbuminous, dark brown, oval ellipsoid, 1.5 to 2 cm long, upto one cm or slightly above in width; indehiscent; testa hard and wrinkled; odour, pleasant; taste, astringent.

**b) Microscopic**

Testa sclerenchymatous followed by a zone of collapsed cells of outer integument, inner integument lined by cuticle on both sides; outer layers of both integuments filled with dark brown material; cotyledons of many layered, thin walled, polygonal parenchymatous cells, filled abundantly with starch grains and occasionally with oil.

**Powder** - Creamish-yellow to light-brown, shows fragments of cotyledon cells; scattered stone cells of testa, abundant starch grains, simple and round, about 5  $\mu$ .

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

**T.L.C.**

T.L.C. of the hexane extract on precoated silica gel 'G' plate (0.2 mm thick) using petroleum ether : diethyl ether : acetic acid (9:1:0.1) shows spots at Rf. 0.14 (purple), 0.26 (brown), 0.32 (light pink), 0.44 (pink) and 0.77 (purple) on spraying with vanillin-sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Saponins (five sapogenols- careyagenol A, B, C, D & E); sterols,  $\alpha$ -spinosterol and  $\alpha$ -spinosterone.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Vātahara, Grāhī, Vraṇa Ropṇa

## IMPORTANT FORMULATIONS - Marma Guṭikā

**THERAPEUTIC USES** - Vātika Kāsa, Kuṣṭha, Prameha, Kṛmi, Viṣaroga, Pakvātisāra, Vraṇa, Nāḍīvraṇa

**DOSE** - 2-6 g powder.

## LATĀKARAÑJA (Seed)

Latākarañja consists of seed of *Caesalpinia bonduc* (Linn.) Roxb. (Fam. Caesalpiniaceae), an extensive, shrubby, wild, perennial climber distributed throughout tropical parts of India.

### SYNONYMS

Sanskrit	:	Kuberākṣa, Kaṇṭakī Karañja
Assamese	:	--
Bengali	:	Kaantaa Karanjaa, Naataa, Naataa Karanjaa
English	:	Bonduc Nut, Fever Nut
Gujrati	:	Kaanchakaa, Kaanka
Hindi	:	Karanja, Karanjuaa, Kaantaa Karanj
Kannada	:	Gajjike Kaayi, Gajkai
Kashmiri	:	--
Malayalam	:	Kalamchikuru, Kaalanchi, Kazhinch - Kai
Marathi	:	Saagar gotaa, Gajarghotaa, Gaajagaa
Oriya	:	Kotokolejaa
Punjabi	:	--
Tamil	:	Kajha shikke, Kalichchikkaai
Telugu	:	Gachchakaay
Urdu	:	Akitmakit

### DESCRIPTION

#### a) Macroscopic

Seeds globose or rounded, smooth, shiny, 1.2 to 2.5 cm in diameter; slightly flattened on one side due to close pressing of adjacent seeds; hilum and micropyle close together; hilum surrounded by a dark area around 4 mm in diameter, usually with a whitish

or yellowish remnant of funiculus; micropyle near the periphery of the dark area; seed coat greenish-grey to bluish-grey, lineate, shiny; 100 seeds weigh from 225 to 250 g.

#### **b) Microscopic**

Testa shows an outer single row of radially elongated, very narrow, translucent, compactly arranged cells forming a palisade layer (Malpighian layer) passing through which is the 'linea lucida'. These cells appear hexagonal in surface view and possess thick walls (rich in pectin as evident from Chloro-zinc Iodine Test); a sub-epidermal zone of 2 or 3 layers of thick walled bearer cells present, followed by multiple rows of osteosclereids, which progressively increase in size, elongate laterally and have more intercellular spaces towards the inner side; the outer few layers of these osteosclereids contain a brown substance; laterally elongated vascular tissues present in the lower region of this zone. The cells inner to vascular elements gradually compacted and rounded towards the inner margin; cotyledons show an outer single layer of epidermis made of small, isodiametric cells, and inner parenchymatous ground tissue cells rich in fixed oil, and having empty cavities uniformly distributed in them.

**Powder** - Colour light yellow through mustard to brown, coarse and free-flowing; bitter in taste and possessing tamarind-like odour. Parts of vessels showing scalariform thickenings and groups of narrow, palisade cells with light line are present; groups of cells of height from 150 to 250  $\mu$  the sub-epidermal layers of seed coat having 10 to 12  $\mu$ , squarish bearer cells and upto 150  $\mu$  long osteosclereids; cotyledon cells (upto 35  $\mu$ ) showing fixed oil when mounted in Sudan III.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	26 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4.0 per cent, Appendix	2.2.7.

#### **ASSAY**

## T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene: ethylacetate : acetic acid (5:4.5:0.5), shows under U.V. (366 nm) spots at Rf. 0.13 (Light Blue), 0.28 (Dark Blue), 0.63 (Pink), 0.92 (Pink); on spraying with anisaldehyde-sulphuric acid reagent and heating the plate for ten minutes at 110° C spots appear at Rf 0.30(Brown), 0.64 (Bluish Purple), 0.72 (Purple), 0.80 (Purple), 0.89 (Grey).

T.L.C. of the hexane extract on precoated silica gel 'G' plate 0.2 mm thick using chloroform: ethylacetate (98:2), on spraying with anisaldehyde- sulphuric acid reagent and heating the plate for ten minutes at 110° C spots appear at Rf 0.03 (Yellow), 0.11 (Greenish Blue), 0.21 (Greenish Yellow), 0.33 (Greenish Blue), 0.43 (Pale yellow), 0.55 (Greenish Blue).

**CONSTITUENTS** - Seeds contain bitter substance phytosterenin, bonducin, saponin, phytosterol, fixed oil, starch and sucrose. Seeds also contain  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$  and  $\zeta$  caesalpins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Pittahara, Kaphahara, Dīpana, Vedanāsthāpaka, Ārtavajanana, Vraṇa Ropaṇa

**IMPORTANT FORMULATIONS** - Āragvadhādi Kvātha Cūrṇa, Kuberākṣādi Vaṭī

**THERAPEUTIC USES** - Viṣamajvara, Sūtikājvara, Śūla, Gulma, Kāsa, Meha, Vātavikāra, Tvagroga, Śoṭha, Vraṇa, Udaraśūla, Śvāsa, Raktātisāra, Kuṣṭha, Āmavāta, Sandhivāta, Agnimāndya, Pravāhikā, Arśa, Yakṛtplīhāroga, Chardi, Kṛmi

**DOSE** - 1-3 g

## LAVALĪPHALA (Fruit)

Lavalīphala consists of dried fruit of *Phyllanthus acidus* (Linn.) Skeels syn. *Cicca acida* Linn. Merrill (Fam. Euphorbiaceae), a small or medium sized tree cultivated in gardens, and also grown as a roadside tree.

### SYNONYMS

Sanskrit	:	Sugandhamūlā, Lavalī, Pāṇḍuḥ, Komala Valkalā
Assamese	:	--
Bengali	:	Noyal, Harphal
English	:	Star gooseberry, Country gooseberry
Gujrati	:	Khaati Aawala, Raay aamali
Hindi	:	Harfaarevadi, Lavali
Kannada	:	Karinelli
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Raaya-aawal
Oriya	:	--
Punjabi	:	--
Tamil	:	Arinelli
Telugu	:	Raachayusarike
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Brownish green, globose, 1.5 to 1.8 cm dia obscurely 6 to 8 grooved, depressed at both ends; pieces show a highly shrivelled and wrinkled external surface, texture rough; odour characteristic; taste, acidic, followed by a delicately sweet taste; seed globose, 0.8 to 1.2 cm dia.

### **b) Microscopic**

T.S. of mature fruit shows the epicarp with a single layer of tabular epidermis, covered by a thin cuticle; numerous sunken stomata scattered on the epidermis; epidermal cells in surface view polygonal in shape with corner thickenings; mesocarp consists of 8 to 10 layers of polygonal cells and 6 to 8 layers of radially elongated large, rather thick walled parenchyma cells, most of which contain yellow pigments (mesocarp of *Emblica officinalis* consists of mostly large polygonal cells with corner thickenings and have a very few pigment cells); prisms of calcium oxalate crystal and starch grains present in a few epidermal cells and also in a few parenchyma cells; many of the cells contain yellow pigments; ramified vascular bundles scattered throughout the mesocarp consist of xylem and phloem, xylem composed of tracheids and fibres; testa have palisade like epidermis composed of tightly packed sclereids with pits.

**Powder** - Shows pieces of isodiametric-parenchymatous cells with yellow or brown colour pigment; prismatic crystals of calcium oxalate; fibres; sclereids with pits; starch grains are fairly abundant, small and simple.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract on precoated silica gel 'G' (E. Merck grade) plate using Chloroform : Methanol : Formic acid (95 : 0.5 : 0.1) shows under UV (366 nm) three fluorescent zones at Rf. 0.14 (green), 0.28 (green) and 0.83 (green). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for five minutes at 105°C six

spots appear at Rf. 0.14 (orange), 0.17 (violet), 0.51 (orange), 0.66 (purple), 0.76 (violet) and 0.91 (purple).

**CONSTITUENTS** - Triterpenoids ( $\beta$ - amyirin, Phyllanthol) and Gallic acid.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Amla, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Guru, Viśada
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Vātakara, Grāhī, Rakta Stambhana, Hṛdya, Rucikara

**IMPORTANT FORMULATIONS** - Drākṣāsava

**THERAPEUTIC USES** - Aśmarī, Arśa, Aruci

**DOSE** - 10-20 g

## MADHŪLIKĀ (Root)

The drug consists of dried root of *Eleusine corocana* (L.) Gaertn. (Fam. Poaceae), an erect, stout, annual grass, cultivated throughout India.

### SYNONYMS

Sanskrit	:	Rāgī, Madhūli, Markaṭahastatṛṇa
Assamese	:	--
Bengali	:	Marua
English	:	Finger Millet, Ragi
Gujrati	:	Naagali-Baavato
Hindi	:	Manduaa, Makaraa, Raagi
Kannada	:	Raagi
Kashmiri	:	--
Malayalam	:	Muttari, Raagi
Marathi	:	Naachnee
Oriya	:	--
Punjabi	:	Kodra, Madua, Koda
Tamil	:	Raagi, Kejhavaragu(siddha)
Telugu	:	Raagulu, Tagidelu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Root fibrous, well branched, upto 25 cm long, 3.5 mm in thickness, gradually tapering, creamy white, rough and dirty; root hairs present, fracture, brittle, fibrous, centre hollow; taste, earthen; no odour.

## b) Microscopic

T.S. shows epiblema consisting of two layers, the cells of the outer layer giving rise to root hairs; the inner layer called rhizodermis has slightly thicker walled hexagonal cells, followed by a cortex traversed by trabeculae, giving rise to large air spaces; endodermis characterized by the presence of casparian strips on the radial walls, followed by a single layered pericycle of fibre and stone cells; stone cells circular, with radial canals, and a narrow or wide lumen; phloem and xylem patches present below this layer arranged radially; pith cells somewhat circular and parenchymatous.

**Powder** - Shows under the microscope, tracheids measuring between 115 and 285  $\mu$  in length and between 13 and 40  $\mu$  in breadth, circular pits present on the surface; vessels elongated, cross wall perforation plates simple; elongated pits present on the walls of vessel; thin walled parenchymatous cells and circular stone cells present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2.5 per cent, Appendix	2.2.2.
Total Ash	Not more than	5.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.3 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of methanolic extract of the drug on precoated silica gel G plate, using methanol - chloroform (3 : 7) and on spraying with 10% sulphuric acid in ethyl alcohol followed by heating the plate for five minutes at 110°C, three spots appeared at Rf. 0.82 (Pink colour) comparable to the spot of sitosterol glucoside, 0.23 (Blackish grey), 0.15 (Blackish grey).

**CONSTITUENTS** - Flavonoids, orientin, isoorientin, vitexin, isovitexin, violanthin, lucenin-1, tricin, keto acids; polysaccharide and the free sugars,  $\beta$ -sitosterol glucoside.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Tridoṣaśāmakā, Raktadoṣahara, Vṛṣya, Rasāyana

**IMPORTANT FORMULATIONS** - Amlapittāntaka Modaka, Amṛta Guggulu, Aśvagandhādi Leha, Kuṣṭhādi Kvātha, Kaṭutumbyādi Taila

**THERAPEUTIC USES** - Trṣṇā, Karapāda Dāha, Vṛkkāśmarī, Śvāsa, Kāsa, Jvaropadrava

**DOSE** - 5-10 g

## MAHĀMEDĀ (Rhizome and Root)

Mahāmedā consists of dried rhizome and root of *Polygonatum cirrhifolium* Royle (Fam. Liliaceae), a herb found in the temperate Himalayas.

### SYNONYMS

Sanskrit	:	Mahāmeda, Vasucchidrā, Tridanti, Devamaṇī
Assamese	:	--
Bengali	:	--
English	:	Mahameda
Gujrati	:	--
Hindi	:	Mahameda, Devarigaala
Kannada	:	Mahamedha
Kashmiri	:	--
Malayalam	:	Mahameda
Marathi	:	--
Oriya	:	--
Punjabi	:	--
Tamil	:	Mahameda
Telugu	:	Mahameda
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Rhizome dirty brown in colour, 2 to 8 cm long and about 2.5 to 3 cm broad, having longitudinal markings on the surface and rough with irregular wrinkles; fracture, short and smooth; odour, distinct; taste, sweet with a slight bitter after-taste.

## b) Microscopic

**Rhizome :** T.S. shows a single layered cuticularized epidermis having actinocytic stomata followed by ground parenchymatous cortex of polygonal to isodiametric cells in which vascular bundles are scattered; in cortical cells starch grains, numerous idioblasts with raphides, and druses of calcium oxalate present; numerous round cavities present in the cortical region; endodermis between cortex and inner core absent; vascular bundles unevenly scattered, amphivasal; xylem elements represented by tracheids and xylem parenchyma; phloem composed of sieve tubes, companion cells and phloem parenchyma.

**Root :** T.S. shows a single layered epiblema, cells polygonal, bearing simple unicellular root hairs; a single layered hypodermis, cells larger, hexagonal, slightly thick walled; a broad cortex, cells thin walled and of varying shapes and sizes with very small intercellular spaces, and containing circular starch grains measuring between 10 to 40  $\mu$  in diameter; idioblasts with raphides present; endodermis single layered, characterized by the presence of casparian strips on their radial walls; pericycle single layered; stele exarch, polyarch, xylem consist of tracheids, vessels with simple perforation plate and reticulate thickenings, and xylem parenchyma; phloem consist of sieve tubes, companion cells and phloem parenchyma; small pith present in centre with parenchymatous cells.

**Powder :** Dark brown; under microscope shows epidermal cells with actinocytic stomata and cortical cells in surface view; starch grains ovoid with concentric striation, either singly or in groups; raphides and druses present; tracheids elongated with pointed ends, wall slightly wavy towards tips, thickenings reticulate; vessels with simple, cross wall perforation, thickenings reticulate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	3 per cent, Appendix	2.2.2.
Total Ash	Not more than	3.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	70 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of methanolic extract of the roots/rhizome on a precoated silica gel G plate, using methanol : chloroform (3 : 7). On spraying with 10% sulphuric acid in ethyl alcohol and heating the plate for about 5 minute at 110°C, two spots appear at Rf. 0.42 and 0.30 showing blackish grey fluorescent were found comparable to the spots of glucose and sucrose respectively.

**CONSTITUENTS** - Glucose, Sucrose

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guna</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphavardhaka, Vātahara, Pittahara, Vṛṣya, Śukravardhaka, Stanyajanana, Bṛṃhaṇa, Jīvaniya, Rucya

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Śiva Guṭikā, Amṛtaprāśa Ghṛta, Aśoka Ghṛta, Dhānvantara Taila, Bṛhatmāṣa Taila, Mahā Nārāyaṇa Taila, Vāsācandanādi Taila

**THERAPEUTIC USES** - Jvara, Raktavikāra, Kṣaya, Dāha, Raktapitta, Bālaroga, Kāmalā, Kṣata , Kṣīṇa

**DOSE** - 3-6 g

## MADHUSNUHĪ (Tuberous Root)

Madhusnuhī consists of tuberous root of *Smilax china* Linn. (Fam. Liliaceae), a deciduous climber with sparsely prickled or unarmed stem. It is imported from China and Japan.

### SYNONYMS

Sanskrit	:	Dvīpāntara Vacā
Assamese	:	--
Bengali	:	Chopcheenee, Kumarika, Shukchin
English	:	China root
Gujrati	:	Chopcheenee
Hindi	:	Chopcheenee
Kannada	:	--
Kashmiri	:	--
Malayalam	:	China Pairu
Marathi	:	Chopcheenee
Oriya	:	--
Punjabi	:	--
Tamil	:	Parangichekkai
Telugu	:	Pirngichekka
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Tubers about 6 to 12 cm long, 2 to 4 cm wide, rough, irregular, cylindrical, curved, slightly tapering with brownish or blackish scars; externally brownish-yellow in colour, and internally brown in colour; fracture, hard; odour not characteristic; taste, slightly bitter.

## b) Microscopic

Cortex shows several layers of thin-walled, polygonal, elongated mucilaginous parenchymatous cells, a few cells containing raphides of calcium oxalate; endodermis not distinguished; ground tissue having several vascular bundles consisting of usual elements; fibres long and aseptate; numerous simple and compound starch grains, measuring 16 to 38  $\mu$  in dia. with 2 to more than 9 components mostly spherical to ovoid, having hilum in centre.

**Powder** : Shows light brown, fragments of mucilaginous parenchymatous cells of cortex fibres and vessels with reticulate thickening; a few scattered needles of calcium oxalate from raphides; numerous simple and compound starch grains measuring 16 to 38  $\mu$  in dia. with 2 to more than 9 components, mostly spherical to ovoid having hilum in centre.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 0.6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.006per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 0.8 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 5 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on precoated Silica gel 'G' plate (0.2 mm thick) using Toluene : Ethyl acetate : Methanol (10 : 10 : 4) as mobile phase and on spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate at 105°C for ten minutes ten spots appear at Rf. 0.09 (dark green), 0.17 (violet), 0.21 (dirty yellow), 0.26 (grey), 0.32 (yellow), 0.48, 0.55 and 0.58 (all violet), 0.73 (greenish blue) and 0.77 (violet).

**CONSTITUENTS** - Saponins, sarsaponin and parallin, which yield isomeric sapogenins, sarsapogenin and smilogenin. It also contains sitosterol and stigmasterol in the free form and as glucosides.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣahara, Rasāyana, Śothahara, Vedanāsthāpana, Naḍībalya, Dīpana, Anulomana, Raktaśodhaka, Vṛṣya, Śukraśodhaka, Mūtrala, Śvedajanana

**IMPORTANT FORMULATIONS** - Madhusnuhī Rasāyana, Copacīnyādi Cūrṇa

**THERAPEUTIC USES** - Vibandha, Ādhmāna, Śūla, Kṛmi, Kuṣṭha, Pūyameha, Śukravikāra, Vātavyādi, Phiraṅga, Unmāda, Apsmāra, Sandhivāta, Kampavāta, Gaṇḍamālā

**DOSE** - 3-6 g powder.

## MEDĀSAKAḤ (Stem Bark)

Medāsakaḥ consists of stem bark of *Litsea chinensis* Lam. syn. *L. glutinosa* (Lour.) C.B. Robins, *L. sebifera* Pers. (Fam. Lauraceae), an evergreen shrub or tree, upto 25 m in height and about 1.5 m in girth with a clean bole, found throughout India, ascending upto an altitude of 1350 m in outer Himalayas.

### SYNONYMS

Sanskrit	:	Medāsakaḥ
Assamese	:	--
Bengali	:	Kukurchite
English	:	--
Gujrati	:	Meda Lakdee
Hindi	:	Maida Lakdee
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Meda Lakdee
Oriya	:	--
Punjabi	:	Medasaka
Tamil	:	Medalakavi
Telugu	:	Meda
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Pieces of bark 1.5 to 1.6 cm in length; 0.1 to 0.5 cm in width; external surface rough, corky, greenish - yellow to yellowish - brown; internal surface smooth, longitudinally striated, dark brown to black; fracture, short and uneven.

#### **b) Microscopic**

T.S. shows broad zone of cork, 5 to 8 layered; secondary cortex consisting of patches of sclereids, fibres, parenchyma, occasionally containing rhomboidal crystals of calcium oxalate, abundant starch grains, cells containing tannins and mucilage; starch grains spherical to oval, single or in groups, simple or compound, measuring from 1.5 to 8  $\mu$ ; fibres long, lignified with tapering ends, measuring from 370 to 630  $\mu$  in length and 23 to 35  $\mu$  in width.

**Powder** - Light brown in colour, odour strong, bitter and mucilaginous showing cork tissue, starch grains, sclereids, fibres, cells containing tannins and mucilage; sclereids round to oblong, laterally compressed, with narrow lumen, and showing radiating pit canals.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.

#### **T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm thick) using chloroform: methanol: acetic acid (80:20:2) shows Under UV (254 nm) three spots at Rf. 0.07 (brown), 0.15 and 0.23 (both violet). Under UV (366 nm) two fluorescent spots appear at Rf. 0.68 (pink) and 0.89 (blue). On exposure to iodine vapour five spots appear at Rf. 0.15, 0.20, 0.23, 0.30 and 0.82 (all yellowish brown). On spraying with 5% ferric chloride solution four spots appear at Rf. 0.07 (violet), 0.15 (blue), 0.23 and 0.30 (both faint green).

**CONSTITUENTS** - Alkaloids (Laurotetaline, actinodaphine, boldine, norboldine, sebiferine and litseferine).

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Stambhana, Bhagnaprasādaka

**IMPORTANT FORMULATIONS** - Asthisandhānaka Lepa

**THERAPEUTIC USES** - Śoṭha, Śūla, Vātavikāra, Agnimāndya, Atīsāra, Raktasrāva, Asthibhanga

**DOSE** - 5-10 g powder.

## MEDĀSAKAḤ (Wood)

Medāsakaḥ consists of wood of *Litsea chinensis* Lam. Syn. *L. glutinosa* (Lour.) C.B. Robins, *L. sebifera* Pers. (Fam. Lauraceae), an evergreen shrub or tree, upto 25 m in height and about 1.5 m in girth with a clean bole, found throughout India, ascending upto an altitude of 1350 m in outer Himalayas.

### SYNONYMS

Sanskrit	:	Medāsakaḥ
Assamese	:	--
Bengali	:	Kukurchite
English	:	--
Gujrati	:	Meda Lakadee
Hindi	:	Meda Lakadee
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Meda Lakadee, --
Oriya	:	--
Punjabi	:	Medalakavi
Tamil	:	Meda
Telugu	:	Jeevakamu

### DESCRIPTION

#### a) Macroscopic

**Wood** - Thick and thin pieces of wood, 14 to 21 cm in length and 0.5 to 2 cm in width; yellowish-white; surface rough with very fine longitudinal striations; fracture, hard, fibrous.

## b) Microscopic

T.S. shows vessels, either single or in groups of 2 or 3; xylem fibres arranged in radial rows with thick walls; medullary rays prominent, uni to tetraseriate, radially elongated, upto 30 cells in height as seen in tangential section and containing abundant spherical to oval starch grains, single or in groups, simple or compound, measuring from 3 to 9  $\mu$ ; fibres long, linear, lignified with blunt ends, measuring in length from 530 to 1060  $\mu$  and from 13 to 24  $\mu$  in width.

**Powder** - Pale yellowish-brown, having characteristic odour, slightly bitter in taste; shows fragments of lignified fibres, starch grains, bordered pitted vessels and some vessels showing scalariform thickenings on their secondary wall.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (80:20) shows under UV (254 nm) three spots at Rf. 0.10 (violet), 0.29 (faint brown) and 0.52 (yellowish green). Under UV (366 nm) three fluorescent spots appear at Rf. 0.29 (brown), 0.52 (yellow) and 0.68 (blue). On exposure to iodine vapour eight spots appear at Rf. 0.10 (brown), 0.13, 0.16, 0.24, 0.29, 0.52, 0.68 and 0.74 (all yellowish brown). On spraying with 10% methanolic-sulphuric acid and heating the plate at 110°C for ten minutes ten spots appear at Rf. 0.10, 0.16 (both brown), 0.26 (grey), 0.31 (brown), 0.40 (purple), 0.44, 0.52, 0.57 (all brown), 0.68 (purple) and 0.77 (brown).

**CONSTITUENTS** - Alkaloids (Laurotetanine, actinodaphine, boldine, norboldine).

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Stambhana

**IMPORTANT FORMULATIONS** - Aileyaka Tāila (Citrakādi Taila), Vātaghna Lepa (Cintāmaṇi Rasa)

**THERAPEUTIC USES** - Śoṭha, Śūla, Vātavikāra, Agnimāndya, Atīsāra, Raktasrāva

**DOSE** - 1 to 3 g powder.

## MEṢAŚRṄĪ (Leaf)

Meṣaśrṅgī consists of dried leaf of *Gymnema sylvestre* R.Br. (Fam. Asclepiadaceae), a large woody, much branched, climber, with pubescent young parts, found throughout India in dry forests upto 600 m.

### SYNONYMS

Sanskrit	:	Madhunāśinī, Ajāśrṅgī
Assamese	:	--
Bengali	:	Medhasingi
English	:	Periploca of the wood
Gujrati	:	Kaavalee, Medhasinge
Hindi	:	Gudmaar, Medhaa Singee
Kannada	:	Kadhasige
Kashmiri	:	--
Malayalam	:	Cakkarakkolli, Madhunaashini
Marathi	:	Kaavalee, Medhaashingi
Oriya	:	--
Punjabi	:	--
Tamil	:	Shirukurum Kaay, ShakkaraiKKolli
Telugu	:	Podapatro
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Leaf simple, opposite, elliptical or ovate, petiolate, petiole 6 to 12 mm long and pubescent; lamina 3 to 6 cm long and 1 to 3 cm broad; acute or shortly acuminate; more or

less pubescent on both sides, base rounded or cordate, venation reticulate; odour, unpleasant; taste, bitter and acrid.

**b) Microscopic**  
**Leaf -**

*Petiole* - Nearly semi circular in outline having a deep furrow, shows a single layered epidermis covered with thick cuticle; multicellular uniseriate trichomes present; cortex composed of 3 or 4 layers of collenchyma and 3 or 4 layers of thin walled parenchymatous cells with intercellular spaces; vascular bundle bicollateral, conjoint and 3 in number, one central larger and crescent shaped and 2 lateral and smaller in size; a few rosette crystals of calcium oxalate present in cortical region.

*Midrib* - Epidermis and trichome as in petiole; epidermis followed by 2 or 3 layers of collenchyma adjacent to the lower surface; vascular bundle crescent shaped, bicollateral, conjoint and situated in centre; rest of the tissue between collenchyma and vascular bundles consisting of polygonal thin-walled parenchymatous cells with intercellular spaces, a few having rosette crystals of calcium oxalate.

*Lamina* - Shows dorsiventral structure; epidermis and trichome as in petiole and midrib; trichome cylindrical, consists of 3 to 6 cells nearly similar in width and variable in length, terminal cells blunt, most of them curved inwards from the leaf surface; palisade 1 or 2 layers; spongy parenchyma irregular, arranged with distinct intercellular spaces, rosette crystals of calcium oxalate present in this region; stomata paracytic, present only on lower surface; palisade ratio 7 or 8; stomatal index 20 to 25, vein islet number 7 to 10 per sq. mm.

**Powder** - Light green; under microscope shows epidermal cells having nearly straight wall, and paracytic stomata in surface view; rosette crystals of calcium oxalate; broken pieces of trichomes and spiral vessels.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	28	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica Gel 'G' plate using n-Hexane : Toluene : Ethylacetate (5:10:2) as mobile phase shows four fluorescent zones under U.V. (366 nm) at Rf. 0.24, 0.37 (both Red), 0.50 (blue) and 0.60 (Red). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate at 110° for ten minutes seven spots appear at Rf. 0.29 (green), 0.37, 0.47 (both violet), 0.55 (pink), 0.60 (green), 0.66 (violet) and 0.93 (pink).

**CONSTITUENTS** - Triterpenoid saponins of gymnemic acid A, B, C and D with sugar-residues such as glucuronic acid, galacturonic acid, ferulic and angelic acids attached as carboxylic acids. Several isopropylene derivatives of gymnemagenin, a hexahydro-droterpene, gymnemagenin, gymnemic acid. The leaves also contain betaine, choline, gymnamine alkaloids, inositol, d-quercitol. Hydrocarbons such as nonacosane, hentriacontane, tritriacontane, pentatriacontane, phytin, resin, tartaric acid, formic acid, butyric acid, amino acids such as leucine, isoleucine, valine, alanine,  $\gamma$ -butyric acid.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Viṣaghna, Dīpana, Cakṣuṣya, Sraṃsana

**IMPORTANT FORMULATIONS** - Ayaskṛti, Nyagrodhādi Cūrṇa, Mahā Viṣagarbha Taila, Mṛtasañjīvanī Surā

**THERAPEUTIC USES** - Śvāsa, Kāsa, Śūla, Kuṣṭha, Prameha, Kṛmi, Vraṇa, Śopha, Arśa, Hṛdroga, Dantakṛmi, Netraroga

**DOSE** - 3-6 g

## MEṢAŚRṄĪ (Root)

Meṣaśrṅgī consists of root of *Gymnema sylvestre* R. Br. (Fam. Asclepiadaceae), a large woody, climber, much branched, with pubescent young parts, found throughout India in dry forests upto 600 m.

### SYNONYMS

Sanskrit	:	Madhunāśinī, Ajaśrṅgī
Assamese	:	--
Bengali	:	Medhasingi
English	:	Periploca of the woods
Gujrati	:	Kaavalee, Medhasinge
Hindi	:	Gudmaar, Medhaasingee
Kannada	:	Kadhasige
Kashmiri	:	--
Malayalam	:	Cakkarakkolli, Madhunaashini
Marathi	:	Kaavalee, Medhaashingi
Oriya	:	--
Punjabi	:	--
Tamil	:	Shakkaraikkolli, Shirukurumkaay
Telugu	:	Podapatro
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Tap root branched, rough, longitudinally fissured, corky, soft and nodulose pieces, 2 to 7 cm long and 0.2 to 1.0 cm in thickness; external surface dark brown and cut surface showing a core cream in colour; fracture, splintery; odour, unpleasant; taste, bitter and acrid.

## b) Microscopic

**Root** - Shows 5 to 20 rows of tangentially elongated and radially arranged cork cells; secondary cortex a wide zone consisting of oval to polygonal cells somewhat irregular in shape and moderately thick walled, filled with rosette crystals of calcium oxalate and a few simple or compound starch grains; secondary phloem composed of sieve tubes, companion cells and phloem parenchyma, with mostly large and a few small rosette crystals and starch grains; medullary rays prominent, uni or multi seriate, generally tetra seriate, extending from primary xylem to secondary phloem; groups of oval to elongated, thick walled, lignified sclereids with clear striations and narrow lumen present in cortex and phloem region; secondary xylem consists of usual lignified elements; vessels simple pitted, single or 2 to 7 in radial groups and dispersed throughout the xylem region; fibres long with tapering ends and wide lumen; primary xylem present diarch.

**Powder** - Light yellow; shows thick walled cork cells; polygonal, thin walled parenchymatous cells, simple pitted fibres and vessels; groups of sclereids, large and a few small rosette crystals of calcium oxalate, simple and compound starch grains, measuring 5 to 11  $\mu$  in dia.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on Silica Gel 'G' plate using Toluene : Ethylacetate : Methanol (10:10:4) as mobile phase shows on spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate at 110°C for ten minutes eight spots at Rf. 0.17 (brown), 0.25 (violet), 0.48 (grey), 0.57 (pink), 0.68, 0.80, 0.87 (violet) and 0.95 (pink).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Mūtrala, Dīpana, Śirovirecaka, Sraṃsana

**IMPORTANT FORMULATIONS** - Mahā Viṣagarbha Taila, Nyagrodhādi Cūrṇa, Mṛtasañjīvanī Surā

**THERAPEUTIC USES** - Kuṣṭha, Prameha, Kāsa, Kṛmiroga, Vraṇa, Viṣavikāra, Mūtrakṛcchra, Śvāsa, Hṛdroga, Raktavikāra, Dāha, Akṣiśūla, Vidradhi, Vātahara

**DOSE** - 50 - 100 ml decoction.

1 - 2 g powder.

## NANDĪ (Root)

Nandī consists of dried root of *Ficus arnottiana* Miq. (Fam. Moraceae), a glabrous tree or shrub without aerial roots, found throughout India in rocky hills up to 1350 m altitude.

### SYNONYMS

Sanskrit	:	Pārśvapippala, Prarohī, Gardhabhāṇḍa, Gajapādapa, Sthālīdruma, Nandīvrkṣa
Assamese	:	--
Bengali	:	Kamru
English	:	--
Gujrati	:	Naandrukheevad
Hindi	:	Beliya Peepal
Kannada	:	Kadarasu, Kallarase
Kashmiri	:	--
Malayalam	:	Kallarayal
Marathi	:	Nandee vruksh, Naandruk
Oriya	:	Plokyo
Punjabi	:	--
Tamil	:	Kagoli, Kodiarasu, Kallarasu
Telugu	:	Kallaravi, Kondaravi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug available in cut pieces with or without bark of varying size, 0.5 to 2.0 cm in thickness; external surface brownish in colour and slightly rough due to exfoliation of cork, cut surface, yellowish-brown in colour; fracture, fibrous; odour and taste not characteristic.

## b) Microscopic

Transverse section of root shows thick cuticle, single layered epidermis, cells rectangular followed by 3 or 4 layers of cork cells; cork cambium 2 to 4 layered; secondary cortex wide consisting of rectangular to polygonal thin walled pitted cells, some filled with reddish-brown substance; circular to elongated, lignified, elliptical stone cells, a few showing concentric striations present in this region; a few prismatic crystals of calcium oxalate and abundant round to oval starch grains upto about 12  $\mu$  in dia. present in cortical cells; endodermis and pericycle not distinct; secondary phloem shows a wide zone consisting of sieve tubes, companion cells, fibres and ray cells; phloem parenchyma contains prismatic crystals of calcium oxalate and round to oval starch grains, laticiferous cells also present in this region; fibres non-lignified, thick walled with narrow lumen; secondary xylem elements thick walled and lignified; vessels and tracheids show bordered pits; medullary rays uni to multiseriate, wide towards peripheral region.

**Powder :** Light brown; under microscope shows groups of parenchyma; simple, round to oval starch grains, measuring upto 12  $\mu$  in dia. and crystals, fragments of fibres, circular to elongated, elliptical stone cells, a few laticiferous cells and border pitted vessels and tracheids.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene : Chloroform (8:12 v/v) as mobile phase shows on exposure to Iodine vapour four spots at Rf. 0.25, 0.37, 0.75 and 0.89 (all yellow). On spraying with Anisaldehyde-sulphuric acid

reagent and heating the plate for ten minutes at 105° C. The same four spots appear violet at Rf. 0.25, 0.37, 0.75 and 0.89.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Grāhī, Medohara, Bhagnasandhānaka

### **IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Raktavikāra, Viṣavikāra, Dāha, Kaphavikāra, Vraṇa, Bhagna, Yonidoṣa

**DOSE** - 10 - 20 g powder.

30 - 50 g decoction.

## NĪLAJHIṆṬĪ (Root)

NīlajhiṆṭī consists of root of *Barleria strigosa* Willd. (Fam. Acanthaceae), a tall herb which is distributed throughout the upper gangetic plain and southern parts of India.

### SYNONYMS

Sanskrit	:	Dāsī, Bāṇa, Kṛṣṇa, Saireyakaḥ, Nīlasaireyakaḥ
Assamese	:	--
Bengali	:	Jhaati, Kaaraajaati
English	:	--
Gujrati	:	Kaataseriyo
Hindi	:	Nili, Katsaraiya
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Nilakurnni
Marathi	:	Koraanti, Wahiti
Oriya	:	--
Punjabi	:	--
Tamil	:	Shemmuli
Telugu	:	Mullugorant, Nilambaramu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Branched tap root, 2 to 10 mm in thickness; knotty and thicker at the transition zone with stem; dark brown; cut pieces of about 20 cm in length; cut or broken surface straw coloured and split; surface of fractured part smooth; bark sloughing off from broken areas; unpleasant odour; tasteless, texture rough.

## b) Microscopic

T.S. of root reveals a circular outline; outer layers generally sloughed off; but strips of cork, cork cambium and cortex with occasional stone cells may be present; phloem composed mostly of parenchyma and fibres and separated from xylem by a flattened layer of cambium; xylem composed of thick walled cells and vessel elements and interrupted by 1 to 3 seriate rays made of squarish or rectangular cells radiating from 8 to 12 points of primary xylem elements present at the periphery of the pith; 1 or 2 growth rings visible in the wood region; pith made of large, angular, compactly arranged, thin walled cells. In dried market samples the pith region usually shows radial fractures; some cells of the pith show dark contents.

**Powder** - Powder shows vascular elements with simple pitted thickenings, and tracheidal cells having pointed end walls. Stone cells, 60 to 120  $\mu$  present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm thick) using ethylacetate : methanol : water (9:0.5:0.5) as the mobile phase shows under U.V. (366nm) spots at Rf 0.13 (Blue); 0.20 (Bluish green); 0.35 (Fluorescent blue); 0.44 (Blue); 0.62 (Purplish blue); 0.82 (Blue); 0.91 (Orange).

## PROPERTIES AND ACTION

**Rasa** : Tikta, Madhura

**Guṇa** : Snigdha

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātakaphahara, Keśarañjana, Viṣaghna, Mūtrala, Keśya,  
Garbhavṛddhikara

**IMPORTANT FORMULATIONS** - Māṇikyā Rasa

**THERAPEUTIC USES** - Kuṣṭha, Vātarakta, Kaṇḍū, Mūtrakṛcchra, Raktavikāra,  
Vātajanyakṣaya, Mūṣikāviṣa, Śirāgranthī, Dantaroga, Kāsa, Śoṭha

**DOSE** - 10 - 20 ml swarasa.

50 - 100 ml kvātha.

## **NIMBA (Root Bark)**

Nimba consists of dried root bark of *Azadirachta indica* A. Juss. syn. *Melia azadirachta* Linn. (Fam. Meliaceae), a medium to large evergreen tree attaining a height of 15 to 20 m or more under favourable conditions and found throughout the plains of India upto an altitude of 900 m.

### **SYNONYMS**

Sanskrit	:	Picumardah, Ariṣṭah, Picumandah, Prabhadrah
Assamese	:	--
Bengali	:	Nim, Nimgaachh
English	:	Margosa Tree, Neem Tree, Indian Lilac
Gujrati	:	Leemado
Hindi	:	Neem
Kannada	:	Turakbevu, Huchchabevu, Chikkabevu
Kashmiri	:	--
Malayalam	:	Veppu, Aryaveppu, Aaruveppu
Marathi	:	Kadunimba, Nimb
Oriya	:	Neemo, Nimba
Punjabi	:	Nimb, Nim
Tamil	:	Vempu, Veppu
Telugu	:	Vemu, Vepa
Urdu	:	Neem

### **DESCRIPTION**

#### **a) Macroscopic**

Root bark available in quilled or curved pieces of varying sizes with a thickness of 0.25 to 0.50 cm; outer surface irregular, rough, scaly, fissured, reddish-brown or greyish-

brown; inner surface, yellowish-brown with parallel striations; fracture, splintery and fibrous; odour like that of saw dust; taste, bitter.

#### **b) Microscopic**

Root bark shows cork, cortex and phloem; cork generally 6 or 7 layers of polygonal and thin walled cells with reddish-brown contents; outer cortex of tangentially elongated large rectangular cells with tangentially elongated sclereids, singly or in groups in isolated patches; sclereids vary in size and wall thickness, distinctly striated, pitted and often associated with cells containing crystal; inner cortex of polygonal parenchymatous cells with bundles of sclerenchymatous fibres, thick walled with irregular lumen; secondary phloem composed of alternating tangential bands of bast fibres and parenchymatous tissues intercepted by uni to biseriate phloem rays; abundant starch grains present in parenchymatous cells of cortex and phloem; starch grains simple, or more usually, compound with 2 or 3 components, hilum cleft or radiate, individual grain 5 to 20  $\mu$ ; abundant prismatic crystals of calcium oxalate in cortex, of 10 to 15  $\mu$ , also associated with phloem fibres; idioblasts with reddish-brown contents seen in cortex; cells with fat droplets seen in inner cortex and phloem.

**Powder** - Reddish-brown; shows cork cells; numerous prismatic crystals of calcium oxalate both isolated, and in association with phloem fibres; individual fibres with narrow lumen and elongated tapering ends; pitted macrosclereids with wide lumen and distinct striations; simple, and compound starch grains with 2 or 3 components, of 5 to 20  $\mu$  in size; parenchymatous cells large and occasionally filled with brown contents.

#### **IDENTITY, PURITY AND STRENGTH**

Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.
Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.

#### **T.L.C.**

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using hexane : ethyl acetate (1:1) shows spots at Rf 0.08, 0.12, 0.19 (all violet), 0.25 (mustard

yellow), 0.33, 0.39, 0.46 (all light violet) and 0.82 (purple) on spraying with 1% Vanillin-Sulphuric acid reagent followed by heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Tetranortriterpenoids, margocin, nimbidiol, nimbolicin, azadirinin.

### **PROPERTIES AND ACTION**

**Rasa** : Tikta

**Guṇa** : Laghu

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Pittahara, Kaphahara, Śītagrāhī, Rucya, Dīpana, Viṣaghna, Kaṇḍūghna, Ahṛdya, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Amṛtaṣṭaka, Aṣṭāṅgadaśāṅga Lauha

**THERAPEUTIC USES** - Chardi, Kuṣṭha, Raktapitta, Prameha, Hṛllāsa, Duṣṭa Vraṇa, Tṛṣṇā, Jvara, Dāha, Kāsa, Śvāsa, Śoṭha, Kaphavikāra, Kṛmiroga, Aruci, Grahaṇī, Yakṛtvikāra, Hṛdayavidāha, Vamana

**DOSE** - 3 - 6 g

## NIMBA (Flower)

Nimba consists of dried flower and flower bud of *Azadirachta indica* A. Juss. syn. *Melia azadirachta* Linn. (Fam. Meliaceae), a medium to large size evergreen tree attaining a height of 15 to 20 m or more under favourable conditions and found through-out the plains of India upto an altitude of 900 m.

### SYNONYMS

Sanskrit	:	Ariṣṭaḥ, Picumandaḥ, Picumardaḥ, Prabhadraḥ
Assamese	:	--
Bengali	:	Nim, Nimgaachh
English	:	Indian Lilac, Margosa Tree, Neem tree
Gujrati	:	Leemado
Hindi	:	Neem
Kannada	:	Chikkabevu, Huchchabevu, Turakbevu
Kashmiri	:	--
Malayalam	:	Aaruveppu, Aryaveppu, Veppu
Marathi	:	Nimb, Kadunimb
Oriya	:	Neemo, Nimba
Punjabi	:	Nim, Nimba
Tamil	:	Vempu, Veppu
Telugu	:	Vemu, Vepa
Urdu	:	Neem

### DESCRIPTION

### a) Macroscopic

Dried flowers are brown to deep brown; individual flower 5 to 6 mm long and 6 to 11 mm wide, pentamerous, bisexual, regular and hypogynous; calyx 5, short, united at base; corolla 5, free, spatulate, spreading, 4.5 to 5.5 mm long 2 mm wide; stamens 10, monoadelphous, staminal tube inserted at base of corolla; gynoecium tricarpeal, syncarpous, superior, trilobular, two ovules in each locule, style 1, stigma 3-lobed; taste, mildly bitter: odour, indistinct.

### b) Microscopic

**Calyx** - Sepal shows thin walled polygonal papillose epidermis; elongated thin walled unicellular conical trichomes of varying lengths; rosette crystals in cells of epidermis.

**Petals** - Petal shows epidermis of rectangular cells papillose at margins, non-glandular unicellular trichomes, over 150  $\mu$  long, tubular and hyaline; glandular trichomes of about 20  $\mu$ , numerous rosette crystals in epidermal cells.

**Androecium** - Epidermis of staminal tube composed of thick walled rectangular parenchymatous cells and the endothecium of the anther walls.

**Gynoecium** - Stigma sticky, parenchymatous epidermal cells, elongated into extensive papillae, style thin walled, rectangular, ovary superior, trilobular.

**Pollen Grain** - Porous, 4-colporate, spherical 105 to 161  $\mu$  in dia., with a smooth exine.

**Powder** - Yellowish-brown, fragments of parenchymatous papillose epidermal cells, trichomes, numerous vessels, rosette calcium oxalate crystals, and yellowish-brown pollen grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : acetone (20:1) shows spots at Rf 0.12 (violet), 0.17 (light pink), 0.33 (violet), 0.51 (purple), 0.64 (dark purple), 0.80 (light purple), 0.85 (light purple), 0.92 (purple) on spraying with 1% Vanillin-Sulphuric acid reagent followed by heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - 15-Acetoxy-7-deacetoxydihydroazadirone (neeflone), nonacosane (saturated hydrocarbon)

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Vātakara, Kuṣṭhaghna, Kṛmighna, Cakṣuṣya, Viṣaghna, Grāhī

**IMPORTANT FORMULATIONS** - Kuṣṭhakālāmla Rasa, Kuṣṭha Śailendra Rasa, Kṛmīvināśana Rasa

**THERAPEUTIC USES** - Kuṣṭha, Aruci, Prameha, Kṛmi, Kaphapittaja Vikāra, Dāha, Jvara, Viṣamajvara, Netraroga, Raktavikāra, Phiraṅga, Śoṭha, Śrama, Tṛṣṇā, Kāsa, Vraṇa, Chardi, Kaṇḍū, Hṛllāsa, Hṛdayavidāha

**DOSE** - 2 - 4 g puśpa cūrṇa.

10 - 20 ml puśpa svarasa.

## NIMBA (Fruit)

Nimba consists of whole dried fruit including seeds of *Azadirachta indica* A. Juss. syn. *Melia azadirachta* Linn. (Fam. Meliaceae), a medium to large size evergreen tree attaining a height of 15 to 20 m or more under favourable conditions and found through-out the plains of India upto an altitude of 900 m.

### SYNONYMS

Sanskrit	:	Ariṣṭaḥ, Picumandaḥ, Picumardaḥ, Prabhadraḥ
Assamese	:	--
Bengali	:	Nim, Nimgaachh
English	:	Indian Lilac, Neem tree, Margosa tree
Gujrati	:	Leemado
Hindi	:	Neem
Kannada	:	Chikkabevu, Huchchabevu, Turakbevu
Kashmiri	:	--
Malayalam	:	Aaruveppu, Aryaveppu, Veppu
Marathi	:	Kadunimb, Nimb
Oriya	:	Neemo
Punjabi	:	Nim, Nimb
Tamil	:	Vempu, Vembu
Telugu	:	Vemu, Vepa
Urdu	:	Neem

### DESCRIPTION

#### a) Macroscopic

**Fruit** - Glabrous, dark reddish-brown, ovoid to ellipsoid drupes. 0.5 to 2 cm long, over one cm wide; indehiscent, deeply wrinkled, enclosing a single seed in a brownish leathery pulp; odour strong; taste, bitter.

**Seed-** Brownish, dorsally convex; upto 1.5 cm long and 0.6 cm wide; seed coat thin, brownish, shell-like, cracks to touch, inside of cracked pieces golden yellow; seed kernel, light brown, oily; odour, strong; taste, bitter.

#### **b) Microscopic**

**Fruit** - Pericarp well differentiated into epicarp, mesocarp and endocarp; epidermis more than one layered; squarish to rectangular cells containing yellowish-brown contents and oil droplets; mesocarp, many layered of loosely packed cells with large elongated sclereids scattered in outer layers; endocarp of two distinct layers, outer of closely packed lignified stone cells, inner fibrous, loosely packed, lignified.

**Seed** - Seed kernel shows a thin brown testa, of isodiametric stone cells overlying integument of loosely packed parenchymatous cells; cotyledon consisting of parenchymatous cells containing abundant oil droplets.

**Powder** - Dark brown; shows abundant brachysclereids, columnar sclereids and pitted stone cells with wide lumen and distinct wall striations; groups of lignified fibres, thin-walled, arranged in network of loose strands; parenchymatous cells of cotyledon containing aleurone grains and oil globules; fragments of testa showing distinctly striated isodiametric stone cells; a few scattered rosette crystals of calcium oxalate.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	16	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	19	per cent, Appendix	2.2.7.

#### **ASSAY**

##### **T.L.C.**

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : acetone (18.5:1.5) shows spots at Rf 0.11 (greyish violet), 0.16 (yellow), 0.19 (green), 0.24 (violet), 0.29 (grey), 0.33 (mustard yellow), 0.42 (pink), 0.49 (greyish black), 0.57 (violet) and 0.76 (light purple) on spraying with 1% Vanillin-Sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Fixed oil containing diterpenoids and triterpenoids (limonoids);nimbin, gedunin, azadirachtin, nimbidinin, salanin.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Tīkṣṇa, Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Bhedanīya, Hṛdayadāhahara, Viṣaghna, Rasāyana, Pācana

**IMPORTANT FORMULATIONS** - Arśoghniṇṇa (Seed), Palāśabījādi Cūrṇa (Seed)

**THERAPEUTIC USES** - Kṛmi, Kuṣṭha, Prameha, Gulma, Arśa, Pālitya, Netrarujā, Raktapitta, Kṣata Kṣaya, Śīroroga, Jvara, Aruci, Dāha, Chardi, Hṛllāsa, Vraṇa, Śoṭha, Viṣavikāra, Vibandha, Khālitya, Gaṇḍamālā

**DOSE** - 1 - 2 g cūrṇa.

5 - 10 drops of oil.

## PALĀŚAḤ (Seed)

Palāśaḥ consists of seed of *Butea monosperma* (Lam.) Kuntze, syn. *B. frondosa* Roxb. (Fam. Fabaceae), a moderate sized deciduous tree, commonly called "Flame of the Forest", found throughout India upto a height of 1250 m, except in the arid zones.

### SYNONYMS

Sanskrit	:	Palāśaḥ, Kiṃśukaḥ, Raktapuṣpakaḥ, Vātapoṭha
Assamese	:	--
Bengali	:	Palaash
English	:	Butea seed, Flame of the Forest, Bastard teak
Gujrati	:	Khakharo
Hindi	:	Dhak, Palash, Tesoo
Kannada	:	Muttagamara, Muttug
Kashmiri	:	--
Malayalam	:	Plashu
Marathi	:	Palas, Palash paapada
Oriya	:	--
Punjabi	:	--
Tamil	:	Purasu
Telugu	:	Moduga
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Seeds reddish-brown, thin, flat, reniform, longer axis from 3 to 4 cm and shorter from 2 to 2.5 cm, raphe equal to antiraphe, micropyle inconspicuous; seed coat reddish brown, waxy; faint odour; taste, slightly acrid bitter; weight of 100 seeds 80 to 115 g.

## b) Microscopic

Single layered epidermis of testa interrupted by balloon shaped cells; malpighian cells palisade like, thick-walled, red, unlignified, lumen large but not uniform; discontinuous transparent Linea lucida in upper half of Malpighian layer; osteosclereids irregular, nonlignified, highly thick walled, columnar, compressed and superposed; mesophyll occupies major portion of testa, upper and lower mesophyll cells small, isodiametric to elliptic, middle layers large, angular, condensed with small intercellular spaces; inner epidermis reddish brown, distinct with small thick walled elongated cells externally covered by thin cuticle.

The transection of cotyledon shows single layered, thick-walled epidermis having angular cells, followed by beaded parenchymatous cells containing starch and protein in form of spiral, as revealed by freshly prepared Millons Reagent; starch grains, rod shaped or ovoid, simple, 20 to 40  $\mu\text{m}$ , hilum indistinct, lamellae distinct. Embryo is straight having a radicle with well-marked hypocotyl, epicotyl with a plumule and a pair of thick cotyledons.

**Powder** - Powder yellowish-brown; acrid and bitter with oily flavour and pleasant smell; small fragments of testa, broken and intact malpighian cells, osteosclereids, mesophyll cells isolated or in groups, cotyledonary parenchyma containing a few starch grains, abundant spiral protein bodies, mucilage and oil globules; when treated with 50%  $\text{H}_2\text{SO}_4$ , emits yellow fluorescence under UV-254 nm.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.
Protein	Not less than	18	per cent, Appendix	2.2.17
Fatty oil	Not less than	6	per cent, Appendix	2.2.15

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethylacetate : methanol (85 : 15 : 0.5) as solvent system shows after spraying with anisaldehyde-sulphuric acid and heating the plate for ten minutes at 120°C, at Rf. 0.26 (magenta), 0.38 (greying green) and 0.56 (greyish green).

**CONSTITUENTS** - Fatty oil; amino acids.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Snigdha, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣahara, Dīpana, Vṛṣya, Bhedana, Bhagnasandhānaka, Garbhanirodhaka, Rasāyana

**IMPORTANT FORMULATIONS** - Kṛmimudgara Rasa, Ayaskṛti

**THERAPEUTIC USES** - Kṛmi, Vraṇa, Gulma, Gudajaroga, Arśa, Raktavikāra, Vātarakta, Udararoga, Kāsa, Kaṇḍū, Tvagroga, Prameha, Yonidoṣa, Sukradoṣa, Mūtrakṛcchra, Kuṣṭha, Pāmā, Dadru, Dāha, Plīhāroga, Atīsāra, Netraśukra, Śūla, Medoroga, Pāṇḍu, Aśmarī, Vṛścika-  
viṣa

**DOSE** - 0.5 to 1 g

## PALĀŚAḤ (Dried Flower)

Palāśaḥ consists of dried flower of *Butea monosperma* (Lam.) Kuntze syn. *B. frondosa* Roxb. (Fam. Fabaceae), a moderate sized deciduous tree, commonly called Flame of the Forest", flowering in March - May found throughout India upto a height of 1250 m, except in the arid zones.

### SYNONYMS

Sanskrit	:	Kimśuka, Raktapuṣpaka, Kṣārśreṣṭha
Assamese	:	--
Bengali	:	Palash
English	:	Bastard teak, Flame of the Forest, Butea Seed
Gujrati	:	Khaakharo
Hindi	:	Dhaak, Tesu, Palaash
Kannada	:	Muttug, Muttulu
Kashmiri	:	--
Malayalam	:	Plashu
Marathi	:	Palas, Palash paapda
Oriya	:	Porasu, Kijuko
Punjabi	:	Tesh
Tamil	:	Purasu
Telugu	:	Moduga
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Inflorescence raceme; flowers large, 4 to 6 cm long, alternate, with pubescent long, velvety, olive green peduncle; bright yellowish-red to orange red pedicels, 1.5 cm long,

twisted, bracteate, bracts and bracteoles small, linear, velvety, orange green, deciduous; calyx campanulate, 5-partite, oblique, about 1 cm long, dark olive green, densely velvety outside, clothed with silky hairs within, two upper teeth connate, large, three lower ones unequal, the lowest being much shorter than the lateral ones; corolla 4 to 6 cm. long, orange red, covered outside with silky white hairs, papilionaceous; stamen diadelphous; anthers linear, yellow; ovary stipitate, silky, pubescent, style incurved, longer than the stamens.

### **b) Microscopic**

*Pedicelel:* T.S. of pedicel circular in outline, bearing numerous 2 to 4 celled uniseriate hairs; cortex collenchymatous, differentiated in two zones- outer formed of smaller cells with some contents and inner zone of larger cells; cortex and stele separated by endodermis of barrel shaped cells containing starch grains; phloem parenchyma containing tannin; pith parenchymatous; vascular bundles separated by broad medullary rays and arranged in a ring; rhomboidal crystals of calcium oxalate present in cortex.

*Sepals:* Sepals on upper surface have one type of trichome 3 to 5 celled, with prominent basal cell; on lower surface two types of trichomes, (i) multicellular, uniseriate, long, thick walled with circular basal cell; (ii) a few multicellular, club-shaped, trichomes glandular in nature; stomata anomocytic type.

*Petals:* Upper surface of wing petal with profuse 2 to 6 celled hairs on its basal part and multicellular trichomes at the tip; lower surface of wing petal covered with multicellular uniseriate trichomes; papillate epidermal cells in the middle region of wing petal, in surface view shows striations radiating from the base of papilla; cells in apical region of wing petal without papillate, but narrow with random striation; upper surface of standard petal glabrous but margins hairy; multicellular, club shaped appendages and uniseriate 2 to 5 celled trichomes present at the apex. In the middle portion cells longer than broad, drawn out into papillae with striations radiating out from this; upper surface of keel petal cells polygonal, with irregular striations, trichomes profuse except at apical region.

Stamens diadelphous; pollen grain 3 pored, oblate, spheroidal; about 28  $\mu$  long and 30  $\mu$  m broad, pore circular to elongate, 8 to 12.5  $\mu$  m, exine wall surface foveolate.

Ovary with two types of trichomes, (i) thin walled having dense contents (ii) 2 to 3 celled trichome, placentation marginal; epidermal cells of style long, narrow in surface view, trichomes uniseriate multicellular and thick walled in stylar region.

**Powder** - Brownish-yellow, slightly bitter in taste, no characteristic odour; shows pieces of various types of trichomes, vascular tissue, epidermal cells with characteristic papillae, polygonal cells with linear striations, pollen grains, and styloid crystals of calcium oxalate; powder treated with 1N HCl followed by one drop of nitrocellulose in amyloacetate becomes

orange yellow under UV 365 nm and with 1N NaOH in methanol becomes, yellowish-black under UV 254 nm.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	10 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	32 per cent, Appendix	2.2.7.

### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using ethyl acetate : methanol : water (100 : 15 : 5) shows under UV (366 nm) fluorescent zones at Rf. 0.17 (yellow), 0.26 (yellow), 0.53 (light brown), 0.58 (greenish yellow) and 0.63 (greenish yellow). On spraying with 5% KOH reagent spots at Rf. 0.17 (yellow), 0.26 (yellow), 0.58 (green) and 0.63 (green).

**CONSTITUENTS** - Coumarins and glycosides, coumaranone glycosides, butrin, isobutrin, monospermoside, isomonospermoside, carbomethoxy-3, 6-dioxo-5-hydro-1, 2, 4-triazine, coreopsin, isocoreopsin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Dīpana, Tṛṣṇāśāmakā, Rakta Stambhana, Mūtrala, Kuṣṭhaghna, Sandhānīya, Dāhapraśamana, Grāhī

**IMPORTANT FORMULATIONS** - Kuṅkumādi Taila, Vaṅga Bhasma (Jāraṇa (b))

**THERAPEUTIC USES** - Raktavikāra, Mūtrakṛcchra, Dāha, Vātarakta, Kuṣṭha, Tṛṣṇā, Raktapitta, Plīhāroga, Gulma, Grahaṇī, Kṛmi, Kaṇḍū, Arśa, Pittābhiṣyanda, Netraśukra

**DOSE** - 3-6 g

## PĀRASĪKAYAVĀNĪ (Seed)

Pārasīkayavānī consists of the seed of *Hyoscyamus niger* Linn. (Fam. Solanaceae), an annual or biennial herb, native to the Mediterranean region and temperate Asia, occurring in Western Himalayas from Kashmir to Kumaon at an altitude of 1600 to 4000 m, imported into India.

### SYNONYMS

Sanskrit	:	Khurāsānī Yavānī, Yavanī, Turuṣakā, Madakāriṇī
Assamese	:	--
Bengali	:	Khorasani ajwan
English	:	Henbane
Gujrati	:	Khurasanee ajma, Khurasanee ajmo
Hindi	:	Khurasanee ajvayan,
Kannada	:	Khurasanee, Ajawaana
Kashmiri	:	--
Malayalam	:	Khurasaanee, Paarasika, Yavaani
Marathi	:	Khurasanee ova
Oriya	:	--
Punjabi	:	Khurasanee ajvain, Bangidewana
Tamil	:	Kuraasanee Yomam
Telugu	:	Kurasanee vamu, Khurasanee omam
Urdu	:	Ajvayanee Khurasanee

### DESCRIPTION

#### a) Macroscopic

Seeds irregularly reniform or sub-quadrant, slightly over a mm in size, dark grey, surface concave, odour pleasantly aromatic, taste bitter, mucilaginous and pungent, aromatic.

## b) Microscopic

Transverse section of seed shows the presence of thick cuticle, testa with two layers, outer one with a row of osteosclereids size ranging from 50 to 80  $\mu$ , inner one with crushed parenchyma, endosperm cells thin walled, containing oil globules, embryo coiled; starch absent.

**Powder** - Dark brown aromatic smell, bitter mucilagenous taste and an oily texture; a number of flask-shaped or dumb-bell shaped osteosclereids seen; fragments of testa in surface view, showing cells with sinuous walls; powder when treated with Sudan IV and mounted in glycerine shows the presence of oil globules which turn orange red; powder cleared with dilute nitric acid shows surface view of sculpturing on testa.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	16	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the methanolic extract on silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : diethyl amine (70:20:10) shows under UV (366 nm) one fluorescent spot at Rf. 0.49 (blue). After spraying with anisaldehyde-sulphuric acid reagent and heating the plate at 105°C for ten minutes spots appear at Rf. 0.09 (Brown), 0.49 (brown), 0.69 (greenish brown). After spraying with modified Dragendorff's reagent spots appear at Rf. 0.90, 0.77, 0.61, 0.23 and 0.10.

**CONSTITUENTS** - Tropane alkaloids hyoscyamine, (its racemic mixture and atropine) and hyoscine.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Rūkṣa, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Pittakara, Mādaka, Vedanāsthāpana, Pācaka, Grāhī, Dīpana, Nidrākara

**IMPORTANT FORMULATIONS** - Sarpagandhā Ghana Vaṭī

**THERAPEUTIC USES** - Rajahṛcchra, Śīghrapātana, Svpanadoṣa, Udaraśūla, Ānāha, Gulma, Kṛmi, Aśmarī, Kāsa, Śvāsa, Anidrā, Unmāda, Śūla, Sandhiśūla

**DOSE** - 125 - 500 mg

## PAṬṬŪRA (Whole Plant)

Paṭṭūra consists of whole plant of *Aerva lanata* (Linn.) Juss. (Fam. Amaranthaceae), an erect or prostrate branched herb, 30 to 60 cm in height, found throughout India in waste lands.

### SYNONYMS

Sanskrit	:	Gorakṣagañja, Bhadrā
Assamese	:	--
Bengali	:	Chaya
English	:	--
Gujrati	:	Gorakhganjo
Hindi	:	Gorakhaganja
Kannada	:	Bilihindisoppu
Kashmiri	:	--
Malayalam	:	Cherula
Marathi	:	Kapurphutee, Kumrapindee
Oriya	:	--
Punjabi	:	Bhuikallan
Tamil	:	Cherupoolai
Telugu	:	Pindichettu, Kanda pindi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap-root, laterally branched, cylindrical, up to 0.8 cm in thickness and about 25 cm long pieces, externally light brown and rough but cut surface white and smooth; fracture, fibrous and hard.

**Stem** - Nearly cylindrical, branching alternate, external surface shows slight ridges and furrows, hairy and light brown in colour; cut surface white; fracture, granular.

**Leaf** - Simple, opposite, alternate, shortly petiolate, lamina 2.0 to 2.5 cm long and 1.0 to 1.6 cm broad, elliptic-orbicular or ovate, acute, reticulate veined, margin entire, densely pubescent on both surfaces.

**Flower** - Minute cluster as axillary spike; greenish-white; perianth 5, bracteolate; actinomorphic, bisexual; stamen 5, opposite to perianth, anthers 2 lobed; stigma bifid, superior ovary, unilocular with campylotropous ovule.

**Fruit** - A greenish, roundish, compressed membranous, utricle or circumscissile capsule with a coriaceous upper part or lid and containing a single seed.

**Seed** - Seed minute, 0.5 to 0.7 cm in dia., black, polished and kidney shaped; taste, pungent.

#### **b) Microscopic**

**Root** - Shows 5 to 7 layers of cork cells, upper 2 or 3 layers filled with brownish content; secondary cortex a wide zone consisting of circular to oval, elongated, thin walled parenchymatous cells, most of the cells containing rosette crystals of calcium oxalate; endodermis not distinct; pericycle present in the form of interrupted ring of pericyclic fibres; anomalous secondary growth present; secondary xylem and phloem tissues in form of 3 or 4 alternating rings; medullary bundles present; phloem consisting of sieve tubes, companion cells and phloem parenchyma; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels circular to oval having simple pits; pith cells circular in shape containing rosette crystals of calcium oxalate.

**Stem** - Shows slightly wavy outline, corresponding to ridges and furrows; epidermis single layered covered with thick cuticle; trichomes multicellular, end cells pointed or vesicular, warty and thick walled; cortex 6 or 7 layers with 3 or 4 layers below ridges being collenchymatous and 3 or 4 layers below furrows chlorenchymatous; rest of the cells oval to elongated, elliptical, thin walled and parenchymatous, with a few cells containing rosette crystals of calcium oxalate; endodermis single layered; pericycle present in the form of a ring, single or groups of 2 to 4 fibres; anomalous secondary growth present; vascular bundles arranged in 2 or 3 rings showing included phloem alternating with parenchymatous tissue; phloem consists of sieve tubes, companion cells and phloem parenchyma; xylem composed of vessels, tracheids, wood fibres and xylem parenchyma; vessels round to oval having simple pits; pith wide consisting of circular to polygonal having intercellular spaces, rosette crystals of calcium oxalate present in this region.

## Leaf -

*Petiole* - Shows single layered epidermis covered with cuticle; trichomes multicellular present on both surfaces; cortex consisting of 2 or 3 layers, upper collenchymatous and lower parenchymatous; vascular bundle collateral and 3 in number; rosette crystals of calcium oxalate present in cortical cells.

*Midrib* - Epidermis, cuticle and trichomes, similar to those in petiole; cortex 5 to 7 layers, upper 3 collenchymatous and lower 3 or 4 circular, thin walled and parenchymatous; vascular bundles 3 in number, 2 accessory and one middle; xylem towards the upper and phloem towards lower epidermis; rosette crystals of calcium oxalate present in cortical region.

*Lamina* - Epidermis, cuticle and trichomes similar as in petiole and midrib; palisade 1 or 2 layers; spongy parenchyma 3 to 5 layers composed of thin walled parenchymatous cells with intercellular spaces, a few rosette crystals of calcium oxalate present in spongy parenchyma; anomocytic stomata present on both surfaces; palisade ratio 2 or 3; stomatal index on upper surface 12 to 15 and on lower surface 16 to 18; vein islet number 4 or 5 per square mm.

**Powder** - Yellowish-green; under microscope shows straight walled epidermal cells, multicellular trichomes and anomocytic stomata in surface view; simple pitted vessels, cork cells, tracheids, fibres and rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 17 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 11 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate using Toluene: Ethylacetate : Methanol (50: 50: 20) as mobile phase shows under UV (366 nm) ten fluorescent zones at Rf. 0.11 (sky blue), 0.27 (red), 0.47 (red), 0.51 (sky blue), 0.73 (sky blue), 0.82 (pink), 0.87

(sky blue), 0.91 (red), 0.94 (red) and 0.97 (dark red). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C ten spots appear at Rf. 0.11, 0.23, 0.37, 0.51, 0.61, 0.73, 0.85, 0.92 and 0.94 (all violet) and 0.97 (dark violet).

**CONSTITUENTS** -  $\alpha$ - Amyrin and  $\beta$  - sitosterol,  $\beta$  - sitosterol palmitate, compesterol, chrysin, flavonoid glycosides and tannins.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Mūtravirecana, Kṛmighna

**IMPORTANT FORMULATIONS** - Śatāvaryādi Ghṛta

**THERAPEUTIC USES** - Aśmarī, Mūtrakṛcchra

**DOSE** - 50-100 ml in the form of decoction.

## PĪLŪḤ (Fruit)

Pīlūḥ consists of fruit of *Salvadora persica* Linn. Var. *wightiana* (Planch.ex Thw.) Verdc, syn. *S. persica* Linn. (Fam. Salvadoraceae), a perennial, woody, glabrous shrub, distributed in the arid tracts of Punjab and north western parts of India.

### SYNONYMS

Sanskrit	:	Guḍaphala, Srānsī, Pilū
Assamese	:	Arak, Irak
Bengali	:	Peelugachh, Jhal
English	:	Salt bush, Toothbrush Tree
Gujrati	:	Peelu, Khareejal
Hindi	:	Pilu, Jhak, Peelu, Kharjal
Kannada	:	Gonimara, Kankhina, Genumar
Kashmiri	:	--
Malayalam	:	Uka
Marathi	:	Pilu, Khakhan
Oriya	:	--
Punjabi	:	Peelu
Tamil	:	Kotumaavali, Chittuva, Perungoli, Udhaiputtai
Telugu	:	Gogu, Varagogu, Gunia
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Fruits are 3 to 5 mm in diameter, ellipsoid-ovoid, occasionally with a small pedicel attached; surface greenish or greenish-brown to dark brown in colour, with irregular

wrinkles, sometimes shrunken; pericarp thin, easily separable, exhibiting creamish to dull brown seed, odour characteristic and taste bitter.

#### **b) Microscopic**

The epidermis is single layered consisting of thick walled, radially elongated cells covered externally with cuticle, the mesocarp differentiated into three zones, the outer and inner zone exhibiting thin walled parenchyma cells while a continuous zone of sclerenchymatous tissue with vascular bundles embedded in it is present in the middle region; testa shows single layered epidermis of thin walled cells followed by parenchymatous cells of the embryo containing aleurone grains and occasional oil globules.

**Powder** - Powder shows fragments of parenchymatous cells with aleurone grains and oil globules; scalariform, reticulate as well as border-pitted vascular elements; thick walled epidermal cells in surface view and sclereids.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	40	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of alcoholic extract on precoated Silica gel 'G' plate (Merck), using n-Butanol; Acetic acid; water (4:1:5), in visible light shows three spots at Rf.0.23, 0.80 (both light green) and 0.46 (light yellow); under UV (366 nm) two white spots appear at Rf.0.37 and 0.46; under UV (254nm) three spots appear at Rf.0.37 (white), 0.46 and 0.80 (both pink), on exposure to Iodine vapours four yellow spots appear at Rf.0.10, 0.37, 0.46 and 0.80, on spraying with vanillin sulphuric acid and heating the plate at 110°C for 10

minutes, six spots appear at Rf. 0.10, 0.23 (both violet), 0.37, 0.40, 0.46 and 0.80 (all orange).

**CONSTITUENTS** -  $\beta$ - sitosterol, sterol glycoside, benzyle isothioagnate, traces of alkaloid, fixed oil, sugar and fat, non-saponifiable portion of oil consists of dibenzylurea and dibenzlethiurea.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta, Kaṭu
<b>Gūṇa</b>	:	Laghu, Snigdha, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Bhedana, Virecana, Śothahara, Vedanāsthāpana, Śirovirecaka, Dīpana, Vidāhī, Rasāyana

**IMPORTANT FORMULATIONS** - Miśraka Sneha

**THERAPEUTIC USES** - Gulma, Aśmarī, Mūtrakṛcchra, Jvara, Sarpaviṣa, Arśa, Bastivikāra, Udararoga, Viṣavikāra, Ānāha

**DOSE** - 3-6 g

## PĪLŪḤ (Leaf)

Pīlūḥ consists of leaf of *Salvadora persica* Linn. Var. *wightiana* (Planch. Ex Thw.)  
Verdc, syn. *S. persica* Linn. (Fam. Salvadoraceae), a perennial, woody, glabrous shrub,  
distributed in the arid tracts of Punjab and north western parts of India.

### SYNONYMS

Sanskrit	:	Gudaphalaḥ, Sransī, Pīlukah
Assamese	:	--
Bengali	:	Peelugaach, Jhaal
English	:	Salt bush, Tooth brush Tree
Gujrati	:	Peelu, Khaaree jaal
Hindi	:	Jhak, Peelu, Pilu, Kharjaal
Kannada	:	Genumar, Gonimara, Kankhina
Kashmiri	:	--
Malayalam	:	Uka
Marathi	:	Khakhan, Pilu
Oriya	:	Kotungo, Toboto
Punjabi	:	Peelu
Tamil	:	Chittuva, Kotumaavali, Perungoli, Uthaiputtai
Telugu	:	Gogu, Gunia, Varagogu

### DESCRIPTION

#### a) Macroscopic

Leaves are 3 to 10 cm in length and 1 to 4 cm in breadth, green, simple, stipulate, petiolate, oblong, ovate, margin entire, broad at base and acute at apex; veins prominent and raised on lower surface; both surfaces glabrous; taste and odour characteristic.

## **b) Microscopic**

**Petiole** - Petiole somewhat circular in outline with a large crescent-shaped vascular bundle and two small vascular bundles fused together to form a central core of vascular tissue; the presence of interxylary phloem indicates anomalous growth; epidermis single layered, covered externally with thick cuticle; cortex a wide zone consisting of circular to oval parenchyma cells; pericycle represented by small patches of thick walled and lignified fibres; phloem consists of usual elements traversed by uni or biseriate medullary rays; xylem consists of vessels, tracheids, fibres and parenchyma; vessels show scalariform thickening and border pitted walls, tracheids are bordered as well as simple pitted, parenchyma cells and fibres are simple pitted; interxylary phloem present in the central xylem region; pith composed of thin walled parenchyma cells; rosettes of calcium oxalate crystals and starch grains present in the parenchyma cells of the cortex and pericyclic region

**Midrib** - Midrib shows single layered epidermis covered externally with thin cuticle on both the surfaces, except at a few places where a periclinal division is seen; cortex is a wide zone of thin walled parenchyma cells, the centre of midrib is occupied by a vascular cylinder consisting of a large crescent-shaped vascular bundle, the pericycle is represented by small patches of fibres, the phloem consists of usual elements, the xylem is represented by vessels, tracheids, parenchyma and fibres; interxylary phloem is present in the xylem region; the xylem is traversed by uniseriate medullary rays which become bi or tri seriate in the phloem region; rosettes of calcium oxalate crystals and a few starch grains are present in the parenchymatous cells of cortex and pericyclic region.

**Lamina** - Lamina shows isobilateral structure; cuticle present, both epidermises are single layered, except for occasional periclinal division; in surface view both the surfaces shows anisocytic and paracytic stomata; 2 or 3 layers of palisade cells are present below the upper and above the lower epidermis, remaining area being occupied by thin walled cells of pongy parenchyma; a number of small vascular bundle and vascular strand are distributed in the mesophyll of the lamina; idioblasts containing large rosettes of calcium oxalate crystals are present beneath both the epidermises; rosettes of calcium oxalate crystals are also present in spongy parenchyma and palisade cells; stomatal index 9 to 11 (upper surface) and 8 to 10 (lower surface); palisade ratio 5 to 6 (upper surface) and 4 to 5 (lower surface); vein islet number 4 to 6 (upper surface) and 5 to 7 (lower surface).

**Powder** - Pale green, shows presence of thin walled parenchyma cells several containing rosettes of calcium oxalate crystals and a few simple starch grains; fragments of epidermal cells showing anisocytic and paracytic stomata; fragment of scalariform and bordered pitted vessels, border and simple pitted tracheid, simple pitted parenchyma cells and thick walled fibres.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	27	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	40	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate (Merck), using Toluene; Methanol (86:14), shows in visible light nine spots at Rf. 0.21, 0.25, 0.28(all green), 0.45 (bright yellow), 0.60 (faint green), 0.72(dark green), 0.79, 0.85 and 0.94 (all green); under UV (254nm) twelve spots appear at Rf. 0.14 (faint orange), 0.21, 0.25, 0.28 (all orange), 0.36, 0.45 (both light orange), 0.53 (faint orange), 0.60, 0.72, 0.79 (all light orange), 0.85 and 0.94 (both orange); on exposure to Iodine vapours ten spots appear at Rf. 0.14 (yellow), 0.21, 0.25, 0.28 (all green), 0.53, 0.60, 0.72, 0.79 (all faint yellow), 0.85, 0.94 (both bluish green), on spraying with sulphuric acid and heating plate at 110°C for 30 minutes, twelve spots appear at Rf. 0.14 (yellow), 0.21, 0.25, 0.28 (all dark green), 0.36 (faint brown), 0.45 (brown), 0.53 (faint brown), 0.60 (violet), 0.72, 0.79 (both faint brown), 0.85 (dark green) and 0.94 (blackish green).

**CONSTITUENTS** -  $\beta$ -sitosterol, glucotropaeolin, terpenes and flavonoids.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Guṇa** : Laghu, Snigdha, Tīkṣṇa, Sara  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Bhedana, Virecana, Śothahara, Vedanāsthāpana, Śirovirecaka, Dīpana, Vidāhī, Rasāyana

**IMPORTANT FORMULATIONS** - Pīlū Taila

**THERAPEUTIC USES** - Gulma, Aśmarī, Mūtrakṛcchra, Jvara, Śarpaviṣa, Arśa, Bastivikāra, Ānāha, Udararoga, Udāvarta, Vātarakta, Yonivyāpat, Kṛmi, Nāḍīvrāṇa, Duṣṭavrana, Vrāṇa, Vrāṇaśoṭha, Mukhapāka, Madyaja Tṛṣṇā, Plīhāroga, Sarva Kuṣṭha, Bhagandara, Apacī

**DOSE** - 3-6 g

## PĪLŪḤ (Root)

Pīlūḥ consists of root bark of *Salvadora persica* Linn. Var. *wightiana* (Planch.ex Thw.) Verdc, syn. *S. persica* Linn. (Fam.Salvadoraceae), a perennial, woody, glabrous shrub, distributed in the arid tracts of Punjab and north western parts of India.

### SYNONYMS

Sanskrit	:	Gudaphalaḥ, Pīlukaḥ, Sransī
Assamese	:	--
Bengali	:	Jhaal, Peelugaach
English	:	Tooth brush Tree, Saltbush
Gujrati	:	Khaaree jaal, Peelu
Hindi	:	Jhak, Kharjaal, Peelu, Pilu
Kannada	:	Genumar, Gonimara, Kankhina
Kashmiri	:	--
Malayalam	:	Uka
Marathi	:	Khakhan, Pilu
Oriya	:	Kotungo, Toboto
Punjabi	:	Peelu
Tamil	:	Chittuva, Kotumaavali, Perungoli, Uthaiputtai
Telugu	:	Gogu, Gunia, Varagogu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The root bark is 2 to 3 mm thick, woody, channeled; pale brown with longitudinal wrinkles, exhibiting scars of roots and rootlets; inner surface creamish to yellowish- brown; fracture, short and smooth; odour, foetid and taste characteristic.

## **b) Microscopic**

The bark shows a wide zone of cork occupying half of the transection; cork cells differentiated into two zones, outer zone consisting of small rectangular cells whereas the lower cells are larger, rectangular and tangentially elongated; phellogen single layered; the phelloderm consist of 10 to 20 layers of thin walled tangentially elongated parenchyma cells with small intercellular spaces; it is followed by a wide phloem being traversed by 2 to 5 seriate medullary rays; the phloem consists of usual element, a few fibres and isolated stone cells; several parenchyma cells are thick walled and arranged in somewhat radial rows in which stone cells and fibres are scattered; prismatic crystals of calcium oxalate are present in the parenchyma cells of outer phloem and phelloderm regions.

**Powder** - Powder shows fragments of cork cells, thin walled parenchyma cells, thick walled and pitted parenchyma cells, prisms of calcium oxalate, fragment of thin walled fibres and stone cells, with thick walled and narrow central lumen.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

## **ASSAY**

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 60 plate (Merck), using Chloroform: Toluene; Methanol (10:75:15), shows under UV (254nm) one yellow fluorescence spot at Rf.0.46; on exposure to Iodine vapours four yellow spots appear at Rf. 0.17, 0.30, 0.46 and

0.67; on spraying with vanillin sulphuric acid and heating the plate at 110°C for 10 minutes, seven spots appear at Rf. 0.11 (blue), 0.17, 0.23 (both violet), 0.30 (yellow), 0.35, 0.46 and 0.67 (all blue).

**CONSTITUENTS** -  $\beta$ -sitosterol and elemental  $\gamma$ - monoclinic sulphur (S-8) and glucotropaeolin isolated from root.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Snigdha, Tīkṣṇa, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Bhedana, Virecana, Śothahara, Vedanāsthāpana, Śirovirecaka, Dīpana, Vidāhī, Rasāyana

**IMPORTANT FORMULATIONS** - Arśakuṭhāra Rasa, Vaiḍūrya Rasāyana, Citrakādiya Taila, Triphalādi Guṭikā, Nārācaka Cūrṇa, Bilvakādhi Lepa, Pippalyādi Guṭikā

**THERAPEUTIC USES** - Gulma, Aśmarī, Mūtrakṛcchra, Jvara, Sarpaviṣa, Arśa, Bastivikāra, Ānāha, Udararoga, Udāvarta, Vātarakta, Yonivyāpat, Kṛmi, Nāḍīvrāṇa, Duṣṭavrāṇa, Vraṇa, Vraṇaśoṭha, Mukhapāka, Madyaja Tṛṣṇā, Plīhāroga, Sarvakuṣṭha, Bhagandara, Apacī

**DOSE** - 10-20 g for decoction.

## POTAGALA (Root)

Potagala consists of dried root of *Typha elephantina* Roxb. (Fam.Typhaceae), a perennial grass-like shrub, about 1.5-3.0 m in height and found throughout plains of India, in stagnant water and the sides of streams and marshes.

### SYNONYMS

Sanskrit	:	Erakā
Assamese	:	--
Bengali	:	Hogalaa
English	:	Elephant grass
Gujrati	:	Ghaabaajariyu
Hindi	:	Pateraa, Erakaa
Kannada	:	Apu, Jambuhullu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Raamabaan
Oriya	:	Hogala
Punjabi	:	Boj, Bori, Patiraa
Tamil	:	Anaikkoria, Anaippul
Telugu	:	Enugajammu, Jammuguddi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The roots are upto 15 cm long and about 4 mm thick, arising in groups from the base of the stem; pale brown to light brown in colour, irregularly flattened with longitudinal fissures giving rise to several secondary and tertiary rootlets from its lower end,

transversely cut surface shows creamish to pale yellow central core; taste and odour indistinct.

### **b) Microscopic**

T.S. shows single layered epidermis, followed by wide cortex which can be differentiated into three zones; the outer cortical cells, below the epidermis consist of 5 to 7 layers of parenchyma cells arranged compactly followed by second zone consisting of circular to oval and tangentially elongated parenchyma cells; the central cortical region exhibits large air cavities lined by 1 or 2 layers of thin walled, compressed, narrow and radially elongated parenchyma cells - the trabeculae; the centre of the root exhibits a typical monocotyledonous structure consisting of alternating bands of xylem and phloem surrounded externally by endodermis and pericycle; the cells of endodermis show thickening on radial and lower tangential walls; except phloem cells all the cells below the pericycle are thick walled and lignified; the vascular cylinder exhibits presence of numerous very long fibres with narrow to negligible lumen; the vessels show scalariform thickening whereas the tracheids have scalariform thickening or border pits; the parenchyma cells are radially elongated and simple pitted.

**Powder** - The powdered drug exhibits fragments of thin walled circular to oval and also radially elongated parenchyma cells; fragments of trabeculae; fragments of fibres showing negligible to narrow lumen; scalariform vessels; scalariform and border-pitted tracheids and simple pitted thick walled parenchyma cells.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extracts on precoated Silica Gel 60 plate (Merck), using Chloroform: Toluene: Ethyl acetate: Formic acid (6:4:0.5), shows in visible light two spots at Rf. 0.89(light green) and 0.64(pale green); under U.V. (254nm) four spots appear at

Rf.0.28(pinkish orange), 0.64(light orange), 0.78 and 0.81(both whitish); on exposures to iodine vapours 8 spots appear at Rf. 0.10, 0.19, 0.28, 0.45, 0.57, 0.64, 0.78 and 0.93 (all yellow); on spraying with 5% ethanolic sulphuric acid and heating the plate at 110°C for 30 minutes 10 spots appear at Rf. 0.10(light violet), 0.19(violet), 0.28, 0.45(both faint brown), 0.57(violet), 0.64(dark brown), 0.78(blue), 0.81, 0.89 and 0.93(all faint brown).

**CONSTITUENTS** -  $\beta$ -sitosterol, cholestrol, quercetin and lanosterol.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Vṛṣya, Cakṣuṣya, Mūtrala, Grāhī, Vraṇaropāṇa

**IMPORTANT FORMULATIONS** - Sukumāra Ghṛta

**THERAPEUTIC USES** - Dāha, Raktavikāra, Vātarakta, Visarpa, Raktapitta, Bastiśoṭha, Mūtrakṛcchra, Aśmarī, Śōpha, Śukradaurbalya, Vraṇa

**DOSE** - 10-20 g for decoction.

## PUDĪNĀḤ (Aerial Part)

PudĪnāḥ consists of the aerial part of *Mentha viridis* Linn. Syn. *M. spicata* var. *viridis* Linn. (Fam. Lamiaceae) a perennial, creeping aromatic herb of 30 to 90 cm high, widely cultivated throughout the plains of India for culinary and medicinal purposes.

### SYNONYMS

Sanskrit	:	Pūtiḥā, Rocanī, Podīnakah
Assamese	:	--
Bengali	:	Pudinaa
English	:	Spear-Mint, Garden Mint
Gujrati	:	Phudino
Hindi	:	Pudeenaa
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Pudinaa
Oriya	:	--
Punjabi	:	Parari pudina
Tamil	:	Pudeenaa
Telugu	:	Pudeenaa
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug consists of small chopped twigs; leaves opposite, decussate, shortly petiolate, petioles 2-mm long; mature leaves 2.5 to 3.5 cm long and 1.5 to 2.0 cm broad, very minutely hairy, ovate, apex acute, coarsely dentate, comparatively smoother and darker

upper surface; stem square, minutely hairy, light brown to brown; flowers in loose cylindrical, slender spikes; awl like, throat of calyx naked, corolla smooth; seeds small, mucilaginous; aromatic odour and slightly pungent taste.

#### **b) Microscopic**

**Stem** - T.S. shows quadrangular outline with corner ridges and thin cuticle; epidermal cells tabular, multicellular uniseriate trichomes present, cortex 8 to 9 cells deep below ridges, while 2 to 3 cells deep elsewhere, variable in size; endodermis single layer; pericycle broken, consisting of sclerenchymatous cells; phloem 2 to 4 cells deep and made up of irregular shaped cells; xylem vessels 26 to 46  $\mu$  in dia; pith present.

#### **Leaf -**

**Midrib:** T.S. shows protruded mid rib towards the lower surface; compact parenchymatous cells enclose a crescent-shaped vascular bundle; collenchymatous cells are absent.

**Lamina:** Dorsiventral, epidermal cell walls of both the surfaces in the surface view are wavy, stomata diacytic; covering trichomes present on the lower surface, uniseriate, 1 to 4 cells long, 42 to 350  $\mu$  in size with pointed apex; glandular trichomes 64 to 80  $\mu$  in diam. with a single basal cell and a head of 8 cells, found in depression of the epidermis; a single row of palisade cells towards the upper side followed by spongy parenchyma 3 to 4 cells deep; palisade ratio 6 to 8; vein islet number 18 to 20; stomatal index for upper epidermis 10 to 20, lower epidermis 15 to 30.

**Powder** - Blackish-brown, fibrous, free flowing, characterized by the presence of uniseriate non-glandular hairs (112 to 350  $\mu$ ), glandular trichomes 64 to 80  $\mu$  in diam, diacytic stomata, epidermal cell walls wavy.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.

Water-soluble extractive	Not less than	7 per cent, Appendix	2.2.7.
Essential oil	Not less than	0.2 per cent, Appendix	2.2.10

## ASSAY

### T.L.C.

T.L.C. of essential oil on silica gel 'G' plate using hexane : ethyl acetate (90:10) shows eight spots at Rf 0.28, 0.33, 0.38, 0.49, 0.55, 0.66, 0.80 and 0.88 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Essential oil (0.2 to 0.8 percent) containing terpene such as carvone (60%) and limonene (10%) as major constituents.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Mūtrala, Rocana, Balya

### IMPORTANT FORMULATIONS - Pudīnārka

**THERAPEUTIC USES** - Ādhmāna, Śūla, Chardi, Kṛmi, Jvara, Jīrṇa Jvara, Mūtrakṛcchra, Kaṣṭhārtava, Prasūtījvara, Aruci, Kāsa, Hikkā, Śvāsa, Mada, Agnimāndya, Visūcikā, Atīsāra, Grahaṇī, Ajīrṇa, Vaktrajāḍya

**DOSE** - 5-10 ml patra svarasa.

20-40 ml phāṇṭa.

1-3 drops taila.

## PULLĀNĪ (Leaf)

Pullānī consists of leaf of *Calycopteris floribunda* Lam. (Fam. Combretaceae), a scandent shrub, distributed in the deciduous forests of western Peninsula.

### SYNONYMS

Sanskrit	:	Pullānī, Toyavallī, Kāravelli
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	--
Hindi	:	Kokkarai
Kannada	:	Marsadabaguli, Enjarige Kubsā
Kashmiri	:	--
Malayalam	:	Pullaani, Varavalli
Marathi	:	Ukshi, Bogull
Oriya	:	--
Punjabi	:	--
Tamil	:	Minnaarukoti, Pillani, Therulankodl
Telugu	:	Bandimurududu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The leaves are 7 to 12 cm by 4 to 6 cm ovate-lanceolate or elliptic-oblong, acute or acuminate, petiole 0.5 cm to 1.0 cm long; upper surface dull green, lower pale brown with prominent veins, both surfaces hairy; taste, astringent and odour characteristic.

**b) Microscopic**  
**Leaf -**

***Petiole*** - The transverse section exhibits a single layered epidermis with numerous unicellular covering as well as short stalked or sessile glandular trichomes with 12 to 16 celled head; wide cortex consisting of thin walled parenchymatous cells; a crescent shaped vascular bundle consisting of usual elements, surrounded dorsally as well as laterally by a sheath of fibres is present in the centre of petiole; rosettes of calcium oxalate crystals are seen in some of the cortical cells.

***Midrib*** - The transverse section shows single layered epidermis covered externally with cuticle; long, unicellular covering as well as short stalked or sessile glandular hairs with 12 to 16 heads present on both the surfaces; cortex consisting of thin walled parenchyma cells; a crescent shaped vascular bundle consisting of usual elements surrounded by a continuous ring of fibres present in the center of the cortex, rosettes of calcium oxalate crystals found in some of the cortical parenchyma cells.

***Lamina*** - The epidermal cells have wavy outline in surface view; anamocytic stomata present on lower surface only; unicellular, long covering trichomes as well as glandular hair similar to those described under petiole, present on both surfaces but more pronounced on lower side.

The transverse section shows dorsiventral structure with two layers of palisade cells below the upper epidermis; mesophyll represented by cells of spongy parenchyma and small vascular bundles and vascular strands; rosettes of calcium oxalate crystals seen in some of the cells of spongy parenchyma; stomatal index 23 to 29; palisade ratio 4 to 7 and vein islet number 5 or 6.

**Powder** - Pale green; shows fragments of upper epidermal cells with covering as well as glandular trichomes; lower epidermal cells with stomata, covering and glandular trichomes, fragments of fibres, reticulate and scalariform vascular elements; scattered covering and glandular trichomes and parenchyma cells with rosettes of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract on precoated Silica gel 'G' plate (Merck), using Ethyl acetate: Methanol: Water (8:11:8) shows in visible light six spots at Rf. 0.13 (light brown), 0.49 (yellow), 0.61 (pale yellow), 0.71 (light yellow), 0.92 (dark yellow) and 0.96 (light orange); under U.V. (254 nm) four spots appear at Rf. 0.61, 0.71 (both white), 0.92 (yellow) and 0.96 (orange); on exposure to Iodine vapours five spots appear at Rf. 0.44, 0.61, 0.71 (all yellow), 0.92 (brown) and 0.96 (dark yellow); on spraying with vanillin sulphuric acid and heating the plate at 110°C for 10 minutes, six spots appear at Rf.0.13, 0.44 (both faint brown), 0.61 (violet), 0.71 (faint brown), 0.92 (black) and 0.96 (dark green).

**CONSTITUENTS** - Octacesanol, sitosterol, calycopterin, 3'0-Methylcalycopterin, 4-0 methylcalycopterin, ellagic acid quercetin and proanthocyanidin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Bhedini, Vibandhahara

**IMPORTANT FORMULATIONS** - Marma Gutikā

**THERAPEUTIC USES** - Kṛmi, Pāṇḍu, Kuṣṭha, Jvara

**DOSE** - 3-6 g

## PULLĀNĪ (Root)

Pullānī consists of root of *Calycopteris floribunda* Lam (Fam. Combretaceae), a scandent shrub, distributed in the deciduous forests of western peninsula.

### SYNONYMS

Sanskrit	:	Kāravelli, Pullānī, Toyavallī
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	--
Hindi	:	Kokkarai
Kannada	:	Enjarige Kubsā, Marsadabaguli
Kashmiri	:	--
Malayalam	:	Pullaani, Varavalli
Marathi	:	Bogull, Ukshi
Oriya	:	--
Punjabi	:	--
Tamil	:	Minnaarukoti, Pillani, Therulankodl
Telugu	:	Bandimurududu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The roots are upto 3 cm. in diameter occasionally with attached rootlets, surface with fine longitudinal wrinkles, buff brown to greyish-brown, bark very thin; fracture, tough and fibrous; taste and odour indistinct.

## b) Microscopic

T.S. shows narrow cork consisting of tangentially elongated cells, phelloderm is a narrow zone represented by thin walled and tangentially elongated parenchyma cells; phloem is composed of soft tissues; xylem is a solid cylinder consisting of vessels and tracheids showing bordered pits and reticulate thickening, simple pitted parenchyma cells and fibres; patches of interxylary phloem of soft tissues are seen in xylem region, the medullary rays are uniseriate; rosettes of calcium oxalate crystals are present in some of the parenchyma cells of phloem and interxylary phloem.

**Powder** - Powder shows fragments of cork cells, parenchyma cells containing rosettes of calcium oxalate crystals, scattered rosettes of calcium oxalate crystals and fragments of vessels and tracheids showing bordered pits and reticulate thickening.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	2.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' precoated plates (Merck), using Ethyl acetate:Methanol;Water (8:11:8) shows under UV (254nm) two spots at Rf.0.39 and 0.71(both faint blue); on spraying with 5% ethanolic sulphuric acid and heating the plate at 110°C for 30 minutes, three spots appear at Rf. 0.39, 0.71 (both faint brown) and 0.88 (violet).

**CONSTITUENTS** - Octacesanol, sitosterol, calycopterin, 3'0-methylcalycopterin, 4-0 methylcalycopterin, ellagic acid, gossoypol and quercetin.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Bhedini, Vibandhahara

**IMPORTANT FORMULATIONS** - Marma Gutikā

**THERAPEUTIC USES** - Kṛmi, Pāṇḍu, Kuṣṭha, Jvara

**DOSE** - 3-6 g

## PULLĀNĪ (Stem)

Pullānī consists of stem of *Calycopteris floribunda* Lam. (Fam. Combretaceae), a scandent shrub, distributed in the deciduous forests of western peninsula.

### SYNONYMS

Sanskrit	:	Kāravelli, Pullānī, Toyavallī
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	--
Hindi	:	Kokkarai
Kannada	:	Enjarige Kubsā, Marsadabaguli
Kashmiri	:	--
Malayalam	:	Pullaani, Varavalli
Marathi	:	Bogull, Ukshi
Oriya	:	--
Punjabi	:	--
Tamil	:	Minnaarukoti, Pillani, Therulankodl
Telugu	:	Bandimurududu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Pieces of stem cylindrical, about 8 to 10 mm thick, surface light brown, smooth; bark thin, easily separable; fracture hard and fibrous; taste and odour indistinct.

## b) Microscopic

T.S. of stem shows narrow cork consisting of rectangular and tangentially elongated cells, phelloderm exhibits 5 to 8 layers of thin walled parenchymatous cells; phloem is composed of soft tissues being traversed by uniseriate medullary rays; xylem is a wide zone consisting of scalariform and reticulate vessels with transverse or lateral wall perforations and tracheids, simple pitted fibres and parenchyma cells; medullary rays are uniseriate; patches of interxylary phloem made up of soft tissues are seen in this region; intraxylary phloem is present at the periphery of pith; the pith consists of thin walled parenchyma cells with isolated stone cells; rosettes of calcium oxalate crystals scattered in phloem and interxylary phloem.

**Powder** - Light brown; shows fragments of vascular elements, scalariform and reticulate vessels and tracheids, stone cells, pitted fibres and parenchyma, thin walled parenchyma cells, parenchyma cells with rosettes of calcium oxalate crystals and isolated rosettes of calcium oxalate crystals.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 2 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 2.5 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' precoated plates (Merck), using Ethyl acetate:Methanol:Water (8:11:8) shows in visible light two spots at Rf. 0.89 (light yellow) and 0.94 (dark yellow); under UV (254nm) four spots appear at Rf. 0.30, 0.51, 0.58 (all light blue) and 0.89 (yellow); on exposure to Iodine vapours four spots appear at Rf. 0.34, 0.51, 0.58 and 0.89 (all yellow); on spraying with 5% ethanolic sulphuric acid and heating the plate at 110°C for 30 minutes, five spots appear at Rf. 0.34, 0.51, 0.58, 0.89 (all faint brown) and 0.94 (black).

**CONSTITUENTS** - Octacesanol, sitosterol, calycopterin, 3'0-Methylcalycopterin, 4-0 methylcalycopterin, ellagic acid.

**PROPERTIES AND ACTION**

**Rasa** : Tikta  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Pittahara, Kaphahara, Bhedini, Vibandhahara

**IMPORTANT FORMULATIONS** - Marma Gutīkā

**THERAPEUTIC USES** - Kṛmi, Pāṇḍu, Kuṣṭha, Jvara

**DOSE** - 3-6 g

## PŪTĪKARAÑJA (Stem Bark)

Pŭtĭkarañja is the dried stem bark of *Caesalpinia crista* Linn. (Fam. Caesalpinaceae); a prickly, shrubby climber found throughout India upto an altitude of 1200 m.

### SYNONYMS

Sanskrit	:	Cirabilvaḥ, Pŭtĭkaḥ, Prakiryah
Assamese	:	--
Bengali	:	--
English	:	Indian elm
Gujrati	:	Charela, Kanajho
Hindi	:	Chilbil, Kanju, Banchillaa, Paapari
Kannada	:	Tapasigida
Kashmiri	:	--
Malayalam	:	Avil, Nettavil
Marathi	:	Baavalaa
Oriya	:	--
Punjabi	:	Chirbil
Tamil	:	Avali, Aapa
Telugu	:	Tapasi, Nemalinara
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark curved, 0.8 to 1.5 mm thick, dark reddish or nearly blackish in colour with a number of sharp prickles; inner surface light brown to dark brown and smooth; fracture, short; odourless; slightly astringent in taste.

## b) Microscopic

**Stem bark-** T.S. of stem bark consists of layers of radially tiered cork, covered by degenerated dark layers of dead cells of cork, followed by 16 to 22 layers of phelloderm; phelloderm cells are thin walled, parenchymatous; some cells are filled with starch grains that are spherical, variable in size measuring from 1.5 to 5  $\mu\text{m}$ , with a centric hilum; rosettes or prismatic crystals of calcium oxalate also present; stone cells are present in the form of a continuous ring; secondary phloem consists of companion cells, sieve cells; phloem parenchyma and thick walled phloem fibres in groups, traversed by medullary rays; simple, rarely compound starch grains and clusters crystals of calcium oxalate also found in secondary phloem region.

**Powder-** Light brown, easily flowable, taste-slightly astringent, odourless; shows the presence of simple to compound starch grains composed of 2 to 4 components; prismatic and rosettes of calcium oxalate crystals; cork in surface view, sclereids, phloem fibres, parenchymatous cells contains prismatic and clusters of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of alcoholic extract of stem bark powder on Silica gel 'G' plate using Toluene: Formic acid: Glacial acetic acid (82: 14.5: 4.5) under UV light (365 nm) shows

one fluorescent zone at Rf. 0.70 (green). On exposure to iodine vapour, six spots appear at Rf. 0.06, 0.25, 0.68, 0.72, 0.86 and 0.95 (all yellow).

**CONSTITUENTS** - Flavonoid, Saponins and Alkaloids.

### **PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṣāya, Kaṭu

**Guṇa** : Laghu, Rūkṣa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Śleṣmasamśamana, Śothahara, Dīpana, Anulomana, Lekhanīya, Bhedanīya, Kṛmighna, Viṣaghna, Aparāpātana

**IMPORTANT FORMULATIONS** - Indukānta Ghṛta, Viṣṇu Taila, Pramehamihira Taila

**THERAPEUTIC USES** - Kuṣṭha, Prameha, Arśa, Kaṇḍū, Pakva-Śopha, Vraṇa, Tvagroga, Ślīpāda, Vātaja Śūla, Udara, Gulma, Śūla, Masūrikā, Amlapitta, Śvitra, Śarīra-Durgandha

**DOSE** - 50-100 ml in the form of decoction.

## RĒṆUKA (Seed)

Renukā consists of dried fruit of *Vitex negundo* Linn. (Fam. Verbenaceae) a small tree with triplicate to pentafoolate leaves and bluish inflorescence, found throughout India.

\par \par

\*Note : 'Renuka' is the fruit of *Vitex agnus-castus* Linn., a plant of foreign origin according to the AFI. However, since they are not available in the market, the recognised substitute fruits of *Vitex negundo* have been taken here as Renuka. 'Nirgundi' is the dried leaf of *Vitex negundo*

### SYNONYMS

Sanskrit	:	Rājaputrī, Nandinī, Kapilā, Dvijā, Bhasmagandhā, Pāṇḍupatrī, Hareṇukā
Assamese	:	--
Bengali	:	Renuka, Kauntee, Renuka Beej
English	:	Chaste-Tree, Hemp-Tree
Gujrati	:	Harenu, Renuka
Hindi	:	Renukaa, Renuka, Sambhaalooka Beej
Kannada	:	Renuka
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Renuka Beej
Oriya	:	--
Punjabi	:	--
Tamil	:	Yettee
Telugu	:	Jeevakamu
Urdu	:	--

### DESCRIPTION

### a) Macroscopic

The fruit is a rounded drupe, 1 to 3 mm in diameter, 1/3 rd to 3/4 th of its size surrounded by a dull grey cup like, persistent calyx alongwith pedicel; calyx cup may show one or two vertical splits; fruit colour light brown to black; locules two, each containing two seeds; texture smooth, taste and odour not characteristic.

### b) Microscopic

Fruit shows a circular outline; the outermost layer consists of compact, rounded or barrel shaped epidermal cells; epidermis bears abundant, characteristic bicelled, bent or wavy trichomes; distal cell of the trichomes generally broken; the subepidermal ground tissue comprising the mesocarp, composed of thin walled, angular cells which overarch between the two loculi of the fruit at the distal end; mesocarp also contains a ring of vascular strands; thick walled lignified cells inner to mesocarp comprise the endocarp; each loculus contains 1 or 2 flattened seeds; calyx consists of an outer epidermal layer of small cells followed by a central tissue of thin walled angular cells.

**Powder** -The powder shows stone cells, bicellular trichomes and groups of vessels with scalariform thickenings beside tissue fragments comprising both thin and thick walled cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

## ASSAY

### T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (8-2), shows under U.V. (366nm) spots at Rf. 0.36 (Blue), 0.52 (Yellowish green), 0.57 (Bluish green), 0.63 (Bluish green), 0.71 (Blue), 0.84 (Blue), 0.93 (Bluish green); on spraying with anisaldehyde- sulphuric acid reagent and heating the plate

for ten minutes at 110°C under U.V. (366nm) spots appear at Rf. 0.04 (Greyish Black), 0.58 (Blue), 0.73 (Blue), 0.90 (Blue), 0.97 (Yellow).

T.L.C. of the n-Hexane extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : ethylacetate (95:5) shows under U.V. (366nm) spots at Rf 0.13 (Green), 0.27 (Green), 0.34 (Green), 0.44 (Green), 0.51 (Green), 0.66 (Green), 0.77 (Green), 0.84 (Green), 0.90 (Dark Green); on spraying with anisaldehyde: sulphuric acid reagent and heating the plate for ten minutes at 110° C under U.V. (366nm) spots appear at Rf 0.13 (Yellow), 0.27 (Yellow), 0.34 (orange yellow), 0.44 (Light yellow), 0.51 (Greenish Yellow), 0.65 (Pale yellow), 0.77 (pale yellow), 0.84 (Yellow), 0.90 (Yellow).

**CONSTITUENTS** - Seeds contain hydrocarbons such as *n*-tritriacontane, *n*-hentriacontane, *n*-pentatriacontane and nonacosane. Other constituents of the seeds include  $\beta$ - sitosterol, *p*-hydroxybenzoic acid and 5 oxyisophthalic acid.

#### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta

**Guṇa** : Laghu

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Pittakara, Vātahara, Kaphahara, Dīpana, Medhya, Pācana, Garbhapātinī, Mukhavaimalyakara, Viṣaghna

**IMPORTANT FORMULATIONS** - Candanādi Taila, Pramehamihira Taila, Daśamūlāriṣṭa, Sārasvatāriṣṭa, Mahāyogarāja Guggulu, Aṇutaila, Balāśvagandhalākṣādi Taila, Vāsācandanādi Taila

**THERAPEUTIC USES** - Trṣṇā, Kaṇḍū, Dāha, Kāsa, Netraroga, Daurbalya, Dadru, Klaibya, Gulma

**DOSE** - 1-3 g

## **ṚDDHI (Tuber)**

Ṛddhi consists of dried tuber of *Habenaria intermedia* D.Don (Fam. Orchidaceae); a glabrous, small, erect, herbaceous plant found in temperate Himalayas, upto 2000 m commercial samples are usually processed in steam or boiling water and dried before marketing.

### **SYNONYMS**

Sanskrit	:	Aśvāsinī
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	--
Hindi	:	--
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	--
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	--

### **DESCRIPTION**

#### **a) Macroscopic**

Unprocessed tubers are 1.5 to 3.5 cm long and 1.0 to 2.5 cm thick, oval, obovate or oblong in shape; buff to yellowish brown, with shrunken surface, covered with numerous fine hairs; internally white to creamish in colour; showing scars of aerial portion at the apex and beaked or sometime round base; odourless; taste, palatable and mucilaginous.

Processed tubers; with scar or attached stem on top; 1.5 to 3.0 cm in length and 0.5 to 1.5 cm in width, conical, tapering to a beaked base, surface rough, occasionally grooved, grayish-brown; very hard to break; fractured surface show creamy interior; taste palatable and mucilaginous; odourless.

#### **b) Microscopic**

T.S. of unprocessed tuber shows 2 to 3 layered epidermis with long unicellular hairs, followed by a distinct exodermis and 15 to 20 layers of cortical parenchyma, cells of which in proximity of exodermis are smaller as compared to the remaining cells of cortex region; a few parenchymatous cells of outer cortex contain bundles of raphides. It is followed by a typical polystelic condition consisting of 14 to 16 diarch steles arranged in a ring and 7 to 10 steles distributed among the parenchyma in the central region; schizogenous mucilage canals lined by an epithelium of usually 6 to 9 cells are found distributed throughout the parenchymatous tissue; small and large starch grains mostly of simple type are found distributed in abundance throughout the parenchyma as well as in the epithelial cells of mucilage canals; the smaller ones are mostly found with hilum as a point or cleft and large one are round to oval with centrally situated hilum in the form of a point or cleft or triangular or 2 to 3 stellate cleft.

The processed tubers show no anatomical changes except the gelatinized starch grains.

**Powder** - The powder shows the presence of a large number of starch grains, long needle shaped raphides in bundles or isolated; fragments of root hairs, mucilage canals, parenchymatous cells and vessels with scalariform thickening.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than 2	per cent, Appendix	2.2.2.
Total Ash	Not more than 5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 14	per cent, Appendix	2.2.6.

Water-soluble extractive

Not less than 22 per cent, Appendix 2.2.7.

### **T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' precoated plates (Merck), using Toluene : Methanol (84:16) shows in visible light four spots at Rf. 0.41, 0.35 (both light yellow, 0.22 and 0.16 (both pink); under UV rays (254nm) three spots appear at Rf. 0.79 (white), 0.67 (dark blue) and 0.39 (yellow), on exposure to iodine vapours five spots appear at Rf.0.79, 0.41, 0.35, 0.22 and 0.16 (all yellow); on spraying with 5% vanillin sulphuric acid and heating the plate at 110°C for 10 minutes, nine spots appear at Rf. 0.79, 0.67, 0.61, 0.41, 0.39, 0.35, 0.22 and 0.19 ( all pink) and 0.16 (violet).

### **CONSTITUENTS -**

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha, Picchila
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Rasāyana, Śukrajanana, Vṛṣya, Ojovardhaka, Tridoṣaśāmaka

**IMPORTANT FORMULATIONS** - Amṛtaprāśa Ghṛta, Aśoka Ghṛta, Chāgalādyā Ghṛta, Daśamūlāriṣṭa

**THERAPEUTIC USES** - Kṣaya, Raktavikāra, Jvara, Mūrcchā

**DOSE** - 3-6 g

## ROHĪṢA (Whole Plant)

Rohīṣa consists of dried leaf, stem and root of *Cymbopogon martinii* (Roxb.) Wats. (Fam. Poaceae) a perennial, sweet scented grass, 1.5 to 3.5 m high, occurs wild in dry localities and cultivated in many parts of India.

### SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Agam Ghaas, Agiyaa Ghaas
English	:	Rosha Grass, Rusa grass
Gujrati	:	Rondso, Ronsdo
Hindi	:	Rohis, Roosaa, Roosaaghaas, Mirchagandha
Kannada	:	Dunllu, Harehullu
Kashmiri	:	--
Malayalam	:	Sambhaarppullu
Marathi	:	Rohish gavat
Oriya	:	--
Punjabi	:	Agya ghass
Tamil	:	Kaavattampillu, Munkipul, Chooraiippul
Telugu	:	Kaamakchhi - Kassuvu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

**Root** - Short, stout and woody; roots fibrous; many culms arise from root stumps.

**Culm** - Erect, terete, smooth shiny, upto 6 mm in dia., internodes 5 to 16 cm long, solid.

**Leaf** - Blades linear-lanceolate or lanceolate tapering to long filiform acuminate point, cordate and amplexicaul at base, upto 50 cm long and 3.5 cm broad; upper leaves are smaller, leaf surface glabrous, margin scabrid; midrib prominent and protruded on the lower surface; leaf sheath shorter than the internodes, glabrous, striate, auriculate, tight and clasping the culm, ligules membranous, 2 to 3 cm long.

**Inflorescence** - Spathate panicle, compound, upto 30 cm long; primary axis bears 2 or 3 branches at each node, these end in a spatheole which bears a pair of racemes, spatheole 1.8 mm long become reddish at maturity; racemes 1.5-2.0 cm long become sessile or shortly pedicelled, lower raceme base and lower most pedicel swollen; sessile spikelet about 3.5 mm long, lower glume 1 mm wide, ovate, with deep median groove, broadly winged, 2 nerved; awn 12 to 18 mm long; pedicellate spikelet about 4 mm long, glabrous; lower glume lanceolate, 8 nerved, flower hermaphrodite or male, stamens-3, anthers 1 or 2 mm long, style 2, stigma pilose.

#### **b) Microscopic**

**Root** - T.S. shows thin walled epiblema with unicellular root hairs; cortex composed of thin walled, parenchymatous cells; large air chambers present in the cortex; endodermis single layered and pericycle two cell layered; central vascular strand has outer 2 or 3 layers of sclerenchymatous cells followed by 3 to 5 cells deep zones of thin walled phloem with a row of circular cavities of 12 to 25  $\mu$  diam.; 5 to 10 cell layer thick zone encloses xylem vessels; which are 35 to 50  $\mu$  in diam.; pith cells thick walled and devoid of any cell contents.

**Stem** - T.S. shows thick cuticle; epidermis devoid of any appendages; hypodermis 6 to 10 cells deep and composed of sclerenchymatous cells; vascular bundles scattered throughout the ground tissue with a row of smaller vascular bundles in the hypodermis; cells of ground tissue thin walled, parenchymatous; vascular bundles present in the ground tissue enclosed by 2 or 3 layers of sclerenchymatous cells.

**Leaf** - T.S. shows isobilateral structure, with a spongy mesophyll between; outline showing a slightly concave upper surface and a convex lower surface; midrib protruded towards lower side; cells of upper epidermis interrupted by the presence of bulliform or motor cells; lower epidermal cells are more uniform in size and smaller; stomata present on both surfaces, characteristically placed in a straight line between veins, mesophyll consists of chlorenchymatous cells placed radially around smaller vascular bundles; bundle sheath present around smaller vascular bundles, on either side of the midrib vascular bundle; group of sclerenchymatous fibres are found and may extend upto bundle sheath; vascular bundle of midrib usually has two conspicuous metaxylem vessels.

Lower epidermis can be distinguished from the upper epidermis by its having more number of stomata, smaller epidermal cells and presence of microhairs and papillae; stomata of the lower epidermis - oval, mostly with low dome shaped long cells present between the veins; long cells of lower epidermis possess 1 or 2 papillae, while papillae are absent on the long cells of upper epidermis; short cells over the veins in rows of more than 5 cells and may be in pairs; silica bodies abundant over the veins mostly dumbbell shaped, occasionally cross-shaped, narrow and crenate; prickle and micro hairs present; micro hairs two celled, observed only on lower epidermis; the basal cell of micro hairs is wide as compared to distal cell; distal cell tapers to an acutely pointed apex.

**Powder** - Brown, fibrous, free flowing, shows debris from leaves showing characteristic graminaceous stomata, silica bodies, and micro hairs; also contains pitted parenchyma and fiber.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	14 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7 per cent, Appendix	2.2.7.
Essential oil	Not less than	0.2 per cent, Appendix	2.2.10

#### **T.L.C.**

T.L.C. of essential oil on silica gel 'G' plate using hexane : ethyl acetate (90:10) shows seven spots at Rf 0.25, 0.38, 0.47, 0.57, 0.64, 0.71 and 0.78 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Essential oil (0.5 percent) containing terpenes such as geraniol, geranyl acetate, citronellol, linalool, geranyl butyrate, myrcene,  $\alpha$ - and  $\beta$ -pinene.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphavātaśāmakā, Bālagraharā, Puṁstvaghna

**IMPORTANT FORMULATIONS** - Balā Taila, Māṣabalādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Kāsa, Hṛdroga, Śūla, Raktapitta, Apasmāra, Pīnasa, Kaphajvara, Kaṇṭha Roga, Jvara, Aruci, Kuṣṭha, Kaṭiśūla, Prameha, Vṛṣcika-Viṣa

**DOSE** - 10-20 g

## RŪMĪMASTAGĪ (Resin)

Rūmīmastagī is a resin obtained from *Pistacia lentiscus* Linn. (Fam. Anacardiaceae), a shrub or small tree indigenous to the countries bordering on the Mediterranean.

### SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Rumi-Mastungi
English	:	Mastic
Gujrati	:	Rumi Mastagee
Hindi	:	Rumi Mastagee, Rumi Mastiki, Mastagee
Kannada	:	---
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Rumaa Mastakee
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	Rumee Mastagee

### DESCRIPTION

#### a) Macroscopic

The resin occurs in small, hard, pear shaped, ovoid or nearly globular, sometimes elongated tears, about 2 to 8 mm in diameter; pale yellow in colour; brittle, breaking into clear glossy fracture, interior transparent, crushing to a sandy powder, taste, slightly agreeable; odour, aromatic.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 2.6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 0.34 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than 94 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than 0.5 per cent, Appendix	2.2.7.

### ASSAY

The drug on steam distillation yields colourless oil (1.5-2.0% v/w), which is heavier than water. (Method in Appendix 2.2.10.).

### T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' precoated plates (Merck), using Toluene : Methanol (95:5); under UV (254nm) shows one spot at Rf. 0.17 (blue fluorescence): on spraying with Vanillin-sulphuric acid and heating the plate at 110°C for 30 minutes, twelve spots appear at Rf. 0.12, 0.17, 0.23 (all violet), 0.40 (blue), 0.41 (purple), 0.44, 0.46, 0.49, 0.56, 0.69, 0.80 and 0.86 (all blue).

**CONSTITUENTS** - Resin, volatile oil, a bicyclic terpenoid and fatty acids.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Madhura

**Karma** : Kaphahara, Mūtrala, Vṛṣya, Vājīkaraṇa, Rakta Saṃgrāhika, Dīpana, Varnya, Mukhadurgandhanāśaka, Daśana sthiraṭākara

**IMPORTANT FORMULATIONS** - Elādi, Kameda, Sukrama Vaṭī

**THERAPEUTIC USES** - Mūtrakṛcchra, Kāsa, Śvāsa, Ādhmāna, Agnimāndya, Grahaṇī, Raktasrāva, Vātapittaja Vikāra, Śoṭha

**DOSE** - 1-2 g

## SARALA (Exudate)

Sarala is an exudate obtained by tapping the wood of *Pinus roxburghii* Sargent syn. *P. longifolia* Roxb. (Fam. Pinaceae), a monoecious conifer found in north-western Himalayas at an altitude between 460 and 1500 m.

### SYNONYMS

Sanskrit	:	Śrīḥ, Śrīveṣṭaka, Śrīvāsaḥ, Śrīniketaḥ, Śryāhvah, Vṛkṣadhūpakaḥ
Assamese	:	--
Bengali	:	Sarala gaachh
English	:	Oleo-resine of Pine
Gujrati	:	Teliyo devdaar, Pilo berajo
Hindi	:	Cheed-Ka-Gond, Gandhabirojaa
Kannada	:	Saral, Sriveshtaka
Kashmiri	:	--
Malayalam	:	Charalam, Saralam
Marathi	:	Sarala deeka
Oriya	:	Sidhaa, Saral
Punjabi	:	Cheed
Tamil	:	Pinaimaaru
Telugu	:	Saral
Urdu	:	Cheed

### DESCRIPTION

#### a) Macroscopic

Blackish brown in colour, semi solid, mostly associated with debris from needles, wood chips and bark of the source tree; odour, terebinthene.

## b) Microscopic

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	0.6 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.4 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	74 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	0.15 per cent, Appendix	2.2.7.
Volatile oil	Not less than	18 per cent, Appendix	2.2.10

### ASSAY

#### G.L.C. -

G.L.C. of Turpentine oil on the Gas Chromatograph Model NUCON - 5765, Column & Stationary phase : 30m fused silica capillary column walls coated with FFAP, Carrier Gas : Helium, 1.5 ml. min<sup>-1</sup>, Column Temperature : 90° C for 2 min. then programmed at the rate of 7° C min<sup>-1</sup> to 220° C, Injection port Temperature : 220° C, Detector Temperature : 240° C, Recorder : 2mV, signal attenuation 1:100, Chart speed : 1 cm.min<sup>-1</sup>, Sample size : 0.10 ml (For GC analyses, pure (0.1ml) is injected with a 1.0 ml syringe).

The identification of compounds is done by comparing the retention time of peaks and by peak enrichment technique with standard samples run under similar operating conditions such as 1- $\alpha$ - pinene (Rt = 6.31 min.); 1- $\beta$ -pinene (Rt = 7.18 min.); car-3-ene (Rt = 7.76 min.); longifolene (Rt = 15.46 min.).

#### T.L.C.

T.L.C. of rosin (Material left after separation of essential oil) on a precoated silica gel G plate, using methanol : hexane (5:95). One spot at Rf. 0.80 on spraying with 2%

vanillin in sulfuric acid (dark pink to purple fluorescent) and on spray with 0.04 per cent bromocresol green solution shows yellow spot.

**CONSTITUENTS** - 1- $\alpha$ -pinene, 1- $\beta$ -pinene, car-3-ene, longifolene and other mono & sesquiterpenes.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Tīkṣṇa, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Dīpana, Durgandhahara, Duṣṭavraṇaśodhaka, Viṣaghna, Varnaṇprasādana, Rakṣoghna

**IMPORTANT FORMULATIONS** - Amṛtaprāśa Cūrṇa, Kuṣṭhadi Taila

**THERAPEUTIC USES** - Jatrūrdhvaroga, Sveda-Daurgandhya, Vātavyādhi, Agnimāndya, Ādhmāna, Kṛmiroga, Mūrccchā, Kuṣṭha, Tvagroga, Karṇaśūla, Kaṇṭharoga, Śoṭha, Nāḍīvrāṇa, Kaṇḍū, Koṭha, Piḍakā, Ūrustambha, Yūkāroga, Grahabādhā, Yonidoṣa

**DOSE** - 1-3 g

## SARPAGANDHĀ (Root)

Sarpagandhā consists of air dried root of *Rauwolfia serpentina* (Linn.) Benth. ex Kurz (Fam. Apocynaceae); a perennial undershrub widely distributed in India in the sub-Himalayan tracts upto 1,000 m as well as, in the lower ranges of the Eastern and Western Ghats and in the Andamans.

### SYNONYMS

Sanskrit	:	Nākuli, Candrikā, Chandramārah
Assamese	:	--
Bengali	:	Chaandar
English	:	Rauwolfia Root, Serpentina Root
Gujrati	:	Amelpodee
Hindi	:	Chhotaa Chaand, Dhavalbaruaa
Kannada	:	Sutranaabhu
Kashmiri	:	--
Malayalam	:	Amalpori
Marathi	:	Adkai, Chandra
Oriya	:	Dhanbarua, Sanochado
Punjabi	:	--
Tamil	:	Sarppaganti
Telugu	:	Sarpagandhi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Pieces of roots mostly about 8 to 15 cm long and 0.5 to 2 cm in thickness, sub-cylindrical, curved, stout, thick and rarely branched; outer surface greyish-yellow to brown with irregular longitudinal fissures; rootlets 0.1mm in dia; fracture, short, slight odour and bitter taste.

**b) Microscopic**

**Root-** Root comprises of stratified cork of about 18 layers, of which the cells of 8 to 12 layers are smaller, suberized and unlignified; cells of remaining layers large, suberized and lignified; phelloderm parenchymatous, some cells packed with starch grains and prismatic and clusters crystals of calcium oxalate; secondary phloem tissue consists of sieve cells, companion cells and parenchymatous cell containing starch grains and crystals of calcium oxalate; phloem fibres absent; phloem parenchyma occasionally filled with granular substances; starch grains mostly simple but compound granules also occur with 2 to 4 components; individual granules spherical, about 5 to 15 µm in diameter, with well marked hilum simple or split in a radiate form; stone cells are absent (distinction from many other species such as *R. canescens*, *R. micrantha*, *R. densiflora*, *R. perakensis* and *R. vomitoria*); secondary xylem is traversed by well developed lignified medullary rays of about 1 to 5 cell wide but uniseriate rays are more prominent; vessels singly or in pairs; xylem parenchyma cells lignified; fibres present; cells of medullary rays thick walled also filled with starch grains and calcium oxalate prisms.

**Powder -** Coarse to fine, yellowish-brown, free flowing, odour slight, bitter in taste; characterized by spherical, simple to compound starch grains, calcium oxalate prisms and clusters; vessels with simple perforation, occasionally tailed; tracheids lignified; xylem fibres irregular in shape, occurs singly or in small groups, walls lignified, tips occasionally forked or truncated; wood parenchyma cells are filled with calcium oxalate crystals and starch grains; stone cells phloem fibres absent.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.

Water-soluble extractive

Not less than 10 per cent, Appendix 2.2.7.

### T.L.C.

T.L.C. of the methanol and Ammonia extract of root powder on silica gel 'G' plate using Toluene : Ethyl acetate : Diethylamine (70 : 20: 10) shows eight spot on spraying with Dragendorff reagent at Rf. 0.11, 0.13, 0.25, 0.37, 0.47, 0.51, 0.61 and 0.82 (all reddish brown). The spot at Rf. 0.82 is of reserpine.

**CONSTITUENTS** - Rauwolfia contains indole alkaloids, such as reserpine, serpentine and ajmalicine.

### PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṭu

**Guṇa** : Rūkṣa, Laghu

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Mūtrala, Dīpana, Rucya, Pācana, Nidrāprada, Viṣaghna, Kāmāvasādaka, Hṛdayāvasādaka

**IMPORTANT FORMULATIONS** - Sarpagandhādi Cūrṇa, Sarpagandhāyoga, Sarpagandhā Vaṭī, Sarpagandhā Ghana Vaṭī

**THERAPEUTIC USES** - Madaroga, Yonīśūla, Jvara, Śūla, Kṛmiroga, Anidrā, Unmāda, Apasmāra, Bhrama, Raktavāta, Bhūtabādhā, Mānasaroga, Visūcikā, Vraṇa

**DOSE** - 1-2 g

## ŚVETAPUNARNAVĀ (Root)

Śvetapunarnavā consists of root of *Boerhaavia verticillata* Poir. (Fam. Nyctaginaceae), a herbaceous weed with a tendency to climb, widely distributed in the plains throughout India during rainy season.

### SYNONYMS

Sanskrit	:	Vṛscīva
Assamese	:	--
Bengali	:	Shatapunyaa
English	:	Horse purslane, Blunt leaved Hogweed
Gujrati	:	Vasedo, Vasedee
Hindi	:	Safed Punarnavaa, Gada Poornaa
Kannada	:	Maachchugoni, Vinleey Duvelladkilu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Pundharighentuli
Oriya	:	--
Punjabi	:	Itsita
Tamil	:	Sharunnai, Mukkarattai-Kirai

### DESCRIPTION

#### a) Macroscopic

Roots occur in small pieces of 5 to 7.5 cm in length and upto 2 cm in thickness; texture rough; lenticels dot like or slightly transversely elongated, arranged in transverse rows; colour brown, freshly cut surface creamish to light brown; odour and taste not distinctive.

## b) Microscopic

Root shows anomalous secondary growth; periderm present and consisting of phellem, phellogen and phelloderm; part of phellem and phellogen sloughed off and phelloderm mostly crushed but forms a continuous layer around the stelar region; the phellogen consists of 4 or 5 layers of rectangular and tangentially elongated cells; cortex composed of parenchymatous cells that are usually crushed; raphides present in some cells of cortex; centre of the root occupied by xylem consisting mostly of vessels, fibres and tracheids; concentric but irregular rings of cambium, patches of xylem and phloem, and parenchyma alternate in turn towards the periphery; medullary rays are not distinct; starch abundant in parenchyma; most of the starch grains rounded or hemispherical in shape; the compound starch grains, however, are scanty.

**Powder** - The powder show raphides (usually broken) and fragments of fibres, and vessel members showing scalariform thickenings; starch present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene:ethylacetate:acetic acid (5:4.5:0.5), shows under U.V. (366nm) spots at Rf 0.37, 0.59, 0.80 (All Blue). On spraying with anisaldehyde: sulphuric acid reagent and heating the plate for ten minutes at 110°C spots appear at Rf 0.19(Greyish Black), 0.59 (Greyish Black), 0.69 (Blue), 0.79 (Purple).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Madhura
<b>Guṇa</b>	:	Rūkṣa, Laghu

**Vīrya** : Uṣṇa  
**Vipāka** : Madhura  
**Karma** : Vātahara, Kaphahara, Pittaśāmaka, Agnidīpaka, Viṣaghna, Jvarahara

**IMPORTANT FORMULATIONS** - Kumāryāsava (A), Punarnavādyariṣṭa, Dhānvantara Ghṛta, Dādhika Ghṛta

**THERAPEUTIC USES** - Pāṇḍu, Viṣavikāra, Śoṭha, Śopha, Udararoga, Hṛdroga, Kāsa, Uraḥkṣata, Śūla, Rakta Vikāra, Paittika Jvara, Cāturthikajvara, Srāva, Plīhāroga, Vātakaṇṭaka, Vidradhi , Alarkaviṣa, Vṛścika-viṣa, Sarpaviṣa, Mūṣikāviṣa

**DOSE** - 5-15 g

## TAILAPARNAḤ (Leaf)

Tailaparnaḥ consists of mature leaf of *Eucalyptus globulus* Labill. (Fam. Myrtaceae) a large tree attaining a height of 90 m or more, native to Australia, but planted world wide and introduced in Nilgiris, Anamalai and Palni hills, Simla and Shillong at an altitude of 1500-2500 m.

### SYNONYMS

Sanskrit	:	Nīlaniryāsa, Ekaliptaḥ, Sugandha Patraḥ
Assamese	:	--
Bengali	:	--
English	:	Blue gum, Eucalyptus
Gujrati	:	--
Hindi	:	Yukeliptas
Kannada	:	--
Kashmiri	:	--
Malayalam	:	Yukkaalimaram
Marathi	:	Nilgiri
Oriya	:	--
Punjabi	:	--
Tamil	:	Yukkaalimaram
Telugu	:	Jeevakamu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Drug consists of mature leaves, more or less scimitar shaped, thick, leathery, greyish-green, petiolate, upto 26 cm long and 4 cm broad; petioles 2.0 to 3.5 cm long and 0.5 to 1.5 mm thick, sometimes twisted; apex acute to acuminate, base obtuse; midrib

prominent, particularly on the lower surface; margin of leaf entire and somewhat thickened, brittle and possess numerous brown to dark brown corky warts. In transmitted light, numerous oil glands can be seen as translucent dots; upper surface smooth, lower surface slightly rough due to the presence of projecting veins; venation - unicostate reticulate; lateral veins anastomose near the margin forming a continuous line; odour strong and characteristic.

**b) Microscopic**

**Leaf** - T.S. shows typical isobilateral structures with two or three rows of palisade cells on both upper and lower sides, surfaces show thick cuticle; numerous sunken stomata and large ovoid schizogenous oil cavities of 160 to 200  $\mu$  diam.; idioblasts present with rosettes or prismatic calcium oxalate crystals; rosette crystals 25 to 35 $\mu$  in size, prismatic crystals 15 to 25 $\mu$  in size; vascular bundle of midrib are crescent shaped with one vascular strand present on each side, all having interrupted patches of sclerenchyma; corky warts comprising of 10 or more layers of cells; laminary bundles enclosed in bundle sheath, the cells of which extend to the epidermis on both sides; upper and lower epidermal cells have straight walls; stomata anomocytic; stomatal index on both upper and lower surface 5 to 10; the palisade ratio on upper surface 5 to 17 and lower surface 3 to 6.

**Powder** - Yellowish brown, free flowing, characterized by the presence of cluster and prismatic crystals of calcium oxalate; epidermis straight walled with sunken stomata; fibers present.

**IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	14	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	21	per cent, Appendix	2.2.7.
Essential oil	Not less than	2	per cent, Appendix	2.2.10

## T.L.C.

T.L.C. of hexane extract on silica gel 60 F 254 plate using Toluene : Acetone (95:05) shows four spots at Rf 0.22, 0.35, 0.41 and 0.49 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Essential oil containing terpenes such as 1,8 - cineole, camphene, sabinene, myrcene, p-menthone,  $\alpha$ - and  $\gamma$ -terpinene, fenchone,  $\alpha$ -  $\beta$ -thujone, citral, verbenone.

## PROPERTIES AND ACTION

**Rasa** : Kaṭu, Tikta, Kaṣāya

**Guṇa** : Laghu, Snigdha

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Dīpana, Pācana, Hṛdya, Mūtrala, Durgandhanāśaka, Agnimāndya, Balaprada

**IMPORTANT FORMULATIONS** - Ekādaśāśatikaprasāriṇī Tailam, Mahāsugandhika Taila, Pañcavaktra Rasa, Pañcagūṇa Taila, Mārtaṇḍabhairava Rasa, Jvaramāri Rasa

**THERAPEUTIC USES** - Kṛmi, Jīrṇakāsa, Pratiśyāya, Svarabheda, Viṣamajvara, Jvara, Śūla, Pūyameha, Kṣaya, Śvāsa, Bastiroga, Pravāhikā, Plīhāroga, Hṛdroga, Agnimāndya

**DOSE** - 1-2 g

## TINIŚAḤ (Wood)

Tiniśaḥ consists of wood of *Ougeinia oojeinensis* (Roxb.) Hochr. syn. *O. dalbergioides* Benth. (Fam. Fabaceae), a small to medium sized deciduous tree, found in the outer Himalayas and sub Himalayan tracts from Jammu to Bhutan up to an altitude of 1500 m and extending through the whole of the northern and central India into greater part of Deccan Peninsula.

### SYNONYMS

Sanskrit	:	Tiniḥ, Syandanaḥ, Rathadru
Assamese	:	--
Bengali	:	Tinish
English	:	Sandan
Gujrati	:	Tanacha
Hindi	:	Sandan, Saanana, Tinishaa
Kannada	:	Karimutale, Kalabangaa
Kashmiri	:	--
Malayalam	:	Totukara, Malavenna
Marathi	:	Timas, Syandan
Oriya	:	Vanjan
Punjabi	:	--
Tamil	:	Narivengai, Naiponai
Telugu	:	Tellamotuku, Dargu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Wood pieces are roughly cubic and about 2 to 3 cm in size; outer part yellow or cream, internal part light to dark brown in colour; cut surfaces are fibrous, wood pieces devoid of any odour.

## b) Microscopic

**Sap wood** - Diffuse porous, vessels in cross sections solitary, in short radial multiples or in clusters, forming oblique chains, about 30 to 220  $\mu$  in diam. with reticulate thickenings and simple pits, without gummy deposits; frequency of vessels per sq. mm is 14 to 18; axial parenchyma is paratracheal, aliform, confluent - broad and filled with simple starch grains 4 to 21  $\mu$  in dia. with prominent striations and slit like centric hilum; fibres present in patches; marginal fibres possess abundant prismatic crystals of calcium oxalate, 4 to 10  $\mu$  in size; fibres are occasionally septate; rays uni- to multiseriate, heterogenous, usually homocellular, some cells may contain minute starch grains of about 8  $\mu$  diam.; cells contain no tannin.

**Heart wood** - T.S. shows vessels of same size as those of sap wood but are usually filled with brownish gummy material and possess bordered pits; frequency of vessels per sq. mm is 6 to 8; axial parenchyma is paratracheal, aliform and is usually filled with brownish substance but lack starch grains; marginal fibres contain abundant prismatic crystals of same size as observed in the sapwood, ray, axial parenchyma and fibres contain tannins.

**Powder** - Brown, fibrous, free flowing, characterized by the presence of several lumps of brown gummy material, xylem parenchyma, medullary ray cells, simple starch grains, xylem vessels with several small slit like pits and fibres containing crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent, Appendix	2.2.2.
Total Ash	Not more than	7 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2 per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of methanol extract on silica gel 'G' plate using diethyl ether : hexane (78:22) shows six spots at Rf 0.47, 0.50, 0.62, 0.65, 0.72 and 0.86 on spraying with Vanillin-Sulphuric acid reagent and heating the plate for 15 minutes at 110°C.

**CONSTITUENTS** - Flavonoids mainly homoferreirin and ougeinin.

**PROPERTIES AND ACTION**

**Rasa** : Kaṣāya  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Rasāyana, Pittahara, Kaphaśoṣaṇa, Medohara, Kuṣṭhaghna, Viṣaghna, Vraṇaropana, Śonitasthāpana

**IMPORTANT FORMULATIONS** - Ayaskṛti

**THERAPEUTIC USES** - Śoṭha, Kuṣṭha, Atīsāra, Raktātīsāra, Pravāhikā, Raktavikāra, Raktapitta, Prameha, Śvitra, Vraṇa, Kṛmi, Pāṇḍuroga, Medoroga, Dāha

**DOSE** - 50 - 100 ml Kvātha.

## TINTIDĪKAḤ (Aerial Part)

Tintidīkaḥ consists of mature dried aerial part of *Rhus parviflora* Roxb. (Fam. Anacardiaceae), an evergreen or sub-deciduous shrub commonly found on the dry hot slopes of Himalayas from Punjab to Nepal and in the hills of Peninsular India at an altitude of 600-2100 m.

### SYNONYMS

Sanskrit	:	Tintidīka
Assamese	:	--
Bengali	:	--
English	:	Sumac
Gujrati	:	--
Hindi	:	Tungalaa, Samakadana, Raitung
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	--
Oriya	:	--
Punjabi	:	Khatte Masoor, Raitung, Tungaa
Tamil	:	--
Telugu	:	Jeevakamu
Urdu	:	Sumaak

### DESCRIPTION

#### a) Macroscopic

**Stem** - Young stem branched, reddish-brown, tomentose; stem pieces 10 to 15 cm long and upto 4 cm in diam., old ones woody with longitudinal striations and

glandular protuberances, greenish-brown, bark separable from wood, inner surface of bark reddish-brown, wood light brown in colour; fracture, hard and fibrous.

**Leaf** - Trifoliate when intact, leaflets elliptic, oblong, obovate, petiolate, petiole 2.5 to 3.5 cm in length, tomentose, terminal leaflet large, obovate, 7 to 8.5 cm in length, 3 or 4 cm broad, rather thick, basal margin entire and cuneate, upper coarsely and irregularly crenate, pubescent, laterals relatively broader and more rounded at base, sessile, pubescent and smooth.

**Fruit** - Drupe, oval, yellowish-green to brownish-green, glabrous, shining, fruits present on panicles; calyx persistent; fruit wrinkled.

#### **b) Microscopic**

**Stem** - T.S. shows cork, cortex and stele; patches of cortical fibres, secretory canals and rhomboid crystals of calcium oxalate, measuring about 13  $\mu$  well distributed in the cortex; xylem in the form of a continuous cylinder traversed by uni or biseriate medullary rays; border pitted and scalariform vessels present; lignified fibres septate, measuring 300 to 770  $\mu$  in length and upto 50  $\mu$  in width; pith parenchymatous, possessing tannins, starch grains and rhomboid crystals of calcium oxalate.

**Petiole** - T.S. shows a single layered epidermis covered with cuticle; abundant unicellular and multicellular, uniseriate trichomes measuring 30 to 360  $\mu$  in length and 10 to 20  $\mu$  in width; cortex consisting of 3 or 4 layers of collenchymatous cells and 5 or 6 layers of parenchymatous cells, some cells of collenchyma and parenchyma contain rhomboidal crystals of calcium oxalate, measuring upto 20  $\mu$ ; collateral vascular bundles 15 to 17 in number, surrounding a central parenchymatous pith and capped by an arch of pericyclic fibres; secretory canals present in phloem region.

**Midrib** - T.S. shows single layered epidermis, covered with cuticle; nonglandular, unicellular and uniseriate, multicellular trichomes abundantly present on the epidermis, followed by collenchymatous tissue; vascular bundles 5 to 7 in number, arranged in a circle, conjoint, collateral, each capped by an arch of fibres; secretory canals present in phloem region; pith consists of parenchymatous cells.

**Lamina** - T.S. shows dorsiventral structure, epidermal cells composed of cubical to slightly elongated and rectangular cells, externally covered with cuticle; below upper epidermis 2 or 3 layers of palisade parenchyma present; lower epidermis single layered with thick cuticle; unicellular and uniseriate, multicellular trichomes present on both surfaces, measuring upto 200  $\mu$  in length and about 30  $\mu$  in width; palisade parenchyma followed by loosely arranged spongy parenchyma cells; mesophyll traversed by vascular bundles; each vascular bundle

surrounded by bundle sheath, extending from upper epidermis to lower epidermis as bundle sheath extension. In surface view lower epidermis shows anomocytic type of stomata while upper epidermis is devoid of stomata; stomatal index 6 to 10 on lower epidermis; vein islet number 12 to 15; palisade ratio 2 to 4.

**Powder** - Brown, odour slightly strong, somewhat acrid in taste; fragments of palisade tissue, calcium oxalate crystals, trichomes, starch grains, bordered pitted vessels and vessels having scalariform thickenings.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.7 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm thick) using chloroform : methanol: acetic acid (80:20:2) shows under UV (254 nm) six spots at Rf. 0.11, 0.18, 0.29, 0.54 (all brown), 0.80 and 0.91 (both yellowish green). Under UV (366nm) seven fluorescent spots appear at Rf. 0.11, 0.18, 0.29, 0.54, 0.70 (all brown), 0.80 and 0.91 (both pink). On exposure to iodine vapour eight spots appear at Rf. 0.11(pinkish brown), 0.15, 0.22 (brown), 0.38, 0.64, 0.74, 0.80 and 0.91 (all yellowish brown). On spraying with 5% ferric chloride solution seven spots appear at Rf. 0.15, 0.24 (both green), 0.41 (faint brown), 0.54 (blue), 0.73 (faint brown) 0.83 and 0.91 (both brown).

**CONSTITUENTS** - Tannins (Gallic acid); flavones (myricetin, quercetin, myricitrin, quercitrin, kampferol); glycosides (isorhmnetin-3- $\alpha$ -L-arabinoside)

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Amla
<b>Guna</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Amla

**Karma** : Vātahara, Kaphavātahara, Pittakara, Rocana, Dīpana, Grāhī, Jvaraghna

**IMPORTANT FORMULATIONS** - Yavānī Śāḍava, Hinguvacādi Cūrṇa, Srī Rāmabāṇa Rasa

**THERAPEUTIC USES** - Vātavikāra, Atīsāra, Agnimāndya, Aruci, Tṛṣṇā, Pravāhikā

**DOSE** - 3 - 6 g

## TRAPUṢAM (Seed)

Trapuṣam consists of dried seed of *Cucumis sativus* Linn. (Fam. Cucurbitaceae), an annual trailing or climbing plant, numerous varieties widely cultivated throughout India upto an altitude of 1200 m. The seeds are devoid of mucilagenous outer layer.

### SYNONYMS

Sanskrit	:	Śvetakaraḥaṭakaṃ, Sudhāvāsaḥ, Mūtralaṃ, Kaṇṭakiphalaṃ
Assamese	:	--
Bengali	:	Ksheeraa, Shashaa
English	:	Cucumber
Gujrati	:	Taanslee
Hindi	:	Kheeraa
Kannada	:	Mullusavte, Santekaayi
Kashmiri	:	--
Malayalam	:	Vellari
Marathi	:	Tause, Khiraa
Oriya	:	Kantiaali Kaakudi
Punjabi	:	Khiraa
Tamil	:	Vellarikkaay, Pippinkaay
Telugu	:	Khirakaya
Urdu	:	Kheeraa

### DESCRIPTION

#### a) Macroscopic

Seeds compressed, elongated, ellipsoid, dorsiventrally convex and laterally ridged; size variable, about a cm or occasionally more in length and upto 0.5 cm wide; micropyle pointed, distinctly visible; outer surface glossy, brittle, peelable; yellowish-white; kernel,

oily, creamish-white; taste, mildly sweet, oily; not slippery to touch when moistened: odour, nil.

#### **b) Microscopic**

Outermost layer of testa absent; hypodermis sclerenchymatous, two layered, outer layer of small, circular, stone cells, inner layer of large, oval, thick walled, striated, lignified sclereids placed at right angle to outer layer; a large zone of aerenchyma filled with loosely packed parenchymatous cells; cotyledon lined by compact layer of cuticularized thin walled epidermis, cotyledon of several layers of elongated, closely packed parenchymatous cells, largely hexagonal, packed with aleurone grains, starch and fat globules; innermost two layers much more elongated, palisade like, and distinct; each cotyledon shows five distinct patches of small, thin walled, polygonal cells present midway, in a roughly trapezoidal shape.

**Powder** - Creamish-white to light-green, oily, shows groups of yellowish, wavy-walled sclereids from testa in surface view, also isolated ones; fragments of parenchymatous cells; annular or spiral xylem vessels in groups; abundant oil globules, aleurone grains, and starch grains.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (20:0.5) shows spots at Rf 0.31 (purple), 0.40 (brown), 0.48 (purple), 0.52 (light purple), 0.60 (purple), 0.70 (light grey) and 0.78 (pinkish brown) on spraying with vanillin-sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Fixed oil and sugars.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Madhura
<b>Guna</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātapittahara, Kaphakara, Mūtrala, Balya, Abhiṣyandī, Mūtrabastiviśodhaka, Agnisādana

## IMPORTANT FORMULATIONS - Dādhika Ghṛta

**THERAPEUTIC USES** - Mūtrāghāta, Mūtrakṛcchra, Raktapitta, Daurbalya, Dāha, Raktavikāra, Anidrā, Śiraḥ Śūla, Chardi, Śītajvara

**DOSE** - 3-6 g powder.

## TŪNĪ (Stem Bark)

TŪnī consists of stem bark of *Cedrela toona* Roxb. (Fam. Meliaceae), a large, rapidly growing, nearly evergreen tree attaining a height upto 18 m, and distributed in tropical Himalayas from the Indus eastward, ascending to 1000 m and also throughout the hills of Central and Southern India.

### SYNONYMS

Sanskrit	:	Nandīvr̥kṣa, Tuni, Tūna, Nandī
Assamese	:	--
Bengali	:	Toongaachha
English	:	Toon, Red cedar
Gujrati	:	Toonee
Hindi	:	Tun, Toonee, Tuni
Kannada	:	Mandurike, Kempu Gandagheri
Kashmiri	:	--
Malayalam	:	Madagirivempu, Ikana, Patukarana
Marathi	:	Toonee, Kurak
Oriya	:	--
Punjabi	:	--
Tamil	:	Karamusuli, Shevagil Malavembu
Telugu	:	Nandichettu, Galimanu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark available in long pieces, channelled, of varying thickness; external surface, rough and rugged due to exfoliation and vertical cracks, fissured, dark grey having lenticels,

inner surface, red, laminated and fibrous; fracture, fibrous and splintery; odour, very mild and pleasant; taste, sharp and acrid.

#### **b) Microscopic**

Stem bark shows exfoliating cork, 8 to 10 layers consisting of tangentially elongated, radially arranged, thin-walled cells; cortex, 12 to 15 layers of rectangular parenchymatous cells, outer layers having cells filled with small rosette crystals of calcium oxalate at regular intervals; inner layers of cortex of isodiametric cells having abundant larger rosette crystals; occasionally stone cells may be present in outer cortex; phloem fibres abundant in patches, thick walled; medullary rays narrow, generally biseriate; starch grains, simple or compound, present in cortical region.

**Powder** - Light reddish-brown; shows occasional fragments of cork cells; fibres, large, abundant in groups, a few isolated, lignified with distinct lumen, tips bluntly pointed or having distinct indentation; stone cells, few, of varying shapes, elongated to isodiametric; phloem parenchyma, thin-walled, containing calcium oxalate rosettes and prisms; abundant prismatic and rosette calcium oxalate crystals, rosettes of varying sizes measuring 11 to 60  $\mu$ , prisms, small; starch grains, simple or compound having 2 to 6 components, 3-component grains most common, round and oval measuring upto 10  $\mu$  in dia., cleft hilum.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using petroleum ether : hexane : ethyl acetate : formic acid (10:30:15:1) shows spots at Rf. 0.34, 0.44, 0.57 and 0.88 (all purple) on spraying with vanillin-sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Triterpenoids.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Grāhī, Bhagnasandhānakara, Medohara

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Bāla Pravāhikā, Vraṇa, Dāha, Yoniroga, Kaṇḍū, Kuṣṭha, Gaṇḍamālā, Raktavikāra, Raktapitta, Śvetakuṣṭha, Prameha, Viṣavikāra, Medovikāra

**DOSE** - 3-6 g

kvātha-10-20 ml

## VANDĀ (Leaf)

Vandā consists of the dried leaf of *Dendrophthoe falcata* (Linn. f.) Ettingsh. syn. *Loranthus falcatus* Linn. f. (Fam. Loranthaceae), an epiphyte, mostly on fruit trees, and distributed throughout India.

### SYNONYMS

Sanskrit	:	Vṛkṣādānī, Bandāka, Vṛkṣaruhā, Saṃharṣā
Assamese	:	--
Bengali	:	Maandaa
English	:	Mistletoe
Gujrati	:	Baando
Hindi	:	Bandaa
Kannada	:	Bandanike, Bandhulu
Kashmiri	:	--
Malayalam	:	Ittikanni, Itil
Marathi	:	Baandagul, Banda
Oriya	:	Vrudhongo
Punjabi	:	Pulluri
Tamil	:	Baadanikaa, Jiddu
Telugu	:	Jeevakamu

### DESCRIPTION

#### a) Macroscopic

Leaves petiolate, exstipulate, opposite, decussate, simple, ovate to oblanceolate, glabrous, soft and leathery when young, brittle when dry; margin entire; base decurrent; apex acute; slightly astringent; odour resembling those of tealeaves.

## b) Microscopic

Transverse section of the leaf shows a thick cuticle, upper and lower epidermis composed of squarish cells with convex periclinal outer walls; surface views of upper and lower nearly similar; stomata paracytic, present on both surfaces; mesophyll of lamina consisting of 2 to 4 layers inner to upper and lower epidermis made up of compactly arranged short rectangular cells and irregularly arranged parenchyma cells of middle layers but possessing a few intercellular spaces; occasional vascular strands passing through this middle portion; isolated sclereids about 50  $\mu$  thick containing prismatic crystals of about 12  $\mu$  present in parenchyma; midrib bulging prominently on both the surfaces and containing a group of 3 to 5 vascular bundles; xylem of vascular bundles oriented towards upper epidermis and consisting of tracheids, vessels and parenchyma; phloem present towards lower epidermis and consisting of thin walled cells; bundle sheath absent; each vascular bundle associated with patch of collenchymatous cells outside the phloem; tannin (ranging from yellow to brown in colour) abundant in parenchyma cells of midrib and lamina region, especially in the 2 or 3 subepidermal layers; stomatal index 9 to 13 on upper surface and 10 to 14 on lower surface.

**Powder** - The powder shows angular epidermal cells and groups of thin walled, rectangular, closely packed parenchyma cells many of which contain tannins.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcohol soluble extract on Silica gel 'G' plate (0.2 mm thick) using toluene : ethyl formate : formic acid (5:4:1) as mobile phase shows under U.V. (366 nm) spots at Rf. 0.06 (Brown); 0.39(Blue); 0.46 (Blue); 0.55 (Red); 0.81 (Pink). On spraying with anisaldehyde: sulphuric acid reagent and heating the plate for ten minutes at 110° C two spots appear at Rf 0.35(Light Green), 0.45 (Orange).

**CONSTITUENTS** - Leaves contain flavonoids such as Quercetin, quercetrin; Tannins comprising of gallic and chebulinic acid.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Tikta, Madhura

**Guṇa** : Laghu, Rūkṣa

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Pittahara, Kaphahara, Vātahara, Mūtravirecanīya, Śukrajanana, Vṛṣya, Rasāyana, Grāhī, Vraṇaropaṇa, Rakṣoghna, Śramahara, Netrya, Grahanāśana, Maṅgalakara, Garbhasthāpana

**IMPORTANT FORMULATIONS** - (No formulations)

**THERAPEUTIC USES** - Raktapitta, Vraṇa, Viṣaroga, Vandhyatva, Hikkā, Viṣamajvara, Bhagandara, Vātāśmarī, Mūtraroga

**DOSE** - 10 - 20 ml juice.

## VANDĀ (Stem)

Vandā consists of the dried stem of *Dendrophthoe falcata* (Linn. f.) Ettingsh. syn. *Loranthus falcatus* Linn. f. (Fam. Loranthaceae), an epiphyte, mostly on fruit trees, and distributed throughout India.

### SYNONYMS

Sanskrit	:	Bandāka, Saṃharṣā, Vṛkṣādānī, Vṛkṣaruḥā
Assamese	:	--
Bengali	:	Maandaa
English	:	Mistletoe
Gujrati	:	Baando
Hindi	:	Bandaa
Kannada	:	Bandhulu, Badanike
Kashmiri	:	--
Malayalam	:	Itil, Ittikkanni
Marathi	:	Baandagul, Banda
Oriya	:	Vrudhongo
Punjabi	:	--
Tamil	:	Pulluri
Telugu	:	Baadanikaa, Jiddu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Small twigs of aerial branches ranging from 2 mm to 2.5 cm in thickness; the bark of stem thin, dark brown and specked with lighter brown, uniformly distributed lenticles; the wood reddish-brown after removal of thin bark; stem slightly rough to touch; fracture irregular; fractured surface dark brown; no distinct taste or odour.

## b) Microscopic

A transverse section of stem reveals a circular outline with a thick cuticle, and epidermis made up of squarish or barrel shaped cells with convex outer periclinal walls and interrupted here and there by lenticular openings; cork made up of thin-walled, crushed rectangular cells; cortex consisting of many layers of tangentially elongated and rounded cells interspersed with sclereids upto 85  $\mu$  in size and in groups of 2 to 4; many cells of cortex, especially those of outer few layers contain tannins ranging in colour from yellow, orange to dark brown; groups of pericyclic fibres form a ring outside phloem; cambium present; xylem surrounding the central pith and composed of well developed vessels, fibre and parenchyma, 1 to 4 seriate medullary rays composed of radially elongated cells present; pith consists of thin walled, rounded or polygonal parenchymatous cells; small groups of sclereids, up to 85  $\mu$  each in size present in both pith and medullary rays; prismatic crystals present in association with sclereids and medullary ray cells.

**Powder** - Powder shows vessel elements with simple pitted thickenings, groups of sclereids containing prismatic crystals (size of crystal 30 to 35  $\mu$  long and 15 to 17  $\mu$  wide) and fragments of parenchyma cells containing tannins.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcohol soluble extract of the drug in chloroform as a mobile phase shows under UV (366 nm) spots Rf 0.13 (Grey); 0.24 (Green); 0.35 (Blue); 0.56 (Yellow); 0.76 (Grey); 0.85 (Orange Pink); 0.96 (Pink).

**CONSTITUENTS** - Young shoots contain nearly 10 per cent tannins and the stem contains  $\beta$ -amyrin-0-acetate, oleanolic acid its methyl ester acetate,  $\beta$ -sitosterol and stigmasterol.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Tikta, Madhura  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Pittahara, Kaphahara, Vātahara, Mūtravirecanīya, Śukrajanana, Vṛṣya, Rasāyana, Grāhī, Vraṇaropaṇa, Rakṣoghna, Śramahara, Netrya, Grahanāśana, Maṅgalakara, Garbhasthāpana

**IMPORTANT FORMULATIONS** - (No formulations)

**THERAPEUTIC USES** - Raktapitta, Vraṇa, Viṣaroga, Vandhyatva, Hikkā, Viṣamajvara, Bhagandara, Vātāśmarī, Mūtraroga

**DOSE** - 10 - 20 ml juice.

## VANDĀ (Aerial Root)

Vandā consists of the dried aerial root of *Dendrophthoe falcata* (Linn. f.) Ettingsh. syn. *Loranthus falcatus* Linn. f. (Fam. Loranthaceae), an epiphyte, mostly on fruit trees, and distributed throughout India.

### SYNONYMS

Sanskrit	:	Bandāka, Saṃharṣā, Vṛkṣādānī, Vṛkṣaruhā
Assamese	:	--
Bengali	:	Maandaa
English	:	Mistletoe
Gujrati	:	Baando
Hindi	:	Bandaa
Kannada	:	Badanike, Bandhulu
Kashmiri	:	--
Malayalam	:	Itil, Ittikkanni
Marathi	:	Baandagul, Banda
Oriya	:	Vrudhongo
Punjabi	:	--
Tamil	:	Pulluri
Telugu	:	Baadanikaa, Jiddu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Adventitious root greyish brown outside, yellowish to brown inside, slender, contorted and knotty in appearance, sending out haustoria into the host plant or, also into its own branches; rarely branched; fracture, irregular; odour and taste not distinct.

### **b) Microscopic**

A transverse section of adventitious root is circular in outline; cuticle and epidermis sloughed off; outermost zone consists of broken tissue of cork and cortex followed by cork cambium made of rectangular cells; cortex wide, many layered, made of thin walled rounded cells and sclereids upto 50  $\mu$  size, present singly or in groups of 2 to 4; many cells of cortex contain tannin; patches of pericyclic fibres surround the vascular ring; phloem composed of small thin walled cells present outside the xylem and separated from it by the vascular cambium; xylem interrupted by short, 1 or 2 seriate medullary rays composed of radially elongated cells; xylem composed of scattered vessels, parenchyma and fibres; pith wide, composed of rounded parenchymatous cells interspersed with thick walled fibres of about 5  $\mu$  in dia.

**Powder** - Powder shows tracheids and vessel members with simple pitted thickenings, broken fibres; stone cells with faint incomplete radial striations, upto 50  $\mu$  in size and containing prismatic crystals.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of the alcohol soluble extract of the drug on silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (80:20) as mobile phase shows under U.V. (at 366 nm) spots at Rf 0.35 (Blue); 0.58 (Blue); 0.90 (Blue).

**CONSTITUENTS** - Catechin and leucocynidin in the bark.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Vātahara, Mūtravirecanīya, Śukrajanana, Vṛṣya, Rasāyana, Grāhī, Vraṇaropaṇa, Śramahara, Netrya, Grahanāśana, Maṅgalakara, Garbhasthāpana

**IMPORTANT FORMULATIONS** - Mūtravirecanīya Kāṣāya Cūrṇa

**THERAPEUTIC USES** - Raktapitta, Vraṇa, Viṣaroga, Vandhyatva, Hikkā, Viṣamajvara, Bhagandara, Vātāśmarī, Mūtraroga

**DOSE** - 10 - 20 ml juice.

## VANDĀ (Flower)

Vandā consists of flowers of *Dendrophthoe falcata* (Linn.f.) Ettingsh. syn. *Loranthus falcatus* Linn. f. (Fam. Loranthaceae), a semi-parasite, mainly on fruit trees, and distributed throughout India.

### SYNONYMS

Sanskrit	:	Bandāka, Saṃharsā, Vṛkṣādānī, Vṛkṣaruhā
Assamese	:	--
Bengali	:	Maandaa
English	:	Mistletoe
Gujrati	:	Baando
Hindi	:	Bandaa
Kannada	:	Badanike, Bandhulu
Kashmiri	:	--
Malayalam	:	Itil, Ittikanni
Marathi	:	Baandagul, Banda
Oriya	:	Vrudhongo
Punjabi	:	--
Tamil	:	Pulluri
Telugu	:	Baadanikaa, Jiddu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Flowers actinomorphic, bisexual, regular, complete, coloured, apetalous, epigynous with cup or disc shaped receptacle, pentamerous; perianth-tepals 5, free and strap shaped towards the distal end and in the form of a sickle-shaped tube towards the basal end; surrounded at the base by a cup-shaped calyx; the perianth tube measures about 40 to 55

mm in length; it is narrow at the base and gradually widens towards the upper part; the perianth lobes become strongly reflexed at maturity. Inside the perianth tube are 5 cushion shaped nectarines; androecium stamens 5, epiphyllous, starting from two-thirds of length of perianth tube and continuing to the tip of perianth lobes, appressed to the style in young flowers; filaments orange coloured; anthers monothealous, dark, basifixed; gynoecium ovary 1, inferior, obscurely unilocular; style long, filamentous; stigma capitate; placentation basal, one ovule in each locule.

#### **b) Microscopic**

**Powder** - The powder shows characteristically triradiate, smooth walled, pollen grains upto 45  $\mu$  in size and having a depression in the centre at distal end of each arm, and endothelial tissue.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of the alcoholic extract on Silica gel 'G' plate (0.2 mm thick) using toluene : ethylformate : formic acid (5:4:1) as mobile phase shows under U.V. (at 366 nm) spots at Rf value 0.11, 0.16, 0.26 (Blue), 0.45 (Pink). On spraying with anisaldehyde : sulphuric acid reagent and on heating the plate for ten minutes at 110°C spots at Rf. 0.07 (Black); 0.12 (Green Black); 0.22 (Blue); 0.31 (Yellow); 0.40 (Yellow); 0.88 (Green) appear.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta

**Vipāka** : Kaṭu

**Karma** : Pittahara, Kaphahara, Vātahara, Mūtravirecanīya, Śukrajanana, Vṛṣya, Rasāyana, Grāhī, Vraṇaropana, Rakṣoghna, Śramahara, Netrya, Grahanāśana, Garbhasṭhāpana

**IMPORTANT FORMULATIONS** - (No formulations)

**THERAPEUTIC USES** - Raktapitta, Vraṇa, Viṣaroga, Vandhyatva, Hikkā, Viṣamajvara, Bhagandara, Vātāśmarī, Mūtraroga

**DOSE** - 10 - 20 ml juice

## VANDĀ (Fruit)

Vandā consists of the dried fruit of *Dendrophthoe falcata* (Linn. f.) Ettingsh. syn. *Loranthus falcatus* Linn. f. (Fam. Loranthaceae), an epiphyte, mostly on fruit trees, and distributed throughout India.

### SYNONYMS

Sanskrit	:	Bandāka, Saṃharṣā, Vṛkṣādānī, Vṛkṣaruhā
Assamese	:	--
Bengali	:	Maandaa
English	:	Mistletoe
Gujrati	:	Baando
Hindi	:	Bandaa
Kannada	:	-
Kashmiri	:	Ittikkanni, Itil
Malayalam	:	Baandagul, Banda
Marathi	:	Vrudhongo
Oriya	:	--
Punjabi	:	Pulluri
Tamil	:	Baadanikaa, Jiddu
Telugu	:	Jeevakamu

### DESCRIPTION

#### a) Macroscopic

The fruit is an ovate pseudo berry, upto 3 mm in thickness and 3 to 8 mm in length; greenish-yellow when mature and turning brown when dry; the top of the fruit is crowned by a persistent calyculus; the fruit contains an elongated, flask-shaped seed upto 5 mm long and 2 mm thick, rugose, brown, hard, and enclosed in a shiny, viscid film.

## b) Microscopic

T.S. of the pseudoberry shows the outer tissues of thalamus separated by a zone of viscid mass from the inner tissues of the seed. Fruit tissue consist of an outer epicarp formed of a single layer of epidermis composed of squarish or rounded, thickly cuticularized cells followed by 3 or 4 layers of thick walled, larged sized, squarish cells containing tannins; mesocarp consist of multiple layers of small relatively clear cells with interspersed groups of stone cells. Fruit wall delimited inside by multiple layers of large, rounded, thin walled parenchymatous cells containing yellow to dark brown tannins; the seed consists of an outer viscid zone delimited towards inside by a ring of tissues made of several layers of isodiametric cells mostly containing brown pigment in outer 2 or 3 layers and a ring of vascular bundles. Inner to this is a zone comprising of radially elongated, compactly arranged thin-walled cells rich in starch towards the center; centre of the seed occupied by a mass of uniform, isodiametric, parenchymatous embryonic cells.

**Powder** - Cellular debris and stone cells with circular striations 20 to 35  $\mu$  are seen, groups of cells containing tannins also present.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	17	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm thick) using toluene: ethylacetate: acetic acid (5:4.5:0.5), shows under U.V. (366nm) spots at Rf. 0.23 (Greyish Black), 0.57, 0.72 (Pink), 0.81 (Blue), 0.89 (Pink). On spraying with anisaldehyde-sulphuric acid reagent and on heating the plate for ten minutes at 110° C spots appear at Rf. 0.22, 0.37 (Blue), 0.52 (Purple), 0.57 (Greyish Black), 0.67, 0.72 (Dark Blue), 0.75 (Purple).

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Vātahara, Viṣaghna, Vṛṣya, Rasāyana, Grāhī, Vraṇaropaṇa, Rakṣoghna, Śramahara, Grahanāśana

## IMPORTANT FORMULATIONS - (No formulations)

**THERAPEUTIC USES** - Raktapitta, Vraṇa, Arśa, Vātavikāra, Aśmarī, Mūtraśarkarā, Mūtrakṛcchra, Mūtrāghāta, Mūtrarujā, Garbhasrāva, Kaṇṭharoga, Vātarakta, Śopharoga, Āmātisāra, Netraroga, Viṣamajvara, Ślīpada

**DOSE** - 10 - 20 ml

## VANYAJĪRAKA (Fruit)

Vanyajīraka consists of dried fruit of *Centratherum anthelminticum* (L.) Kuntze (Fam. Asteraceae), an annual, robust, erect herb, found throughout India upto 1850 m in Himalaya and Khasi hills and often cultivated.

### SYNONYMS

Sanskrit	:	Āraṇyajīrakaḥ, Bṛhatpālī, Somarājī, Vanajīrakaḥ
Assamese	:	--
Bengali	:	Somaraaj
English	:	Purple Flebane, Worm Seed Fleabane
Gujrati	:	Kaaleejeeree, Kadavijeeree
Hindi	:	Kaalijeeree, Karajiri, Soharaai
Kannada	:	Kaadujeerage, Kaarijirige
Kashmiri	:	--
Malayalam	:	Krimishatru, Kattujirakam
Marathi	:	Kadujire
Oriya	:	--
Punjabi	:	--
Tamil	:	Kaattuchirakam, Chittilai
Telugu	:	Adavijilakaroa, Garetikamma
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

The fruits are cypsela, indehiscent, 3 to 5 mm long and 1 to 2 mm in diameter; tapering towards base, pappus present over flattened upper end; surface exhibits about 20 longitudinal ridges, hairy, blackish-brown to black in colour; taste, bitter and odour indistinct.

### **b) Microscopic**

T.S. of fruit exhibits about 20 ridges and furrows; the epidermis is single layered, covered externally with thick cuticle; trichomes are of two types - covering and glandular; covering trichomes unicellular, elongated with tapering ends, present mostly on the ridges; glandular hairs, sessile with unicellular heads are seen in the furrows; rest of the pericarp consists of thin walled parenchymatous cells; vascular bundles are present below the ridges, followed by discontinuous and laterally extending arches of thick walled and lignified sclerenchymatous tissues; testa is single layered followed by thin walled parenchymatous cells of the cotyledon, most of them consisting of aleurone grains and a few exhibit oil globules.

**Powder** - The powder exhibits fragments of fibres, fibre sclereids, scalariform vascular elements, thin walled parenchymatous cells with aleurone grains and oil globules, covering as well as glandular trichomes thin walled radially elongated cells of pappus.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2.0 per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14 per cent, Appendix	2.2.7.

### **T.L.C.**

T.L.C. of petroleum ether extract on Silica Gel G 60 precoated plate (Merck) using Petroleum ether (60-80°C); Diethyl ether: Acetic acid (70:32:2), shows under UV (366 nm) one spot at Rf. 0.48 (light blue); on exposure to iodine vapours 4 spots appear at Rf. 0.48 (dark orange), 0.57, 0.68 and 0.84 (all faint orange); after spraying with 5% ethanolic sulphuric acid and heating the plate at 110°C for 30 minutes, 4 spots appear at Rf. 0.48 (black) 0.57, 0.68 and 0.84 (all faint brown).

**CONSTITUENTS** - Sterols, avenasterol and vernosterol, a bitter principle, essential oil, resins and fixed oil consisting of myristic, palmitic, stearic, oleic, linoleic and vernolic acids

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Jantunāśaka, Mūtrala, Dīpana, Stambhana, Netrya

**IMPORTANT FORMULATIONS** - Madhusnuhī Rasāyana

**THERAPEUTIC USES** - Śvāsa, Kāsa, Hikkā, Jvara, Kuṣṭha, Vraṇa, Kaṇḍū, Śvitakuṣṭha, Kṛmi, Śopha, Śūla, Gulma, Mūtrāghāta, Raktavikāra

**DOSE** - 1-3 g

## VIDĀRĪKANDA (Tuber)

Vidārīkanda is the dried tuber of *Pueraria tuberosa* DC. (Fam. Fabaceae), a large, perennial climber with tuberous roots, upto 60 cm long and 30 cm thick, even weighing upto 35 kg, from about 5 or 10 kg; they are distributed nearly throughout India.

### SYNONYMS

Sanskrit	:	Ikṣugandhā, Vidārī
Assamese	:	--
Bengali	:	Shimiya, Shimiabatraji, Bhui Kumdo
English	:	Indian Kudju
Gujrati	:	Khakharvel, Vidaree, Vidareekand
Hindi	:	VidareeKand, Bilaikand, Sural, Patal Kand
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Bendriya bel, Bindree, Vendrichavel
Oriya	:	--
Punjabi	:	Siali
Tamil	:	Nilpushni Kezhugu
Telugu	:	Nelagummudu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Dried cut pieces of tuber, 3 to 5 cm large, 2 to 4 cm broad and fibrous; outer surface where present, light brown in colour; outer surface, where epidermis is present, is light brown with transverse warts and ridges; cut surface creamy; fleshy, transverse small warts and ridges are found on the surface, texture smooth; sweet in taste, no particular smell (cut

pieces of the tubers of *Ipomoea digitata*, substitute of *P. tuberosa*, are cubical, smooth, light cream in colour and can easily be distinguished).

### b) Microscopic

T.S. of whole root tuber is slightly wavy in outline, epidermis not discernible; 3 to 4 layers of cork cells, followed by 5 to 7 layers of parenchymatous cells present; cork cambium-brown in colour and 2 or 3 cells thick, endodermis well developed; pericycle fibrous followed by 2 layers of stone cells filled with sandy crystals; phloem consist of sieve tubes, companion cells, patches of bast fibres and phloem parenchyma; xylem pentarch in young root, consist of vessels with scalariform cross perforation, tracheids, xylem fibres and parenchyma; medullary rays broad and parenchymatous. The medullary rays and phloem cells are filled with starch grains which are polygonal, 2 to 5  $\mu\text{m}$  in diameter, simple or two to many-compound, hilum usually indistinct, occasionally a central cleft, lamellae indistinct. In macerated preparation crystal fibres are multicellular, articulated, each cell carrying a crystal of calcium oxalate, some of the articulated fibres are swollen in the middle like a bulb pipette.

**Powder** - Greyish-brown, no characteristic odour, bitter in taste; shows parenchyma filled with starch, septate fibres in the form of crystals fibres as well as shaped bulb like pipette; vessels with simple and scalariform cross perforation plates, stone cells, and starch as described under microscopy; powder treated with 1N NaOH in methanol and nitro-cellulose in amyloacetate gives light green fluorescence under UV 254 nm.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Moisture content	Not more than	10	per cent, Appendix	2.2.9.
Total ash	Not more than	11	per cent, Appendix	2.2.3.
Acid insoluble ash	Not less than	1	per cent, Appendix	2.2.4.
Alcohol soluble extractive	Not less than	13	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.
Starch	Not less than	14	per cent, Appendix	2.2.13

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using toluene : ethyl acetate : methanol (80 : 20 : 0.5) shows under UV (366 nm) blue fluorescent zones at Rf. 0.19, 0.25, 0.34, 0.38. On spraying with anisaldehyde-sulphuric acid reagent and heating for ten minutes at 120°C, spots appear at Rf. 0.19 (green), 0.34 (Magenta), 0.45 (green), 0.48 (blue), 0.62 (blue), 0.67 (red) and 0.92 (dark pink).

**CONSTITUENTS** - Pterocarpan-tuberosin, pterocarpanone-hydroxytuberosone, two pterocarpenes-anhydrotuberosin and 3-O-methylanhydro-tuberosin, and a coumestan tuberostan. An isoflavone-puerarone and a coumestan-puerarostan.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Vātahara, Pittahara, Hr̥ḍya, Br̥ṃhaṇa, Vṛ̥ṣya, Mūtrala, Balya, Stanyada, Svarya, Vājīkaraṇa, Varṇya, Jīvanīya, Rasāyanī

**IMPORTANT FORMULATIONS** - Marma Guṭīkā, Nityānanda Rasa, Sārasvatāriṣṭa, Śatāvaryādi Ghṛta, Aśvagandhādyariṣṭa, Mahā Viṣagarbha Taila

**THERAPEUTIC USES** - Raktapitta, Śukrakṣaya, Raktadoṣa, Dāha, Kṣaya, Kāsa, Śūla, Mūtrakṛcchra, Visarpa, Viṣamajvara

**DOSE** - 3-6 g

## VIRALĀ (Stem Bark)

Viralā consists of dried stem bark of *Diospyros exsculpta* Buch. - Ham. syn. *D. tomentosa* Roxb. (Fam. Ebenaceae), a small or occasionally large tree found distributed in sub-Himalyan tract, Rajasthan, Madhya Pradesh, Bihar and Orissa.

### SYNONYMS

Sanskrit	:	Tindukaḥ, Tinduki
Assamese	:	--
Bengali	:	Kend, Gaab
English	:	Gaub Persimon, Indian Persimon
Gujrati	:	Timbaru
Hindi	:	Gaabh, Tendu, Kendu
Kannada	:	Holitupare, Kushaarta
Kashmiri	:	--
Malayalam	:	Panchchi, Pananchi, Panachcha
Marathi	:	Temburani
Oriya	:	--
Punjabi	:	Tendu
Tamil	:	Panichchai, Tumbika
Telugu	:	Tinduki, Tumikechettu
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Bark available in pieces of variable lengths, usually 1 to 1.5cm thick, light brown in colour, surface uneven with exfoliating rectangular scales, slightly curved, outer surface ash coloured, inner surface brownish, striate but smooth; fracture, granular; odour, characteristic, taste, sweet and astringent.

## b) Microscopic

T.S. shows a thick portion of rhytidome; cork consists of 5 or 6 layers of tangentially elongated rectangular, dorsoventrally compressed thin walled cells, a few strongly lignified and filled with reddish brown masses; cortex consists of 4 to 6 layers of thin walled parenchymatous cells, many containing prismatic calcium oxalate crystals, measuring 20 to 70  $\mu$  and starch grains about 6 to 10  $\mu$ ; tanniferous cells present; phloem traversed by uniseriate medullary rays; sieve tube associated with companion cells; phloem parenchyma consists of cells with thin, dark reddish brown walls many of the cells contain calcium oxalate crystals mostly prismatic type but a few clusters also observed; patches of fibres present with a fairly large lumen; sclereids occur in groups of 8 to 10, oval to elongate in shape, measuring 45 to 175  $\mu$  in length with thick striated walls, the lumen is very small often reduced to a line; pit canals present.

**Powder** -Ash colour, coarse; fragments of thick-walled cork cells with dense brown content; sclereids elongated and oval shaped showing pit canals with narrow lumen; calcium oxalate crystal in the form of prisms and clusters; a few yellowish tannin cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	2	per cent, Appendix	2.2.7.

## T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' (E . Merck grade) plate using Chloroform : Acetone (98 : 2) shows under UV (366 nm) two fluorescent zones at Rf. 0.88 (blue) and 0.93 (green). On spraying with Anisaldehyde - Sulphuric acid reagent and heating the plate for five minutes at 105°C six spots appear at Rf. 0.32 (pink), 0.49 (pink), 0.56 (grey), 0.71(dark pink), 0.88 (pink) and 0.93 (pink).

**CONSTITUENTS** - Triterpenoids (Lupeol, Betulin, Betulinic acid, Oleanolic acid) and Sterol.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Grāhī, Jihvājāḍyakara, Vraṇaropaṇa, Savarṇakara

**IMPORTANT FORMULATIONS** - Nyagrodhādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Udarda, Prameha, Raktapitta, Aruci, Atīśāra, Vibandha, Pittaroga, Karṇasrāva, Vraṇa, Agnidagdhā Vraṇa, Atidagdhā Vraṇa, Bhagna, Tṛṣṇā, Dāha, Yoniroga, Medoroga

**DOSE** - 5 - 10 g

## VIŚALĀ (Root)

Viśalā consists of dried root of *Trichosanthes bracteata* (Lam.) Voigt (Fam. Cucurbitaceae), a large perennial, upto 9 m in height, dioecious, branched, woody tendril climber, commonly growing in moist thickets from the Himalayas to the south, ascending upto an altitude of 2,500 m.

### SYNONYMS

Sanskrit	:	Mahākāla, Gavādanī
Assamese	:	--
Bengali	:	Maakaal
English	:	--
Gujrati	:	Raataan Indraayan
Hindi	:	Maakaal, Mahar Kaundala, Lal Indraayan, Mahakaal
Kannada	:	Avagudehannu
Kashmiri	:	--
Malayalam	:	Kaakkattonti
Marathi	:	Kaundal, Kavandal
Oriya	:	Mahaakaal
Punjabi	:	Kaehree, Aankorattai
Tamil	:	Korattai
Telugu	:	Erraa Chedupucca
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Well developed fibrous roots, pale yellow to creamish-brown, available in pieces, 4 to 15 cm long, 0.3 to 2 cm thick; cylindrical and slightly curved; deeply grooved

longitudinally; external surface, dusty, shrivelled, rough due to exfoliating cork, longitudinal fissures and root scars; fracture, fibrous; taste, bitter and astringent.

#### **b) Microscopic**

**Root-** Root shows multi-layered cork, outer layers exfoliating, inner of rectangular cells, cortex narrow with a row of sclereids externally and shows presence of patches of fibres; phloem, narrow of small polygonal cells; bulk of root composed of large rounded vessels arranged in radiating rows interspersed by dominant strands of multiseriate medullary rays filled completely with starch grains; pith absent.

**Powder-** Deep creamish-brown; abundant sclereids of various shapes, mostly in groups, isodiametric sclereids 20 to 30  $\mu$ , thick-walled with round lumen, strongly striated; fibres, singly and in groups; cork cells; well developed reticulately thickened and border-pitted vessels; starch grains, mostly simple.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

#### **T.L.C.**

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using chloroform : methanol (9:1) shows spots at Rf 0.16, 0.42, 0.63, 0.69, 0.77 and 0.83 (all purple) on spraying with vanillin-sulphuric acid reagent and heating the plate at 105°C for about ten minutes.

**CONSTITUENTS** - Saponins, trichosanthin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Prasūtikṛta, Vāmaka, Viṣaghna

**IMPORTANT FORMULATIONS** - Pāṇīya Kalyaṇaka Ghṛta, Viśālādi Cūrṇa

**THERAPEUTIC USES** - Jvara, Āmadoṣa, Prameha, Antarvṛddhi, Kuṣṭha, Stanapīḍā, Kāmalā, Ślīpada, Vṛddhi, Plīhodara, Śvāsa, Kāsa, Gulma, Gaṇḍāmaya, Granthi, Vraṇa, Mūḍhagarbha

**DOSE** - 1 -3 g

## VYĀGHRANAKHA (Fruit)

Vyāghranakha consists of mature fruit of *Capparis sepiaria* Linn. syn. *C. zeylanica* Linn. f. (Fam. Capparidaceae), a perennial climbing shrub with hooked stipular spines, distributed throughout India, in the plains.

### SYNONYMS

Sanskrit	:	Ahimsrā, Vyāghrāyudha
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	--
Hindi	:	Baghanai, Kanthari, Kareruaa
Kannada	:	Kathiramullu, Mulhukallari
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Ardanti, Vyaghranakh, Wag, Wagati
Oriya	:	--
Punjabi	:	--
Tamil	:	Atandai, Kattukathiri, Marandan, Thoratti
Telugu	:	Nalla uppi
Urdu	:	--

### DESCRIPTION

#### a) Macroscopic

Subglobose, many seeded berry; green when young, red brown when ripe, 3 to 4 cm in diameter, on a greatly thickened stalk; seeds are trigonal, 4 to 5 mm long, 3 to 4 mm wide, 2 to 3 mm thick with white thin covering; seed coat hard.

**b) Microscopic**

**Fruit** - Epicarp shows thick cuticle covering the single layered epidermal cells followed by thick walled parenchyma, filled with yellow contents, mesocarp composed of thick walled parenchyma, having groups of pitted sclereids at places along with some vascular strands, endocarp contains collapsed cells, abundant oil globules present.

**Seed** - T.S. shows testa having thick cuticle; with a single layered, laterally elongated, loosely packed, pigmented, epidermal cells, followed by 8 to 10 layers of compactly arranged circular pitted stone cells with very thick wall and narrow lumen; tegmen consists of collapsed cells; endosperm parenchyma filled with oil and aleurone grains, oil cells with yellowish oil at some places.

**Powder** - Reddish brown, sticky, shows sclereids, parenchymatous cells filled with oil and cells filled with aleurone grains.

**IDENTITY, PURITY AND STRENGTH**

Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	30	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	26	per cent, Appendix	2.2.7.
Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.

**T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' (0.2 mm thick ness) plate using toluene : methanol (6:3) shows nine bands at Rf. 0.12, 0.23, 0.32, 0.53, 0.56, 0.61, 0.64, 0.71, 0.86 (all brown), on spraying with 5% Ethanolic-sulphuric acid reagent and heating the plate for ten minutes at 105°C.

**CONSTITUENTS** - Thioglucoside glucocapparin, n-triacontane, á-amyrin and fixed oil.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Varṇya, Viṣaghna, Kaṇḍūghna

## **IMPORTANT FORMULATIONS - Balā Taila**

**THERAPEUTIC USES** - Viṣavikāra, Sarpaviṣa, Kaṇḍū, Piḍakā, Koṭha, Bhrama, Pravāhikā, Raktapradara, Kuṣṭha, Vraṇa, Jvara, Graharoga, Vātavikāra, Mukhadurgandha

**DOSE** - 2-6 g

# **THE AYURVEDIC PHARMACOPOEIA OF INDIA**

**PART – I  
VOLUME – VI**

**First Edition**



**GOVERNMENT OF INDIA  
MINISTRY OF HEALTH AND FAMILY WELFARE  
DEPARTMENT OF AYURVEDA, YOGA &  
NATUROPATHY, UNANI, SIDDHA AND HOMEOPATHY  
(AYUSH)  
NEWDELHI  
2008**

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Government of India

Department of Ayurveda, Yoga – Naturopathy, Unani, Siddha & Homeopathy  
(AYUSH)

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अनिता दास  
ANITA DAS



सचिव  
भारत सरकार  
स्वास्थ्य एवं परिवार कल्याण मंत्रालय  
आयुर्वेद, योग व प्राकृतिक चिकित्सा,  
यूनानी, सिद्ध एवं होम्योपैथी (आयुष) विभाग  
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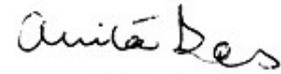
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### FOREWORD

Awareness on Quality Standards of Ayurvedic Medicine is increasing with the demand for these products. The growth and acceptability of these medicines depend upon the compliance with the quality standards and in process quality assurance in the manufacture of these medicines. Therefore, it is essential to have scientific standards for identity, purity and strength of these medicines. Government of India appreciated the need for developing Pharmacopoeial Standards of Ayurveda, Siddha & Unani medicines and established the Pharmacopoeial Laboratory of Indian Medicines (PLIM) at Ghaziabad in the year 1970 to undertake pharmacopoeial work on Ayurvedic, Siddha & Unani medicines. The scientific work of PLIM is guided and monitored by the Ayurvedic Pharmacopoeia Committee (APC). The APC comprises of experts in Ayurveda, Pharmacognosy, Phyto-Chemistry, Pharmaceuticals Sciences and Ayurvedic Pharmacy who constantly scrutinize the scientific data generated by PLIM and other Laboratories on Pharmacopoeial work. Quality standardization of natural products is a complex task, therefore, 20 other laboratories of the Council of Scientific & Industrial Research (CSIR), Central Council for Research in Ayurveda & Siddha (CCRAS) and other eminent Laboratories & Universities have been associated with the work of development of the Pharmacopoeial Standards under the APC Scheme of the Department of AYUSH. The scientific work of various laboratories is regularly monitored by subject experts of the Ayurvedic Pharmacopoeia Committee.

This Sixth volume of the Ayurvedic Pharmacopoeia of India containing 101 monographs of single drugs is a result of hard work of experts of Pharmacopoeia Committee, scientists working in PLIM, CCRAS and other laboratories associated with the APC Scheme. I place on record my appreciation for the dedication and hard work put by the officers of the Department of AYUSH, PLIM, CCRAS and experts associated

with the APC in the publication of this Volume. I hope that the Drug Testing Laboratories, in-house Quality Control Labs of Manufacturing units, teaching and R&D institutions will be highly benefited with this publication and their suggestions and feedback will be welcome for updation of APC Volumes.



(Anita Das)

New Delhi,

23<sup>rd</sup> June 2008.

## PREFACE

The first and second part of the Ayurvedic Formulary of India comprising of 444 and 191 formulations respectively cover more than 351 single drugs of plant origin. This is part of nearly 500 priority single drugs of plant origin to come with in the ambit of the Ayurvedic Pharmacopoeia of India. The Ayurvedic Pharmacopoeia of India, Part-I, Vol-I, Vol-II, Vol III, Vol IV and V comprises 80, 78, 100, 68 and 72 monographs of Ayurvedic single drugs of plant origin which go into one or more formulations included in the Ayurvedic Formulary of India, Part-I and Part-II. As a continuing activity monographs on 96 single drugs of plant origin and four monographs each on Guda (Jaggery), Goghrtā (Clarified Cow's Butter), Jala (Potable water), Madhu (Honey) and Śarkarā (Sugar) used as Vehicle or adjuvant, making compilation of Vol VI of the Ayurvedic Pharmacopoeia of India Part-I comprising of these 101 monographs. In compiling the monograph, each monograph bears the title of the drug in Sanskrit as given in Ayurvedic Formulary of India. This is followed by definition of the drug giving botanical identity by using scientific binomial nomenclature with authority and very brief information about its source, occurrence, distribution and precautions to be taken during collection, if any. List of synonyms in Sanskrit and also in other Indian regional languages. The monograph further records macroscopic and microscopic description of the drug highlighting diagnostic features for identification and authentication even if the drug is in powdered state. The monograph further gives under Identity, Purity and Strength, certain physico chemical parameters such as limits of foreign matter, moisture content, total ash, acid insoluble ash, alcohol soluble extractive, water soluble extractive, volatile content (if any) followed by thin layer chromatographic fingerprint profile. Wherever feasible, an Assay of active/marker chemical constituent or a group of chemical constituents such as total alkaloids or volatile oil etc have been given. There is always range of variations in data on chemical constituents and certain physico chemical parameters due to geographical, climatic and ontogenetic variability. Therefore, variations in results of such data pose difficulty in fixing narrow range. The data has been given on the basis of average results of 3 samples from different laboratories. Under the constituents major chemical constituents as reported in the literature have been given.

Under each monograph, classical attributes of each drug according to the doctrine of Rasa, Guna, Vīrya, Vipāka and Karma have been kept intact. These are considered a

reasonable basis and convenient reference point for a clinical classification. Such parameters are not possible to measures by modern scientific methods thus not mandatory.

The legal notices and general notices have been provided for pharmaceutical and regulatory purposes. The Appendices include details of the apparatus, reagents, chemicals, solution tests, methods of preparation of samples for microscopic or chromatographic examination.

The committee hopes that the publication of Ayurvedic Pharmacopoeia of India, Part-I Vol-VI containing 101 monographs would add to the requirements under the Drugs and Cosmetic Act. The regular monitoring of the manufactured and marketed Ayurvedic drugs, on the basis of the standards prescribed here in would bear evidence of the usefulness of these volumes and help ensure their quality and status revision for the future.

The Committee urges the Government of India to recommend the adoption of these monographs for the purposes of identity, purity and strength of drugs for use in their Government, Semi-Government and Government aided institutions and voluntary public organizations. The Ayurvedic Pharmacopoeia of India, Part-I, Vol. VI, 2008 would be added to Rule 168 of the Drugs and Cosmetics Act and be notified by Government as standards to be complied with by the manufacturers for sale or distribution of Ayurvedic drugs. Ayurvedic Pharmacopoeia of India, Part-I, Vol. I, II, III, IV and V are already included in the First Schedule of Drugs & Cosmetics act 1940.

**Prof. S.S.Handa**  
**Chairman**

**Dr. S.K.Sharma**  
**Vice-Chairman**

**Dr. G.S.Lavekar**  
**Member Secretary**

## ACKNOWLEDGMENT

The Ayurvedic Pharmacopoeial committee duly acknowledges the contributions made by the staff of the participating institutions associate with the APC project work for developing quality standards of single drugs of plant origin.

The committee expresses gratitudes of the Secretary, Department of AYUSH. Ms. Anita Das and Shri Shiv Basant for providing constant support for completion of this work and its further continuation and also sincerely thanks to Dr. M.M. Padhi, Deputy Director [Tech.]; Shri. Vasantha Kumar, Asst. Director [Chem.] Dr. Pramila Pant, Research Officer [Chem.], Dr. Bishnupriya Dhar, Research Officer [Phar.], Dr. M.N. Rangne, Dr. Chhote Lal, Dr. AKS Bhadoria and Dr. Nikhil Jirankalgikar S.R.F. (Ayu.), Dr. Rajesh Singh S.R.F. [Ayu.], Dr. Sandhya Rani S.R.F. [Ayu.], Mr. Chinmay Rath S.R.F. [Bot.] and other associated officers of PLIM viz., Dr. Rajeev Kr. Sharma, Senior Scientific Officer (Pharmacognosy), Shri N.S. Mahara, R.O. (Phg.), Dr. Jai Prakash, R.O. (Chem.), Shri V. C. Srivastava, Sr. Research Assistant (Chem.), Shri B.B. Prasad, R.A. (Botany), Shri S.K. Gaur, R.A. (Chem.), Shri C. Arunachalam, R.A. (Botany), Shri R.K. Pawar, R.A. (Chem.), Shri Rajendra Singh, Lab. Asstt. (Chem.) and Shri Sanjeev Gupta, Lab. Asstt. (Botany) for their constant efforts in bringing out this volume. Thanks to Mr. Ashish, Ms. Meenakshi, Ms. Deepti, D.E.O., who took pains in typing and arranging all the technical data into a final shape.

## LEGAL NOTICES

In India there are laws dealing with drugs that are the subject of monographs which follow. These monographs should be read subject to the restrictions imposed by these laws wherever they are applicable.

It is expedient that enquiry be made in each case in order to ensure that the provisions of the law are being complied with.

In general, the Drugs & Cosmetics Act, 1940 (subsequently amended in 1964 and 1982), the Dangerous Drugs Act, 1930 and the Poisons Act, 1919 and the rules framed there under should be consulted.

Under the Drugs & Cosmetics Act, the Ayurvedic Pharmacopoeia of India (A.P.I.), Part-I, Vol. VI, is the book of standards for single drugs included therein and the standards prescribed in the Ayurvedic Pharmacopoeia of India, Part-I, Vol. VI, would be official. If considered necessary these standards can be amended and the Chairman of the Ayurvedic Pharmacopoeia Committee authorized to issue such amendments. Whenever such amendments are issued, the Ayurvedic Pharmacopoeia of India, Part-I, Vol. VI, would be deemed to have been amended accordingly

## GENERAL NOTICES

**Title** - The title of the book is "Ayurvedic Pharmacopoeia of India". Wherever the abbreviation A.P.I. is used, it may be presumed to stand for the same and the supplements thereto.

**Name of the Drugs** - The name given on the top of each monograph of the drug is in Sanskrit as mentioned in the Ayurvedic classics and/or in the Ayurvedic Formulary of India, Part-I and Part-II will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

**Introductory Para** - Each monograph begins with an introductory paragraph indicating the part, scientific name of the drug in Latin with short description about its habit, distribution and method of collection, if any.

**Synonyms** - Synonyms of each drug appearing in each monograph in Sanskrit, English, Hindi, Urdu and other Indian regional languages have been mentioned as found in the classical texts, Ayurvedic Formulary of India, Part-I and Part-II as procured from the experts, scholars of Ayurveda and officials in the field from different states.

**Italics** - Italic type has been used for scientific name of the drug appearing in the introductory paragraph of each monograph as also for chemicals and reagents, substances or processes described in Appendix.

**Odour and Taste** - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description, as large numbers of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour.

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case if poisonous drugs, indicated in monograph.

**Mesh Number** - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

**Weights and Measures** - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gramme (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube, which delivers in 20 drops 1 gram of distilled water at 15°C.

Metric measures are required by the Pharmacopoeia to be graduated at 20°C and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

**Identity, Purity and Strength** - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects, pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extractive, water-soluble extractive, ether-soluble extractive, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method, which he uses, will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

**Standards** - For statutory purpose, statements appearing in the API, Part-I, Vol. VI, under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

**Thin Layer Chromatography (T.L.C.)** - Under this head, wherever given, the number of spots and R<sub>f</sub> values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

**Quantities to be Weighed for Assays and Tests** - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

**Constant Weight** - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

**Constituents** - Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

**Percentage of Solutions** - In defining standards, the expression per cent (%), is used, according to circumstances, with one of the four meanings given below.

Per cent w/w (percentage weight in weight) expresses the number of grammes of active substance, in 100 grammes of product.

Per cent w/v (Percentage weight in volume) expresses the number of grammes of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent v/w (percentage volume in weight) expresses the number of millilitres of active substance in 100 grammes of product.

**Percentage of alcohol** - All statements of percentage of alcohol ( $C_2H_5OH$ ) refer to percentage by volume at 15.56 °C.

**Temperature** - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

**Solutions** - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

**Reagents and Solutions** - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

**Solubility** - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities, which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that 1 gramme of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

<b><i>Descriptive terms</i></b>	<b><i>Relative quantities of solvent</i></b>
Very soluble	Less than 1 part.
Freely soluble	From 1 to 10 parts.
Soluble	From 10 to 30 parts.
Sparingly soluble	From 30 to 100 parts.
Slightly soluble	From 100 to 1000 parts.
Very slightly soluble	From 1000 to 10,000 parts.
Practically insoluble	More than 10,000 parts.

**Therapeutic Uses and Important Formulations** -Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognized Ayurvedic classics and in the Ayurvedic Formulary of India, Part -I and Part-II.

**Doses** -The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in Ayurvedic texts. A conversion table is appended giving classical weights of Ayurvedic System of Medicine with their metric equivalents. Doses mentioned in the Ayurvedic Pharmacopoeia of India (A.P.I.) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

## INTRODUCTION

The Ayurvedic system of medicine has been prevalent in India since the Vedic period, and still remains the mainstay of medical relief to over 60 per cent of the population of the nation. In earlier times the practitioners of Ayurveda (Vaidya) were themselves collecting herbs and other ingredients and preparing medicines. For the purpose of acquiring raw materials Vaidyas now depend on commercial organizations trading in crude herbal drugs. Likewise, with passage of time a number of Ayurvedic Pharmaceutical units have come up for the manufacture of Ayurvedic drugs and formulations on commercial scale.

Under the circumstances and responding to opinions of the scientific community after independence, the Govt. of India began a series of measures to introduce a quality control system, from 1964 onwards similar to that existing already under the Drugs and Cosmetics Act, 1940, for western medicine. The Government of India introduced an amendment in 1964 to the Drug and Cosmetics Act 1940, to control to a limited measure the Ayurvedic, Siddha and Unani drugs.

The Act was accordingly amended in 1964, to ensure only a limited control over the production and sale of Ayurvedic medicines namely:-

1. The manufacture should be carried out under prescribed hygienic conditions, under the supervision of a person having prescribed qualifications;
2. The raw materials used in the preparation of drugs should be genuine and properly identified; and
3. The formula or the true list of all the ingredients contained in the drugs should be displayed on the label of every container.

To start with, development of standards for the identity, purity and strength of single drugs and those of formulations at a later stage, assumed importance for the effective enforcement of the provision of the Act. If the raw materials to be used in a medicine and stage-by-stage processes of manufacturers are standardised, the final product namely, the compound formulation could be expected to conform to uniform standards. The requirement that the list of ingredients be displayed on the label will enable analysts to verify label claims. It will also ensure that the manufacture do not make false claim. Arrangements to evolve and lay down physical, chemical and biological standards, wherever even necessary, to identify the drugs and ascertain their quality and to detect adulterations are an urgent necessity of the profession. Setting up of Drug Standardisation Units, Research Centres, Drug Testing Institutes and Central Drug Laboratories for Ayurvedic Medicines both at national and regional level for this purpose are therefore, essential. The several Committees appointed by the Government of India to assess and evaluate the status and practice of Ayurvedic Medicine have stressed the importance of preparing an Ayurvedic Pharmacopoeia, which is precisely a book of standards.

Having regard to all these considerations, the Central Council of Ayurvedic Research recommended the constitution of Ayurvedic Pharmacopoeia Committee consisting of experts

on Ayurveda and other sciences. The Government of India accepted the recommendations of the Central Council of Ayurvedic Research and constituted the First Ayurvedic Pharmacopoeia Committee, vide their letter No. 14-8/62-ISM, dated the 20th September, 1962 for a period of three years with effect from the date of its first meeting under the Chairmanship of Col. Sir R.N. Chopra with the following member :-

1. Col. Sir Ram Nath Chopra, Drugs Research Laboratory, Srinagar  
*Chairman*
2. Vaidya B.V. Gokhale, 29/14-15, Erandavane, Deccan Gymkhana, Poona-4 *Member*
3. Vaidya D.A. Kulkarni, Principal, Post Graduate, Training Centre in  
Ayurveda, Jamnagar *Member*
4. Kaviraj B.N. Sircar, 779-780, Nicholson Road, Kashmere Gate, Delhi-6 *Member*
5. Shri A.N. Namjoshi, Navyug Mansion, 19-A, Sleater Road, Bombay-7 *Member*
6. Dr.B.B.Gaitonde, Profossor of Pharmacology, Grant Medical College,  
Bombay *Member*
7. Dr. C.G. Pendse, Director, Indian Council of Medical Research, New Delhi *Member*
8. Dr. G.K. Karandikar, Dean, Medical College, Aurangabad *Member*
9. Dr. G.S. Pande, Honorary Director, Indian Drug Research Association,  
955-Sadashiv Peth, Lakshmi Road, Poona-2 *Member*
10. Dr. M.V. Venkataraghava, Chellakoti, Nungabakkum, Madras-34 *Member*
11. Ayurvedachara Kaladi K. Parameswaran Pillai, Laksmivilasam  
Vaidyasala, Vanchiyur, Trivandrum *Member*
12. Dr. V. Narayanaswamy, 70, Tana Street, Vepeiy, Madras-7 *Member*
13. Vaidya P.V.Dhamankar Shastri, Pardeshi Lane, Panvel, District Kolaba,  
Bombay *Member*
14. S.K. Borkar, Drug Controller (India), Directorate General of Health Services,  
Government of India, New Delhi *Member*
15. Shri Bapalal G.Vaidya, Principal, O.H. Nazar Ayurveda Mahavidyalaya,  
Surat *Member*

16. Kumari Savita Satakopan, Drugs Control Laboratory, Near Polytechnic,  
National Highway 8, Baroda *Member*
17. Vaidya Vasudev M. Dwivedi, Director of Ayurveda,  
Government of Gujrat, Ahmedabad *Member*
18. Shri P.V. Bhatt, M.Sc., Chemist, The Ayurvedic Rasashala,  
Deccan Gymkhana, Poona. *Member*
19. Vaidya Ram Sushil Singh, Assistant Director of Ayurveda,  
Director of Medical Services (Ayurveda), Govt. of U.P. *Member*
20. Dr.Y. Kondal Rao, Secretary, Indian Medical Practitioner's  
Cooperative Pharmacy & Stores Limited, Adyar, Madras-20 *Member*
21. Dr. V. Srinivasan, M.Sc., M.B.B.S., Ph.D., Director, Sarabhai  
Chemicals Research Institute, Shahibag, Ahmedabad-4 *Member*
22. Dr. C. Dwarakanath, Adviser in Indian System of Medicine,  
Ministry of Health, New Delhi *Member Secretary*

The Committee was assigned the following functions :-

4. To prepare an official Formulary in two parts :-
  - (a) Single drugs, of whose identity and therapeutic value there is no doubt; and
  - (b) Compound preparations, which are frequently used in Ayurvedic practice throughout the country.
5. To provide standards for drug and medicines of therapeutic usefulness or pharmaceutical necessity commonly used in Ayurvedic practice.
6. To lay down tests for identity, quality and purity.
7. To ensure as far as possible uniformity, physical properties and active constituents; and
8. To provide all other information regarding the distinguishing characteristics, methods of preparation, dosage, method of administration with various anupanas or vehicles and their toxicity.

As a first step in this direction the Ayurvedic Pharmacopoeia Committee started preparing the official Formulary of Ayurveda in two parts as mentioned under the assigned functions of the Committee. Since the work of preparation of Ayurvedic Formulary could not be completed after the expiry of first three years, the Government of India extended the term of the Committee by another three years vide their notification No. F. 20-1/66-RISM, dated 14th January, 1966 and a gain for a further period of three years vide their notification No. F. 1-1/69-APC, dated 9th January, 1969.

During the years that followed, Ayurvedic Formulary, Part I and II and Ayurvedic Pharmacopoeia of India, Part - I, Volume I - V were published, the former containing the compound formulations from classical Ayurvedic texts prescribed in Schedule - I to the Drug and Cosmetics Act, and the later, laying down standards for single drugs of plant origin. Amendment to the provisions introduced in 1982 further strengthen the ASU system by defining misbranded, adulterated and spurious drugs in the ASU system.

Subsequently under the 10<sup>th</sup> Five Year Plan a project was initiated by the Department to develop Method of Preparation, Standard Operative Procedures, Pharmacopoeial Standards and Shelf Life of Compound formulations of Ayurveda appearing in Ayurvedic Formulary of India, Parts I & II.

The work of the Ayurvedic Pharmacopoeia Committee was transferred along with some technical staff to Central Council for Research in Ayurveda and Siddha, New Delhi as a secretariat for APC vide letter no. X-19011/6/94-APC (AYUSH), dated 29<sup>th</sup> March, 2006.

Prof. A.N. Namjoshi (1972, 1981, 1988 and 1994) and Vaidya I. Sanjeeva Rao (1998) and Dr. P.D. Sethi (2001) were Chairmen of reconstituted Ayurvedic Pharmacopoeia Committee during the specified periods.

The present Ayurvedic Pharmacopoeia Committee (APC) was reconstituted under the Deptt. of AYUSH vide letter No.X-19011/6/94-APC (AYUSH) dated 9<sup>st</sup> March, 2006 consisting of following members.

Ms. Savita Satakopan, M.Sc.

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2006)

Chairperson (9<sup>th</sup> May 2005 to 22<sup>nd</sup> June

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Chairman (23<sup>rd</sup> June, 2006 to onwards)

Dr. S.K. Sharma, M.D. (Ayu.), Ph.D.

Advisor (Ayurveda),

Department of AYUSH,

Red Cross Society Building, New Delhi - 110 001. Vice-Chairman

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Managing Director,  
Indian Medicines Pharmaceutical Corporation Ltd.,  
Mohan, Via - Ram Nagar,  
Distt.- Almora, Uttranchal. Member (Ex-officio)

Drugs Controller General (India),  
Ministry of Health & Family Welfare,  
Nirman Bhawan, New Delhi - 110 011. Member (Ex-officio)

## NON-OFFICIAL MEMBERS

### Phytochemistry & Chemistry Sub-Committee

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Former Professor of Pharmacology  
& Deputy Director of Medical Education, Chennai.  
Member

### **Formulary Sub-Committee**

#### **(Rasa Shastra / Bhaishajya Kalpana - Ayurvedic Pharmacy)**

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Prof. Siddhinandan Mishra, G.B.M.S.; Ph.D.  
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Prof. Ved Vrat Sharma, H.P.A.  
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(Single Drugs of Plants, Minerals, Metals, Animal origin)**

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## CO-OPTED MEMBERS

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Project Investigator,  
Center of Psychosomatic & Biofeedback Medicine,  
Faculty of Ayurveda,  
Institute of Medical Sciences,  
Banaras Hindu University,  
Varanasi - 221 005.

1. The term of the Committee shall be for a period of three years from the date of its first meeting and the members shall hold office for that period.
2. The Chairman of the APC shall have the powers to form sub-committees whenever required and to co-opt experts from outside for such sub-committees.
3. The Committee shall have the power to frame procedures of functioning.
4. The functions of the Committee shall be as follows:
  - (i) To prepare Ayurvedic Pharmacopoeia of India of single and compound drugs.
  - (ii) To prescribe the working standards for compound Ayurvedic formulations including tests for identity, purity, strength and quality so as to ensure uniformity of the finished formulations.
  - (iii) Keeping in view the time constraint, to identify such methods, procedures and plan of work as would enable to publish the formulary and standards of all commonly used drugs to be brought out in a phased manner.
  - (iv) To prepare remaining parts of the official formulary of compound preparations from the classical texts including standardized composition of reputed institution.
  - (v) To develop and standardize methods of preparations, dosage form, toxicity profile etc.
  - (vi) To develop quality standards, safety, efficacy profile of intermediates likes extracts of Ayurvedic raw drugs.
  - (vii) To develop the quality standards, safety, efficacy profile of different parts of the plants; as well as to include new plants as Ayurvedic drugs.

- (viii) Any other matter relating to the quality standards, shelf life, identification, new formulations etc.
5. The following are the targets focus of the Committee:
- (i) To evolve standards of single drugs mentioned in the Ayurvedic Formularies of India.
- (ii) To evolve standards for compound formulations mentioned in the Ayurvedic Formularies of India & other Ayurvedic formulations of National Priority.
- (iii) To prepare drafts SOP of Ayurvedic Formularies of India from the classical texts and other authentic sources.

### CONTRIBUTING LABORATORIES & INSTITUTIONS

1. B.V. Patel Pharmaceutical Education & Research Development Centre, Ahmedabad.  
**(Dr. (Mrs). M.Rajani)**
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**(Dr. (Ms.) A. Saraswathy)**
3. Central Council for Research in Ayurveda and Siddha (CCRAS), New Delhi  
**(Dr. V.K. Lal)**
4. Central Research Institute of Unani Medicine, Hyderabad  
**(Dr. Sheikh Imam)**
5. Govt. Drug Testing Laboratory, Joginder Nagar  
**(Dr. Arjun Singh Kharwal)**
6. IPGTRA Gujarat Ayurveda University, Jamnagar  
**(Dr. Subrata De)**
7. National Botanical Research Institute (CSIR), Lucknow.  
**(Dr. (Mrs) Shanta Mehrotra, Dr. A.K.S. Rawat, Adarsh Kumar Agnihotri, Miss.Vartika Rai, Miss. Manisha Agarwal and Madan Mohan Pandey)**
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**(Dr. D.R. Lohar, Dr. Rajeev Kr. Sharma, Ravindra Singh and C. Arunachalam)**

10. Tropical Botanic Garden and Research Institute (TBGRI), Thiruvananthapuram.  
**(Dr. S. Rajasekharan, Dr. V. George, Dr. Mathav Dass, M. Navas, J. Ushakumari and S.R. Rajani Kurup)**
11. University Institute of Pharmaceutical Sciences, Punjab University, Chandigarh.  
**(Prof. Karan Vasisht)**

## ABBREVIATIONS OF TECHNICAL TERMS

$\mu$	.	Micron (0.001 mm)
cm.	.	Centimeter
dia.	.	Diameter
Fam.	.	Family
Ft.	.	Feet
g.	.	Gram
hr.	.	Hour
Kg.	.	Kilogram
l	.	Liter
m.	.	Meter
mg.	.	Milligram
min.	.	Minute
ml.	.	Millilitre
mm.	.	Millimeter
PS.	.	Primary Standards
1 N.	.	Normal solution
0.1 N	.	Decinormal solution
0.5 N	.	Half-normal solution
1 M.	-	Molar solution

## ABBREVIATIONS USED FOR LANGUAGES

Assam.	.	Assamese
Beng.	.	Bengali
Eng.	.	English
Guj.	.	Gujrati
Kan.	.	Kannada
Kash.	.	Kashmiri
Mal.	.	Malayalam
Mar.	.	Marathi
Ori.	.	Oriya
Puj.	.	Punjabi
Sansk.	.	Sanskrit
Tam.	.	Tamil
Tel.	.	Telugu

## ABBREVIATIONS FOR PARTS OF PLANTS

Bark	Bk.
Dried Fruit	Drd.Frt
Dried Rhizome	Drd.Rz.
Exudate	Exd.
Flower	Fl.
Flower Bud	Fl.Bud
Fresh Fruit	Fr.Frt.
Fruit	Frt.
Fruit Rind	Fr. Rind
Fruit Pulp	Frt.Pulp
Fresh Rhizome	Fr.Rz.
Kernel	Ker.
Leaf	Lf.

Root Bark	Rt.Bk.
Root	Rt.
Rhizome	Rz.
Seed	Sd.
Stem Bark	St.Bk.
Stem	St.
Stolon	Stl.
Tuberous Root.	Tub.Rt.
Unripe Fruit	Unripe Frt.
Whole Plant	Wh.Pl.

### INDO-ROMANIC EQUIVALENTS OF DEVANĀGARĪ ALPHABETS

अ	-	a	ड	-	ḍa
आ	-	ā	ढ	-	ḍha
इ	-	i	ण	-	ṇa
ई	-	ī	त	-	ta
उ	-	u	थ	-	tha
ऊ	-	ū	द	-	da
ऋ	-	r̄	ध	-	dha
ए	-	e	न	-	na
ऐ	-	ai	प	-	pa
ओ	-	o	फ	-	pha
औ	-	au	ब	-	ba
·	-	m̄	भ	-	bha
:	-	ḥ	म	-	ma
क	-	ka	य	-	ya
ख	-	kha	र	-	ra
ग	-	ga	ल	-	la
घ	-	gha	व	-	va
ङ	-	ṅa	श	-	śa
च	-	ca	ष	-	ṣa
छ	-	cha	स	-	sa
ज	-	ja	ह	-	ha
झ	-	jha	क्ष	-	kṣa
ञ	-	ña	त्र	-	tra
ट	-	ṭa	ज्ञ	-	jña
ठ	-	ṭha			

## **ĀDĀRĪ (Leaf)**

Ādārī consists of dried tender leaves of *Acacia pennata* (L.) Willd. Syn. *Mimosa pennata* L. (Fam. Mimosaceae), a large thorny climbing shrub distributed throughout India.

**SYNONYMS :** Khadiravallī, Āri

### **REGIONAL LANGUAGE NAMES**

Bengali	:	Kuchai
Gujrati	:	Khervelya
Hindi	:	Biswal, Latakhadira, Aazi Khair
Kannada	:	Siguri
Marathi	:	Aarai velyakhera
Oriya	:	Potadontari
Tamil	:	Iya kozhundu
Telugu	:	Karusakaya

### **DESCRIPTION**

#### **a) Macroscopic**

Bulk colour yellowish green or green; leaves bipinnately compound; petiole 2 cm long, with a plate shaped gland near the middle or the base; rachis grooved, obscurely prickled, with glands opposite to two uppermost pairs of pinnae; leaflets 4 to 8 mm long and 1 mm broad, linear to oblong, tip acute, base truncate, glabrous, margin ciliate, veins obscure, midrib slightly prominent and very close to the distal margin; no odour or taste.

#### **b) Microscopic**

**Rachis** -Epidermis a single layer of rectangular cells; cortex of 5 to 8 layers of angular parenchyma, followed by a ring of sclerenchyma with 3 to 4 layers of cells, continuous except on the abaxial side, where a larger patch of sclerenchyma is found; four

vascular bundles present around a small pith; xylem vessels angular; pith cells parenchymatous with starch grains having a central hilum.

**Leaflet** -Dorsiventral; in surface view, epidermal cells slightly sinuous and thin walled, cuticle present; upper epidermis a single layer of polygonal cells; palisade tissue 2 or 3 layers; spongy mesophyll consists of irregular polyhedral cells with interspaces; midrib shows a slight projection; vascular bundle almost circular in outline and encircled with a sclerenchymatous sheath; in between vascular bundle and lower epidermis, is a patch of 2 or 3 layers of parenchyma.

**Powder** -Greyish to yellowish green, polygonal cells of epidermis with paracytic stomata; sclerenchymatous fibres of about 20  $\mu$  width; starch grains of 18 to 21  $\mu$  across with a central hilum; pitted, scalariform and spiral vessels.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Sulphated ash	Not more than	11 per cent,	Appendix 2.2.6
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	8 per cent,	Appendix 2.2.7
Water- soluble extractive	Not less than	18 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *n-hexane: ethyl acetate: methanol* (2:7:1) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.07 (light pink), 0.22 (yellow), 0.26 (light violet), 0.33 (orange), 0.43 (light pink), 0.53 (light pink), 0.62 (yellow), 0.75 (light violet), 0.87 (pale yellow), 0.88 (grey), 0.91 (orange) and 0.95 (pink).

**CONSTITUENTS** - Octadecadienoic, octadecanoic, palmitic and pentadecanoic acids; lupeol,  $\alpha$ -spinasterol,  $\beta$ -sitosterol and tannins

**PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Kaṭu, Tikta  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Kāśahara, Pittaśāmaka

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Jvara (fever), Raktadoṣa (disorder of blood), Agnimāndya (digestive impairment)

**DOSE** - Cūrṇa (Powder): 3 to 6 g

## **ĀMRAGANDHI-GUGGULU (Leaf)**

Āmrāgandhi-guggulu consists of leaves of *Balsamodendron caudata* Mauch. Syn. *Commiphora caudata* Engl. *Protium caudatum* W. & A. (Fam. Burseraceae), a handsome deciduous, armed, small tree with thick trunk and papery bark occurring in dry forests in the region of the Eastern Ghats, mostly in plains.

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Devadhup
Kannada	:	Kundamaavu, Kaimaavu
Malayalam	:	Kilimarum
Tamil	:	Cenkiluvai Ilai
Telugu	:	Kondamamidi

### **DESCRIPTION**

#### **a) Macroscopic**

Leaves compound, borne on grooved rachis, imparipinnate, leaflets 2 to 5 pairs, glabrous, ovate or orbiculate, entire, acuminate, unequal at base, nerves finely reticulate, greenish brown; no characteristic smell, taste slightly resinous.

#### **b) Microscopic**

**Rachis** - Cross section grooved in outline; epidermis single layered; cuticle present; a cortex of 6 or 7 layers of thick walled parenchyma cells present; the innermost layer of the cortex consists of larger cells in a continuous row, similar to an endodermis; two or 3 wavy layers of sclerenchymatous pericycle present; stele lobed in the phloem region, with a single resin canal beneath each lobe; phloem and phloem parenchyma present in a continuous wavy ring, followed by xylem ring with vessel groups alternating with xylem parenchyma; vessels large in size; pith parenchymatous; abundant druses, and scattered minute starch grains present in the cortical, phloem and pith regions.

**Petiole** - Cross section grooved in outline; epidermis single layered; cuticle present; cortical region many layered, with thick walled parenchyma; a sinuous, discontinuous sclerenchymatous band present; stele lobed; large resin canals present in the phloem; xylem in groups beneath resin canals in the lobe; pith parenchymatous; druses and starch grains present in cortex, phloem and pith.

**Midrib** TS shows bulge on the adaxial side, concave curvature on the abaxial side; epidermis single layered with thick cuticle; sub-epidermal layers collenchymatous on both adaxial and abaxial sides; ground tissue parenchymatous; a shallow arc of vascular bundle present in the center; phloem present outside the xylem; facing the central arc a core of xylem surrounded by phloem present on adaxial side below the bulge; resin canals present; one beneath and two lateral to the vascular bundle; druses present throughout the tissues.

**Lamina** Dorsiventral; epidermis single layered with larger cells and thicker cuticle on the adaxial side than on the abaxial side; in surface view upper epidermal cells with almost straight walls, lower with distinctly wavy walls; stomata anomocytic; stomatal number 32 to 40 / mm<sup>2</sup>; stomatal index 26 to 28; palisade ratio 6 to 8; vein-islet number 3 to 5; veinlet termination number 28 to 32.

**Powder** -Greenish brown; no characteristic smell; a slight resinous taste; druses of calcium oxalate crystals of about 25 μ, starch grains up to 10 μ, vessels scalariform, pitted and reticulate, phloem fibres 200 μ to 1100 μ from the rachis.

## **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	9 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	13 per cent,	Appendix 2.2.8
Fixed oil	Not less than	2 per cent,	Appendix 2.2.9

## T.L.C.

T.L.C. of methanolic extract on aluminum plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm shows fluorescent zones appearing at R<sub>f</sub> 0.14 (violet), 0.16 (pink), 0.20 (violet), 0.57, 0.60 (both pink), 0.67 (deep violet), 0.75 (pink) and 0.83 (deep violet). On dipping the plate in *vanillin-sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, ten spots appear at R<sub>f</sub> 0.12 (blue), 0.24 (violet), 0.29 (pink), 0.33 (blue), 0.37 (pale violet), 0.51, 0.57, 0.60 (violet), 0.75 (pale violet) and 0.83 (green).

**CONSTITUENTS** - Guggulsterones

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Snigdha, Viśada, Sūkṣma, Sara, Sugandhi
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Hṛdya, Pratidūṣaka, Kapha-vātahara, Vraṇaropana, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Aṅgamarda (body ache), Gaṇḍamālā (cervical lymphadenitis), Kuṣṭha (Leprosy / diseases of skin), Pādadarī (chaffed / cracked soles / rhagades), Prameha (metabolic disorder), Sandhiśoṭha (arthritis), Śoṭha (inflammation), Vātarakta (Gout), Vātaroga (disease due to Vāta doṣa), Visarpa (Erysepales), Vraṇa (ulcer)

**DOSE** - Svarasa (juice) : 5 to 10 ml

## ARANYA-SŪRAṆA (Tuber)

Aranya-sūraṇa consists of dried tuber of *Synantherias sylvatica* Schott Gen. Aocja Syn. *Amorphophallus sylvaticus* (Roxb.) Kunth. (Fam. Araceae), a perennial, tuberous herb with a small, sub-globose, smooth rhizome and a barred spathe, streaked with green and light pink. The plant is usually found along forest borders in the states of Tamil Nadu, Kerala and Karnataka.

**SYNONYMS :** Vajrakanda, Sitasūraṇa

### REGIONAL LANGUAGE NAMES

Bengali	:	Ola-kochu
Gujrati	:	Godasurana
Hindi	:	Vanasurana
Malayalam	:	Jangali-Ola
Tamil	:	Kattu-Karunaikizhanagu
Telugu	:	Mancha Kanda

### DESCRIPTION

#### a) Macroscopic

Unpeeled tuber sub-globose, depressed, bulbiferous, dark greyish-brown, warty, 18 to 25 cm in thickness, whole or may be cut vertically and horizontally into transverse slices of 2 to 3 cm size; rootlets a few, thin; texture starchy; odour not distinctive; taste, acrid.

#### b) Microscopic

A section through the tuber reveals an outer tegumentary tissue comprising a few layers of thin walled cork, irregular and peeled off at places; cortex massive, consisting of thin walled parenchyma abundant in starch grains; a zone of 2 or 3 layers of clear, angular, thin walled cells runs periclinally in outer region of cortex; calcium oxalate crystals also found in the form of raphide bundles; starch grains without striations, single or compound,

hilum linear; simple grains spherical, ovoid or sub-reniform; compound ones usually comprising up to 6 units, polyhedral or sub-spherical; abundant in tissues surrounding the small, scattered vascular bundles; vascular bundles scattered in cortex, running straight or in oblique fashion, comprising the smaller as well as larger bundles towards the centre; xylem composed of a few vessels with spiral thickenings, and xylem parenchyma; phloem consists of sieve tubes and companion cells.

**Powder** Dull creamish, fine; powder microscopy shows raphides 150  $\mu$  long; simple and compound starch grains, 2 to 6 membered and usually up to 50  $\mu$  in size, and occasionally vessel fragments with spiral thickenings.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	8 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	4 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract of the drug on silica gel 'G' 60 F<sub>254</sub> using *n-hexane: ethyl acetate*: (7:3) as mobile phase and on spraying the plate with *anisaldehyde-sulphuric acid reagent* and heating it for 15 minutes at 105<sup>0</sup>, shows four spots at R<sub>f</sub> 0.17 (blue), 0.28 (Violet), 0.37 (dark violet) and 0.40 (dark violet).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kṛmighna, Arśoghna, Rucya, Vedanāhara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Granthiśoṭha (lymphadenitis), Arbuda (tumor),  
Vicarcikā (eczema), Udararoga (diseases of abdomen), Ślīpada (Filariasis), Arśa (piles)

**DOSE** - Cūrṇa (powder): 5 to 10 g after Śodhana

## ĀRĀROṬA (RHIZOME)

Ārāroṭa is the dried rhizomes of *Maranta arundinacea* L. (Fam. Marantaceae), a rhizomatous herb of about 75 cm in height, cultivated in India and also often found in wild, as an escape.

**SYNONYMS :** Sita tavakṣīra

### REGIONAL LANGUAGE NAMES

Bengali	:	Ararut
English	:	West Indian Arrowroot
Hindi	:	Araaruta
Kannada	:	Araaruta
Marathi	:	Tavakira
Oriya	:	Araaruta
Punjabi	:	Araaruta
Tamil	:	Aruruttukkilangu
Telugu	:	Palagunda

### DESCRIPTION

#### a) Macroscopic

**Rhizome-** horizontal and unbranched, spindle shaped, 12 to 20 cm long and dull white to creamy in colour when fresh, prominently marked with nodal rings and scale leaves which completely encircle the nodes; internodal length is 0.5 to 1.5 cm; sliced individual pieces are cylindrical, rough, and size ranges from 1 to 2 cm long and 1 to 2.5 cm across; externally brownish and broken surface off-white; fracture, hard and fractured surface fibrous and starchy; starchy odour and taste.

#### b) Microscopic

TS circular in outline, epidermis a single layer of small polygonal cells, followed by a wide cortex of large polygonal cells with interspaces; medullary vascular bundles many, of various sizes and scattered in the cortical region; each vascular bundle encircled by a semilunar bundle sheath of sclerenchymatous cells, and consists of a small phloem patch and xylem with 1 to 6 vessels; stele consists of compactly arranged smaller vascular bundles towards endodermis and larger ones in the centre, embedded in the ground tissue of parenchymatous cells; starch grains present in parenchymatous cells; irregularly ovoid, or pear shaped, ranging between 20 to 40  $\mu$ , some even unto 75  $\mu$  occasionally, concentric striations seen, with an eccentric stellate hilum.

**Powder-** Creamy, starchy, under microscope shows compact polygonal parenchyma, spiral, scalariform and annular vessels; elongated spindle shaped fibres of 15 to 20  $\mu$  width; starch grains circular, oval or pear shaped with a diameter of 20 to 40  $\mu$ , occasionally even unto 75  $\mu$ , with concentric striations and a central or lateral, linear or crossed hilum.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	5 per cent,	Appendix 2.2.3
Sulphated ash	Not more than	7 per cent,	Appendix 2.2.6
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	1 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	12 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the methanolic extract on precoated silica gel 'G' plate (0.2 mm thick) using *n*-hexane: chloroform: methanol (26:13:1) as mobile phase and after spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, shows spots at R<sub>f</sub> 0.27, 0.53 (both light violet), 0.68, 0.77, and 0.85 (all pink).

**CONSTITUENTS** - Starch (25-30%), dextrin and sugars.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Balya, Vṛṣya

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Kāsa (cough), Śvāsa (Asthma), Dāha (burning sensation), Tr̥ṣṇā (thirst), Kṣaya (pthisis), Agnimāndya (digestive impairment), Raktadoṣa (disorder of blood)

**DOSE** - Cūrṇa (powder): 5 to 10 g

## **ASTHÍSŔŅKHALĀ (Aerial Part)**

AsthísŕŅkhalā consists of dried aerial parts of *Cissus quadrangularis* L. (Fam. Vitaceae), a fleshy climber with jointed stem and leaf opposed tendrils growing along hedges and distributed throughout the hotter parts of India.

**SYNONYMS** : Asthisamhŕt, Vajravallī

### **REGIONAL LANGUAGE NAMES**

Bengali	:	Haadjodaa
English	:	Bone setter
Gujrati	:	Haadsaankal
Hindi	:	Hadjoda
Kannada	:	Mangarballee, Sunduballi
Malayalam	:	Piranta
Marathi	:	Kaandvel
Oriya	:	Haadabhanga gachha
Punjabi	:	Hadajoda

### **DESCRIPTION**

#### **a) Macroscopic**

Stem pieces sub-quadrangular, flattened, winged and jointed, having constricted nodes and spindle shaped internodes; smooth, shiny, dull green or greyish brown when old; branches dichotomous; leaves alternate, cauline, cordate; ovate, exstipulate, soft, thick, shiny and shortly petioled; tendril brittle, long, slender, twisted, simple, arising at nodes opposite the leaves.

#### **b) Microscopic**

Stem shows a flattened, 4 angled, almost dumb bell shaped outline with one or two notches on each side; four angles of the stem appear blunt in cross section with a

sclerenchymatous patch immediately below the epidermis in each corner; epidermis consists of a single layer of polygonal or slightly elongated cells with straight anticlinal walls and convex periclinal walls covered over by thick cuticle; in surface view, epidermal cells divided into groups of 3 to 8 due to thickened anticlinal walls; stomata uniformly distributed, anomocytic; ground tissue demarcated into an outer cortex and a central pith by a ring of vascular bundles; cortex made up of more or less compactly arranged, thin walled parenchymatous cells some of which contain crystals of calcium oxalate in the form of druses up to 25  $\mu$  dia., as well as raphides; some idioblasts stain red with Ruthenium Red indicating the presence of some mucilage in them; circular cavities present sporadically; vascular bundles conjoint, collateral, open, endarch; those under the angles of the stem larger in size and number; bundles contain a peripheral patch of sclerenchyma cells followed by, phloem elements, phellogen and xylem elements; vessels possess annular and spiral thickenings; a peripheral patch of collenchymatous cells is also associated with a group of vascular bundles; pith composed of thin walled loosely arranged parenchymatous cells; some contain druses and raphides; cavities, larger and much more abundant than those present in the cortex; transverse section of tendril has prominent semi-barrel shaped epidermal cells covered by a cuticle having fine striations, as seen in surface view of the epidermis with cuticle.

## **Leaf**

**Midrib** -Keeled on adaxial side, convexly rounded on the abaxial side; ground tissue parenchymatous, thin-walled cells, those in periphery containing chloroplasts; a small patch of sclerenchyma and below this a group of collenchyma cells in the keel; a ring of 4 to 6 vascular bundles without bundle sheaths; some cells of midrib have druses and raphides, each vascular bundle consists of a centripetal xylem composed of vessels with spiral thickenings, and xylem parenchyma and an outer phloem composed of sieve tubes, companion cells and phloem parenchyma with a few small cavities dispersed among them.

**Lamina** A section through the leaf shows well defined upper and lower epidermis comprised of parenchymatous cells rounded in vertical section and angular in surface view; stomata present on both surfaces anomocytic; mesophyll of lamina undifferentiated; margin

composed of a patch of sclerenchyma; stomatal index for upper surface not more than 4 while for lower surface not more than 5.

**Powder** Epidermal cells in surface view showing anticlinal divisions and stomata; fragments consisting of hexagonal parenchymatous cells of ground tissue some showing the presence of crystals of calcium oxalate as druses and raphide; some fragments having vessels, fibers and starch grains also.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	20 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	2 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' plate (0.2 mm thick) using *toluene: ethyl acetate* (7:3) as mobile phase and when seen under UV 366 nm shows spots at  $R_f$  0.21 (blue); 0.45; 0.53 (both red); 0.66 (pink); 0.71; 0.82 (both red); on spraying with *anisaldehyde- sulphuric acid reagent* and on heating the plate for ten minutes at  $105^\circ$  spots appear at  $R_f$  0.35 (grey), 0.57 (brownish green), 0.73 (light yellow), 0.78 (brownish green) and 0.87 (brown).

**CONSTITUENTS** - Triterpenoids: 7-oxo-onocer-8-ene- $3\beta$ ,  $21\alpha$  -diol; friedelan-3-one; taraxerol; isopentacosanoic acid;  $\beta$  -sitosterol.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya, Madhura
<b>Guṇa</b>	:	Laghu, Sara, Snigdha, Picchila
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Madhura

**Karma** : Balya, Kaphahara, Kṛmighna, Pācana, Sandhānīya, Stambhana,  
Vātahara, Vṛṣya

**IMPORTANT FORMULATIONS** - Asthisāṅghātikā Yoga, Asthisamhāra vaṭikā,  
Asthisamhāra tailam

**THERAPEUTIC USES** - Arśa (piles), Asthibhagna (bone fracture), Kṛmi (worm  
infestation), Netraroga (diseases of the eye), Śvāsa (Asthma), Ūrustambha (stiffness in thigh  
muscles), Vraṇa (ulcer)

**DOSE** - Svarasa (juice) : 10 to 20 ml

Ārdrā kalka (paste) : 10 to 20 g

## BHŪTAKEŚĪ (Fruit)

Bhūtakesī consists of dried fruits of *Selinum vaginatum* C.B. Clarke (Fam. Apiaceae), a glabrous herb attaining a height of 1 to 1.5 m distributed in Himalayas from Kashmir to Kumaon between altitudes of 1800 to 3900 m.

**SYNONYMS** : Ākāśamāmsī, Murā, Bhūrigandhā, Gandhamādanī

### REGIONAL LANGUAGE NAMES

Bengali	:	Bhutakesi
Hindi	:	Bhutakesi, Muramaansi
Kannada	:	Mura
Malayalam	:	Moramamsi
Marathi	:	Mura
Oriya	:	Bhutakesi
Punjabi	:	Pushwari
Telugu	:	Bhutakesi

### DESCRIPTION

#### a) Macroscopic

Drug consists of yellowish-brown separated mericarps; each mericarp broadly oblong, dorsally compressed, 5 to 9 mm long, 3 to 4 mm wide and 1 to 2 mm thick; ridges five, yellowish-brown, three dorsal and two lateral, the lateral being large, membranous and winged; taste, bitter and spicy; odour, sweet and musk-like.

#### b) Microscopic

TS of the mericarp shows epicarp consisting of a single layered epidermis of rectangular, tubular cells having thick outer walls, striated cuticle and a few stomata; parenchymatous mesocarp, 3 to 4 layered, thickened, lignified and occasionally reticulate in the region of vascular bundles; a narrow endocarp of elongated, rectangular cells; testa

composed of single layer of yellowish cells; endosperm consisting of thick-walled cubical parenchyma; vascular bundles one in each primary ridge; vittae, four on dorsal, two to four on commissural surface, each lined internally by endothelial cells and filled with yellowish oil; cells of endosperm filled with numerous small aleurone grains, fixed oil and micro-rosette crystals of calcium oxalate.

**Powder** -Light brown, shows epidermal cells of epicarp with striated cuticle in surface view; fragments of yellowish-brown endothelium of vittae; parenchymatous cells with pitted thickening; fragments of reticulate vessels attached with pitted parenchyma and lignified sclerenchyma with reticulate thickening; patches of endospermic parenchymatous cells containing fixed oil, numerous small aleurone grains and micro-rosette crystals of calcium oxalate.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	8 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	17 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on precoated silica gel 'G' 60 F<sub>254</sub> TLC plate (E. Merck) of 0.2 mm thickness using *toluene: ethyl acetate* (85:15) as mobile phase and when seen under UV 254 nm shows five spots at R<sub>f</sub> 0.18 (blue), 0.29 (blue-green), 0.33 (light blue), 0.50 (bright blue) and 0.61 (green).

**CONSTITUENTS** - Essential oil and coumarins.

#### **PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṭu, Kaṣāya

<b>Guna</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣaghna, Vedanāhara, Rakṣoghna, Keśya, Kāntiprada

**IMPORTANT FORMULATIONS** - Candanādi Taila

**THERAPEUTIC USES** - Apasmāra (Epilepsy), Bhrama (vertigo), Jvara (fever), Kṣaya (pthisis), Śvāsa (Asthma), Mūrchā (syncope), Raktagata vāta (hypertension), Raktapitta (bleeding disorder), Tṛṣṇā (thirst), Vātavyādhi (disease due to Vāta doṣa)

**DOSE** - Cūrṇa (powder) :1 to 3 g

## **BHŪTAKĒŚĪ (Rhizome)**

Bhūtakeśī consists of dried rhizomes of *Selinum vaginatum* C.B. Clarke (Fam. Apiaceae), a glabrous herb attaining a height of 1 to 1.5 m distributed in Himalayas from Kashmir to Kumaon between altitudes of 1800 and 3900 m.

**SYNONYMS** : Rocanatagara, Māmsī Viśeṣa

### **REGIONAL LANGUAGE NAMES**

Bengali	:	Bhutakesi
Hindi	:	Bhutakesi, Muramaansi
Kannada	:	Mura
Malayalam	:	Moramamsi
Marathi	:	Mura
Oriya	:	Bhutakesi
Punjabi	:	Pushwari
Telugu	:	Bhutakesi

### **DESCRIPTION**

#### **a) Macroscopic**

Dried rhizome pieces cylindrical, curved, up to 12 cm long and 0.5 cm thick; surface earthy brown to brown in colour, rough, longitudinally wrinkled, bearing horizontally arranged, protruded lenticels and circular scars of roots; fracture short, horny revealing distinct creamish white, central cylinder of wood and brownish bark towards periphery; odour not distinct; taste, astringent.

#### **b) Microscopic**

TS of rhizome show multilayered cork of thin walled rectangular cells; cork cambium not distinct; cortex consists of 5 to 10 to several rows of circular to oval parenchyma cells

with groups of sclereids; secondary phloem wide, largely composed of parenchyma, a few fibres, obliterated sieve elements and interspersed with oval secretory canals; cambium distinct, consisting of 6 to 8 layers of thin walled, small rectangular cells; secondary xylem consists of vessels, tracheids, fibres and xylem parenchyma; xylem vessels occur singly or in groups of 2 to 5; medullary rays multiseriate, traversing both xylem and phloem; pith consists of large circular to oval pitted cells filled with round, simple or compound starch grains with 2 to 5 components, measuring 5 to 15  $\mu$ in diameter.

**Powder** -Light brown, shows fragments of cork in surface view; groups of sclereids; patches of pitted parenchyma; spiral and pitted vessels and round, simple or compound starch grains measuring 5 to 15  $\mu$  in diameter.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	8 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	4 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	23 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	7 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of ethanolic extract (cold maceration at room temperature) of the drug on precoated silica gel 'G' 60 F<sub>254</sub> TLC plate of 0.2 mm thickness using *toluene: ethyl acetate* (9.2: 0.8) as solvent system and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating at 105<sup>0</sup> for 10 minutes, shows spots R<sub>f</sub>0.15 (dark brown), 0.26 (magenta), 0.29 (dark orange), 0.39 (violet), 0.49 (light pink), 0.54 (brownish-yellow), 0.59 (light pink), 0.85 and 0.95 (both magenta),.

**CONSTITUENTS** - Coumarins: vaginatin, selinidin, vaginol, vaginidin and archangelone.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Sugandhi, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Tridoṣahara, Vedanāhara, Rakṣoghna, Keśya, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Apasmāra (Epilepsy), Jvara (fever), Kāsa (cough), Kṛmi (worm infestation), Pratiśyāya (coryza), Ucca Raktacāpa (hypertension), Unmāda (mania / psychosis), Vātavyādhi (disease due to Vāta doṣa)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## BĪJAPATRĀ (Whole Plant)

BĪjapatrā consists of the dried whole plant of *Adiantum capillus-veneris* L. {Fam. Adiantaceae (Polypodiaceae)} a terrestrial fern occurring throughout the hills in India in moist shady places especially on damp old walls and crevices of rocks.

**SYNONYMS :** Kṛṣṇadaṇḍikā, Haṃsapadīsadṛśā

### REGIONAL LANGUAGE NAMES

English	:	Maiden-hair fern
Gujrati	:	Kaalo hansaraaj, Hanspadi
Hindi	:	Kaalaa Hansraja
Kannada	:	Hansraaja, Mubaraka
Malayalam	:	Plavu
Marathi	:	Hansraaja
Oriya	:	Hansraaja
Telugu	:	Naalla Hamsapadu
Urdu	:	Parsiaoshan

### DESCRIPTION

#### a) Macroscopic

**Rhizome** Brown, soft with variable lengths up to 7 mm in thickness, paleae covering the rhizome, roots present.

**Root** Well branched, black coloured, thin, wiry and arising in clusters from the underside of the rhizome.

**Fron**d Circinately coiled in the bud condition, rachis dark and shining, bi or tripinnate often covered with paleae that may extend onto rachis and also sometimes on pinnules or leaflets, pinnae stalked, rachis may terminate in a pinna or may be elongated bearing a vegetative bud

at the tip, rachis divides pinnately and the ultimate branches bear pinnules in an alternate manner; the terminal pinnule usually differs in shape and size; the venation is open and dichotomous, veins spread in the a fan like manner in the lamina; sub marginal sori borne at the distal ends of the pinnae or pinnules and consists of sporangia borne superficially over a short portion towards the distal regions of the veins, the ultimate ends of the veins do not bear sporangia.

## **b) Microscopic**

**Root** Epidermis single layered; cuticle present; cortex of two zones, outer parenchymatous usually 3 layered and inner sclerenchymatous; endodermis distinct with casparian thickenings; pericycle distinct; stele diarch and exarch; phloem forms two conspicuous groups alternating with xylem.

**Rhizome** Epidermis single layered, thin walled; cuticle present; cortex parenchymatous filled with starch grains; stele dictyostele, 5 to 7 meristeles; each meristele is a protostelic type surrounded by a distinct endodermis and pericycle; xylem exarch and diarch surrounded by phloem.

### **Frond**

**Rachis** Epidermis single layered with thick cuticle, followed by 1 or 2 layered sclerenchymatous hypodermis; cortex parenchymatous and contains starch grains; stele consists of single layered endodermis followed by pericycle; xylem triarch, exarch, surrounded by phloem.

**Petiole** Epidermis single layered with thick cuticle, followed by sclerenchymatous cortex; vascular bundle consists of single layered endodermis and pericycle; xylem surrounded by phloem.

**Pinnule** Mid-vein laterally flat outline; mesophyll one or 2 layered; vascular bundle surrounded by thick sclerenchymatous bundle sheath, followed by a single layered endodermis and pericycle; xylem surrounded by phloem.

**Lamina** Undifferentiated, with one or 2 layered irregular shaped cells in the mesophyll; stomata present in lower epidermis; epidermal cells are elongated, parallel to the long axis of the leaf, in surface view more wavy in abaxial side and less wavy in adaxial side; stomatal number 30 to 35/mm<sup>2</sup>; stomatal index for lower epidermis 32 to 35; fertile leaves present showing sporangia.

**Powder** Dark reddish brown, spiral vessels, fibres, starch grains 10 to 20 μ, epidermis with stomata present, sporangium up to 400 μ in size with stalk and head, stalk 2 or 3 cells wide and about 4 cells long, head biconvex in shape and single layered wall with annulus (thick wall) and stomium (thin wall), spores homosporous tetrahedral, triradiate ridge with concave side and up to 90 μ in size.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	15 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	10 per cent,	Appendix 2.2.4
Water-soluble extractive	Not less than	4 per cent,	Appendix 2.2.8
Alcohol-soluble extractive	Not less than	10 per cent,	Appendix 2.2.7

#### **T.L.C.**

T.L.C. of chloroform extract on aluminum plates precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (6:1) as mobile phase and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.18, 0.22, 0.40, 0.64, 0.71, 0.76, 0.80 and 0.87 (all green). Under UV 366 nm fluorescent zones at R<sub>f</sub> 0.18 (pink), 0.20, 0.32 (both purple), 0.36, 0.55, 0.59 (all pink), 0.66 (blue), 0.70, 0.80 (both pink). On spraying the plates with *vanillin-sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.29 (blue), 0.40, 0.46 (both purple), 0.55 (yellow), 0.66 (purple), 0.76 (green), 0.88 and 0.93 (both grey).

**CONSTITUENTS** - Adiantone; adiantoxide; astragalin; nicotiflorin; isoquercitrin; rutin; kaempferol-3-O-rutinoside; 1-caFFEylglucose and sulphate esters of 1-coumarylglucose and 1-coumarylgalactose; kaempferol-3-glucuronide; quercetin;  $\beta$ -sitosterol; stigmasterol; campesterol

### **PROPERTIES AND ACTION**

**Rasa** : Kaṣāya, Kaṭu  
**Guṇa** : Guru  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Kaṇṭhya, Kaphahara, Kaphapittaśāmaka, Mūtrajanana, Rasāyana, Stambhana, Viṣaghna, Vraṇaropaṇa

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnirohiṇī (acute stage of diphtheria), Aṅgamarda (body ache), Apasmāra (Epilepsy), Atisāra (diarrhoea), Bhrama (vertigo), Dāha (burning sensation), Gulma (abdominal lump), Jvara (fever), Kāsa (cough), Lūtāviṣa (spider bite), Mūtrakṛcchra (dysuria), Raktapitta (bleeding disorder), Raktavikāra (disorders of blood), Śoṣa (emaciation), Śoṭha (inflammation), Śvāsa (Asthma), Svarabheda (hoarseness of voice), Visarpa (Erysepales), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 1 to 3 g

Svarasa (juice) : 10 to 20 g

## **BIMBĪ (Leaf)**

Bimbī consists of the dried leaves of *Coccinia grandis* (L.) Voigt Syn. *C. cordifolia* Cogn, *C.indica* W & A, *Cephalandra indica* Naud. (Fam. Cucurbitaceae), a monoecious perennial climber, distributed all over India and often cultivated.

**SYNONYMS :** Raktaphalā, Tuṇḍī, Bimbikā, Oṣṭhopamaphalā

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Kanabhaturi
Bengali	:	Tela Kuccha, Bimbu
English	:	Ivy gourd
Gujrati	:	Gholam, Ghilodi, Tindoran, Kadavi Ghilodi
Hindi	:	Kunduru, Kunru
Kannada	:	Tonde balli
Malayalam	:	Koval, Kova, Nallakova
Marathi	:	Tondlee
Oriya	:	Kainchi kakudi, Bano Kundri
Punjabi	:	Kunduru, Kunduri
Tamil	:	Kovai
Telugu	:	Donda tige
Urdu	:	Kunduru

### **DESCRIPTION**

#### **a) Macroscopic**

Bulk colour dark green; leaves brittle; simple, alternate, petiolate, exstipulate, 5 to 10 cm. long and 4 to 8 cm in width; lamina variable in size, usually 5 angled with shallow sinuses; bright green above with blackish dots on the surface and paler beneath; palmately reticulate with five main veins, base cordate, apex acute, margin more or less sinuate toothed; surface of the lamina rough.

## b) Microscopic

**Midrib** -TS flat towards adaxial surface and ridged towards abaxial side; epidermal cells of adaxial and abaxial surface brick shaped; hypodermis adjacent to both epidermis collenchymatous; ground tissue of parenchyma containing prismatic calcium oxalate crystals; two vascular bundles present, one towards adaxial and the other towards abaxial surface; adaxial vascular bundle smaller than that of abaxial surface; xylem composed of vessels with annular and spiral thickenings, xylem parenchyma, and fibres; phloem contains sieve tubes with simple sieve plates, companion cells, parenchyma and fibres.

**Lamina** -TS shows leaf dorsiventral; cuticle present; epidermal cells of adaxial surface slightly elongated, larger and oval where black dots representing glands present; the epidermal cells of abaxial surface are brick shaped; cuticle present; palisade layer a single row, absent over midrib region; spongy parenchyma cells chlorenchymatous and wavy walled; xylem contains vessels with annular and spiral thickenings; epidermal cells of both adaxial and abaxial epidermis in surface view are occasionally elongated, walls thin, deeply sinuate; multicellular sessile glandular trichomes with head measuring 100 to 120  $\mu$  in diameter are present on adaxial epidermis; covering trichomes measuring 18 to 20 wide and 280 to 300  $\mu$  long, gradually tapering, sparsely distributed and localized at the costal region of the adaxial epidermis; stomata anomocytic ; stomatal index of abaxial epidermis 20 to 25, adaxial surface 16 to 18.

**Powder** -Light green, shows epidermal cells, anomocytic stomata, concentric starch grains 3 to 5  $\mu$  in diameter, xylem vessels with annular and spiral thickenings; calcium oxalate crystals, epidermal fragments with glands and trichomes.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	6 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	15 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	38 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm shows fluorescent spots (all blue)  $R_f$  0.12, 0.39, 0.47, 0.55, 0.78 and 0.92; on exposure to *iodine vapours* two spots (both yellow) appear at  $R_f$  0.05, 0.12 and 0.39. On spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, seven spots appear at  $R_f$  0.12, 0.29, 0.39, 0.47, 0.55, 0.61 and 0.78.

**CONSTITUENTS** - Alkaloids such as Cephalandrine A, cephalandrine B, cephalandrine,  $\beta$ -sitosterol and triacontane.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Grāhī, Kapha-pittahara, Vātakara

**IMPORTANT FORMULATIONS** - Bimbāghṛta, Tuṇḍighṛta

**THERAPEUTIC USES** - Kāmalā (Jaundice), Madhumeha (Diabetes mellitus), Pūyameha (urinary infection)

**DOSE** - Svarasa (juice) : 10 to 20 ml

Cūrṇa (powder) : 3 to 6 g

## **BIMBĪ (Stem)**

Bimbī is the dried stem of *Coccinia grandis* (L.) Voigt Syn. *C. cordifolia* Cogn. *C. indica*, W & A., *Cephalandra indica* Naud (Fam. Cucurbitaceae), a monoecious perennial climber distributed all over India and often cultivated.

**SYNONYMS :** Oṣṭhopamaphalā, Raktaphalā, Tuṇḍī, Bimbikā

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Kanabhaturi
Bengali	:	Bimbu, Tela Kuccha
English	:	Ivy gourd
Gujrati	:	Ghilodi, Gholam, Kadavi Ghilodi, Tindoran
Hindi	:	Kunduru, Kunru
Kannada	:	Tonde balli
Malayalam	:	Kova, Koval, Nallakova
Marathi	:	Tondlee
Oriya	:	Bano Kundri, Kainchi kakudi
Punjabi	:	Kunduri, Kunduru
Tamil	:	Kovai
Telugu	:	Donda tige
Urdu	:	Kunduru

### **DESCRIPTION**

#### **a) Macroscopic**

Stems pieces measuring 2 to 10 cm in length and 0.5 to 4 cm in thickness, externally ridged, grey or greenish grey; cut surface smooth with a thin bark and abundant light coloured central wide wood; odour and taste indistinct.

## b) Microscopic

In TS the mature stem consists of cork, composed of stratified rectangular, tangentially elongated cells; cortex composed of 10 to 15 layers of thin walled, isodiametric parenchymatous cells with intercellular spaces, filled with numerous concentric starch grains, of about 5  $\mu$  in diameter; pericycle in the form of patches of fibres, with thick walls, narrow lumen, measuring 10 to 15  $\mu$  in diameter; vascular bundles conjoint, wedge shaped, bicollateral, phloem contains sieve tubes, companion cells, extensive parenchyma of isodiametric cells, and fibres of 550 to 625  $\mu$  long and 12 to 18  $\mu$  width, xylem consists of vessels with reticulate and scalariform thickenings, protoxylem elements possess annular and spiral thickenings; very short fibres upto 30 $\mu$  in width, walls very thick with simple pits; medullary rays multiseriate, composed of 18 to 22 radially elongated with some filled with starch grains; pith scanty, parenchymatous, cells isodiametric, thin walled.

**Powder** -Pale cream, microscopically it shows isodiametric parenchymatous cells, xylem and phloem fibres, sieve tubes, sieve plates and vessels; paranchymatous cells filled with numerous concentric starch grains upto about 5  $\mu$ ; xylem vessels with, scalariform and reticulate thickenings.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	10 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	33 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	40 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm shows fluorescent spots at  $R_f$  0.10, 0.15, 0.35, 0.47, 0.50, 0.63 and 0.72 (all blue); on exposure to *iodine vapour* spots appear at  $R_f$  0.15, 0.47, 0.63 and 0.94 (all yellow); and on spraying with 5% *methanolic sulphuric acid*

*reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at R<sub>f</sub> 0.10, 0.15, 0.35, 0.47, 0.50, 0.63, 0.72 and 0.94.

**CONSTITUENTS** - Alkaloids such as Cephalandrine A, cephalandrine B, cephalandrine,  $\beta$ -sitosterol and triacontane.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Grāhī, Kapha-pittahara, Vātakara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aruci (tastelessness), Prameha (metabolic disorder), Pravāhikā (dysentery), Raktapitta (bleeding disorder)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## BR̥HAT DUGDHIKĀ (Whole Plant)

Br̥hat Dugdhikā consists of dried whole plant of *Euphorbia hirta* L. Syn. *E. pilulifera* Auct. non L. (Fam. Euphorbiaceae), a small erect or ascending annual herb with milky latex, found throughout the hotter parts of India as a common weed.

**SYNONYMS** : Dugdhikā

### REGIONAL LANGUAGE NAMES

Bengali	:	Barakherui
English	:	Asthma weed
Gujrati	:	Dudhelo, Dudeli, Dudhi
Hindi	:	Dudhi, Badi dudhdi
Malayalam	:	Nelapalai
Marathi	:	Mothi dudhi, Naayato, Dudhi, Dudali, Mothi naayati
Oriya	:	Dudili, Dudoli
Punjabi	:	Dudhi
Tamil	:	Ammanpatchaiarisi
Telugu	:	Reddivarinanubalu, Nanubalu

### DESCRIPTION

#### a) Macroscopic

**Root** Six to 9 cm long, 2 to 3 mm in diameter, almost cylindrical with tapering ends, small rootlets, surface smooth, except for small protuberances at certain places.

**Stem** Erect, usually branched, terete, branches often compressed, covered with crisp hairs, stem pieces 3 to 5 mm thick in diameter, very thin bark, fracture short.

**Leaf** Petiolate, petioles about 3 mm long; occasionally reddish, simple, opposite, superposed, subsessile, 1 to 4 by 0.5 cm. oblong, lanceolate or obovate lanceolate, acute or sub acute, dentate, minutely stipulate, dark green above pale beneath, venation reticulate.

**Flower** Inflorescence shortly pedunculate, axillary cymes; bracteate; perianth absent, involucre numerous, less than 1 to 1.5 mm long on single stalked stamen, anthers two celled; pistil tricarpellary, ovary superior, axile placentation.

#### **b) Microscopic**

**Root** TS shows outermost region of cork consisting of 4 or 5 layers of thin walled, brown suberised rectangular parenchymatous cells; cork cambium seen; cortex consists of 6 to 8 layers of tangentially elongated parenchymatous cells without intercellular spaces; some of these cells contain simple starch grains and prismatic calcium oxalate crystals; the vascular cylinder has thin walled polygonal phloem cells, xylem consists of vessels and thick walled parenchyma, traversed by uniseriate medullary rays; pith absent.

**Stem** TS shows nearly circular outline, epidermal cells slightly elongated laterally with thick cuticle; multicellular, uniseriate covering trichomes about 30 to 200 in length; cortex consists of 6 to 8 layers of rounded or oval shaped parenchymatous cells, a few cells containing simple, oval shaped starch grains and prismatic calcium oxalate crystals; next to the cortex is a broad vascular cylinder separated by an endodermis and a single layer of pericycle; phloem narrow and xylem has reticulate vessels; pith consists of circular cells with intercellular spaces, prismatic calcium oxalate crystals measuring about 8 to 25  $\mu$  seen in a few cells.

#### **Leaf**

**Petiole** TS shows somewhat circular outline; epidermis single layered, externally covered with thick cuticle and have covering trichomes similar to that of stem; stele composed of vascular bundle located in center, xylem composed of vessels with protoxylem facing towards upper surface and phloem on the abaxial side, enclosed within a bundle sheath;

ground tissue composed of thin walled parenchymatous cells, a few having prismatic calcium oxalate crystal and starch grains.

**Midrib** Strongly projects on the lower side; epidermis single layered with thick cuticle on both surfaces; collenchyma single layered present only on lower surface just adjacent to lower epidermis; stele shows similar structure as described in petiole except very prominent bundle sheath and shows starch grains in a few cells; prismatic calcium oxalate crystals and starch grains in a few cells of ground tissue.

**Lamina** Shows dorsiventral structure; epidermis single layered on either surface, upper epidermis consists of tabular cells, walls slightly wavy in surface view; whereas walls of lower epidermal cells straight; trichomes similar to those of stem; palisade two layered; spongy parenchyma 2 to 4 layered, loosely arranged; vascular bundles embedded in spongy parenchyma; stomata anomocytic present on both surfaces; palisade ratio 5 or 6, stomatal index 27 to 36 on lower surface and 25 to 30 / mm<sup>2</sup> on upper surface, vein islet number 1 to 2, veinlet termination number 6 to 9.

**Powder** Yellowish brown, shows abundant fragments of parenchymatous cells, a few filled with starch grains; vessels with reticulate and spiral thickenings; phloem fibres; crystals of calcium oxalate in the form of prism; abundant covering, multicellular trichomes, and a few parenchymatous cells with brownish contents.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	7 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	3 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	10 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate using *toluene: ethyl acetate* (95:5) as mobile phase and when seen under UV 366 nm shows fluorescent zones at  $R_f$  0.15 (grey), 0.32 (pink) and 0.36 (green). On spraying with *vanillin-sulphuric acid reagent* and heating the plate for five minutes at  $105^{\circ}$ , four spots appear at  $R_f$  0.22 (pink), 0.36 (violet), 0.70 (pale violet) and 0.91 (purple).

**CONSTITUENTS** - Flavonoids, ellagotannins and triterpenoids.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta, Madhura
<b>Guṇa</b>	:	Rūkṣa, Guru, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Garbhakāraka, Kaphahara, Mūtrala, Śleṣmanissāraka, Stanya, Vṛṣya, Viṣṭambhī

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Dadru (taeniasis), Kṛmi (worm infestation), Kāsa (cough), Kuṣṭha (Leprosy / diseases of skin), Mūtrakṛcchra (dysuria), Pūyameha (urinary infection), Śūla (pain / colic), Tamakaśvāsa (bronchial asthma)

**DOSE** - Cūrṇa (powder): 1 to 3 g

Svarasa (juice) : 10 to 20 drops

## BRHATĪ (Whole Plant)

Br̥hatī consists of dried whole plant of *Solanum anguivi* Lam. Syn. *S. indicum* L (Fam. Solanaceae), a prickly, much branched perennial undershrub, up to 1.8 m high, mostly found throughout warmer parts of the country upto an elevation of 1500 m.

**SYNONYMS** : Br̥hatkaṇṭakārī, Mahadvyāghrī, Siṃhikā, Bhaṇṭākī, Vanavṛntāka

### REGIONAL LANGUAGE NAMES

Assamese	:	Tidbhagnri, Tidbaghuri
Bengali	:	Vyaakud, Byakura
English	:	Indian Nightshade
Gujrati	:	Ubhi ringni, Ubhimo ringni
Hindi	:	Badi kateri, Kataai, Vanbhantaa
Kannada	:	Kirigulia, Heggullu
Malayalam	:	Cheru vazhuthina, Putiri chunda
Marathi	:	Dorli, Ringani
Oriya	:	Lavyaankudi, Dengaabheji, Bryhoti
Punjabi	:	Kandwaari vaddi
Tamil	:	Pappar mulli, Cheru vazhuthalai, Mullamkatti
Telugu	:	Tella mulaka
Urdu	:	Badi kateli

### DESCRIPTION

#### a) Macroscopic

**Root** - Root well developed, long, ribbed, woody, cylindrical, pale yellowish-brown, 1 to 2.5 cm in diameter; a number of secondary roots and their branches present, surface rough due to presence of longitudinal striations and root scars; fracture, short and splintery; no distinct odour and taste.

**Stem** - Dried stem pieces cylindrical, prickly, about 2 to 5 cm in length and 0.5 to 2 cm in thickness; external surface greyish-green, rough, longitudinally fissured and bearing longitudinally arranged vertical lenticels and recurved flattened spines; transversely cut smooth surface shows narrow brownish bark towards periphery and creamish -white wood around central pith; fracture hard, fibrous, breaks with snap; odour not distinct, taste bitter.

**Leaf** - Leaves simple, petiolated, subentire or pinnatifid, occurring in broken, curled pieces of different sizes; upper surface greyish-green and lower surface whitish in colour; fracture brittle; taste, bitter.

**Fruit** *Dried berries globose, yellow to reddish-brown in colour measuring about 0.5 to 1 cm in diameter bearing small spiny remains of stigma on one side and calyx with attached pedicels on other side; taste astringent; seeds many in dried pulp.*

#### **b) Microscopic**

**Root** - TS of root shows thin cork composed of 5 to 15 layers of thin-walled, tangentially elongated, rectangular cells filled with yellowish-brown content; cork cambium single layered; secondary cortex composed of 5 to 9 layers of thin-walled, oval and tangentially elongated cells; stone cells present in singles or in groups of 2 to 5 or more in this region; secondary phloem composed of sieve elements, parenchyma and stone cells, traversed by phloem rays; phloem parenchyma abundant, thin-walled; stone cells present in outer phloem region in singles or groups of 2 to 5, varying greatly in shape and size; phloem rays 1 to 3 cells wide, isodiametric to slightly radially elongated in inner phloem region and radially elongated in outer phloem region, occasionally stone cells also found in medullary rays; wood occupies bulk of root and composed of vessels, tracheids, fibres and xylem parenchyma, traversed by xylem rays, all elements being lignified; vessels occur singly or in groups of 2 to 5 with simple pits; xylem fibres moderately thick-walled with simple pits and pointed ends found in abundance; xylem parenchyma have simple pits or reticulate thickenings; xylem rays uni to biseriate, thick-walled, cells radially elongated and pitted,

microsphenoidal crystals of calcium oxalate as sandy masses and simple starch grains present in some cells of secondary cortex, phloem and medullary rays; simple and rounded to oval starch grains, measuring 5.5 to 11.6  $\mu$  m in diameter.

**Stem** - TS of stem shows cork composed of 4 or 5 layers of rectangular cells interrupted by lenticels and at places bearing multicellular branched trichomes; cortex consists of an outer zone of 5 to 8 layers of small, rounded parenchyma cells filled with brownish contents, and inner cortex consisting of 4 or 5 rows of oval to round, comparatively larger parenchyma cells; groups of pericyclic fibres present outside the phloem; phloem composed of sieve elements, phloem fibres and phloem parenchyma filled with black-coloured contents; xylem composed of vessels, tracheids, fibres and parenchyma; xylem vessels occur singly or in groups of 2 to 5 with pitted walls; xylem rays uniseriate, consisting of radially elongated parenchyma cells; pith composed of circular to oval parenchyma cells filled with starch grains.

#### **Leaf-**

**Petiole** - TS of petiole shows a single layered epidermis of parenchyma cells interrupted at places by multicellular, branched trichomes and glandular trichomes; 3 or 4 layered hypodermis of chlorenchyma cells; ground tissue of round parenchyma cells encircling a large, conjoint, collateral, arch-shaped, vascular bundle in the centre and two small vascular bundles in the wings region below hypodermis.

**Lamina** TS of leaf shows a dorsiventral structure with a single layered epidermis on both surfaces interrupted at places by multicellular, branched trichomes; bilayered palisade of columnar cells below upper epidermis and 3 or 4 layered spongy mesophyll of round to oval parenchyma cells.

**Midrib** -Contains a single vascular bundle consisting of radially arranged xylem and phloem; patches of collenchyma on both dorsal and ventral side of vascular bundle below epidermis.

**Powder** -Shows cork in surface view; leaf epidermis in surface view; abundant branched multicellular trichomes; yellowish fragments of epicarp and greenish fragments of testa in surface view; thin walled fibres; pitted and spiral vessels; microsphenoidal crystals of calcium oxalate and circular, simple or 2 to 4 compound starch grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	5 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	4 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	6 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of ethanolic extract (cold maceration at room temperature) of the drug on precoated silica gel 'G' 60 F<sub>254</sub> TLC plate of 0.2 mm thickness using *toluene: ethyl acetate* (7:3) as solvent system and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating at 105<sup>0</sup> for 10 minutes, shows spots at R<sub>f</sub> 0.16 (light grey), 0.28 (grey), 0.43 (light pink), 0.55 (green), 0.62 (pink), 0.66 (dark pink), 0.77 (light pink) and 0.85 (pink).

**CONSTITUENTS** - Steroidal saponins: Protodiscin saponin C, indioside A, B, C, D and E; solafuranone.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Grāhī, Hṛdya, Kaphahara, Keśya, Pācana, Vātahara, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Daśamūla Kvātha

**THERAPEUTIC USES** - Āmadoṣa (products of impaired digestion and metabolism), Agnimāndya (digestive impairment), Aruci (tastelessness), Chardi (emesis), Hṛdroga (heart

diseases), Hikkā (hiccup), Jvara (fever), Kṛmi (worm infestation), Kāsa (cough), Kuṣṭha (Leprosy / diseases of skin), Netraroga (diseases of the eye), Pratiśyāya (coryza), Svarabheda (hoarseness of voice), Śvāsa (Asthma), Śūla (pain / colic)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

Kvātha (decoction) : 40 to 80 ml

## CANAKA (Whole Plant)

Caṇaka consists of the whole plant of *Cicer arietinum* L. (Fam. Fabaceae), a much branched herb cultivated in most parts of India for its seeds used as pulses.

**SYNONYMS** : Harimantha ḥ, Sakalapriya, Vājimantha

### REGIONAL LANGUAGE NAMES

Assamese	:	Imas
Bengali	:	Chholaa
English	:	Bengal gram, Chick pea, Gram
Gujrati	:	Chanaa, Chanya
Hindi	:	Buut, Chanaa, Chunnaa, Chane, Chholaa
Kannada	:	Kadale
Malayalam	:	Katal
Marathi	:	Harbaraa, Chane
Punjabi	:	Chholaa
Tamil	:	Katalai, Kadalai, Kondakkadalai
Telugu	:	Sangalu

### DESCRIPTION

#### a) Macroscopic

**Root** - Root upto 25 cm long, 2 to 12 mm thick with secondary and tertiary roots, surface light brown, rough with longitudinal wrinkles; fracture, tough showing creamish interior; odour, mild and taste characteristic.

**Stem** - Stem elongated, with nodes and internodes, variable in length, upto 6 mm in diameter, surface pale brown with a few purple patches and longitudinal wrinkles; fracture, short showing creamish interior; odour, mild and characteristic taste.

**Leaf** - Leaf compound, imparipinnate, leaflets 8 to 13 pairs, each upto 1 cm in length and 5 mm in width; light brown; oval to oblong, margin serrate, base round, apex acute, both surfaces pubescent; odour characteristic; taste, sour.

**Fruit** - Fruit turgid, pod with persistent calyx and short stalk; 1.5 to 2.0 cm in length and 5 mm to 1 cm in breadth; apex acute, base tapering, surface light brown, pubescent; seeds 1 to 3, brown, triangular, with pointed apex, micropyle present below the apex; cotyledons 2, yellowish to dark yellow; odour, mild but specific; taste, slightly astringent.

#### **b) Microscopic**

**Root** - Root shows single layered epidermis followed by cortex consisting of 5 to 8 layers of thin walled parenchyma cells; pericycle represented by patches of long, thick walled and lignified fibres; phloem composed of sieve tubes, companion cells and phloem parenchyma being traversed by uni to triseriate, thin walled medullary rays; xylem shows vessels, tracheids, fibres, parenchyma and medullary rays with thick and pitted walls ; vessels and tracheids show bordered pits, parenchyma cells simple pitted and fibres have simple oblique pits; pith composed of thin walled parenchyma cells.

**Stem** - Circular in outline with 5 to 6 small ridges; epidermis single layered covered externally with cuticle, some of them elongate to form long unicellular as well as glandular trichomes with 2 or 3 celled stalk and 4 to 6 celled head, both measuring from 350 to 680  $\mu$  in length; cortex composed of collenchyma and parenchyma; collenchyma cells present below the ridges only; pericycle represented by patches of fibres; phloem consists of sieve tubes, companion cells and phloem parenchyma being traversed by uni to biseriate medullary rays; xylem shows border pitted vessels and tracheids, simple pitted parenchyma cells and long fibres, all the elements being thick walled and lignified; pith composed of thin walled circular to oval parenchyma cells.

**Leaf** -

**Rachis** -crescent shaped in outline; epidermis single layered with both covering and glandular trichomes similar to those of stem; cortex consists of thin walled circular to oval parenchyma cells; central region occupied by large vascular bundle in the middle flanked by 2 small vascular bundles on each side; small patches of pericycle present on both upper and lower sides of vascular bundles.

**Midrib** -shows single layered epidermis covered with cuticle, centre of midrib occupied by vascular bundle with small patches of sclerenchymatous cells on both dorsal and ventral side; remaining portion occupied by thin walled parenchyma cells.

**Lamina** -shows dorsiventral structure; epidermis single layered covered externally with cuticle, covering and glandular trichomes similar to those of stem present on both surfaces; in surface view upper epidermal cells larger with some what straight walls, lower epidermal cells smaller with sinuous walls, anomocytic and a few anisocytic stomata present on both surfaces; mesophyll shows two layers of palisade cells below the upper epidermis followed by cells of spongy parenchyma, a number of small vascular bundles present in mesophyll; stomatal index 11 to 13 (upper surface), 22 to 25 (lower surface); palisade ratio 3 to 5.

**Fruit** -Fruit shows single layered epicarp covered with cuticle, covering and glandular trichomes similar to stem; mesocarp consists of thin walled parenchyma cells, a number of vascular bundles similar to leaf present in a row; lower mesocarpic region shows a band of 3 to 4 layers of lignified sclereids with narrow lumen, followed by a row of thick walled and lignified fibres, inner most region show 2 to 3 layers of parenchyma cell; seed coat shows 2 rows of palisade like macrosclereids, linea lucida present in outer layer; followed by a zone of thin walled parenchymatous cells, outer 2 to 3 layers thin walled and tangentially elongated cells, remaining cells circular to oval, lower parenchyma cells tangentially elongated and collapsed, small vascular bundles and vascular strands present; cotyledon shows thin walled parenchyma cells, most of them loaded with aleurone and starch grains; starch grains simple, mostly oval with cleft shaped central hilum, measuring upto 20  $\mu$  in length.

**Powder** Shows fragments of epidermal cells with anomocytic and anisocytic stomata with covering and glandular trichomes, palisade like macrosclereids, parenchyma cells with starch and aleurone grains, bordered pitted tracheids and vessels, simple pitted parenchyma cells, thick walled fibres, groups of radially elongated sclereids, isolated covering and glandular trichomes and palisade cells.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	9 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *toluene: ethyl acetate: ethyl alcohol* (7:1:2) as mobile phase, shows spots under UV 254 nm at R<sub>f</sub> 0.81 (pink), 0.51, 0.37 (both light blue), 0.63, 0.22 and 0.10 (all blue).

**CONSTITUENTS** - Flavonoids such as, quercetin, isoquercetin, kaempferol-3-glucoside, astragalin, populnin, biochenin-A-7-glucoside, isorhamnetin, protensein, garbanzol and cyanogenic glycosides.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Lavaṇa, Amla
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Vātakara, Pittahara, Kaphahara, Viṣṭambhī, Balya, Rucikara,  
Ādhmānakāraka

**IMPORTANT FORMULATIONS** - Kravyāda Rasa, Caṇakāmla, Caṇakādi Lepa

**THERAPEUTIC USES** - Annadravaśūla (gastric ulcer), Chardi (emesis), Dāha (burning sensation), Jvara (fever), Kāsa (cough), Pīnasa (chronic rhinitis / sinusitis), Prameha (metabolic disorder), Śoṣa (emaciation), Śvāsa (Asthma), Tṛṣṇā (thirst), Udara (diseases of abdomen)

**DOSE** - Cūrṇa (powder) : 5 to 20 g

## DĀRUHARIDRĀ (Fruit)

Drug consists of dried fruits of *Berberis aristata* DC. (Fam. Berberidaceae), an erect, glabrous, spinescent shrub found in the Himalayas between 2000 to 3000 m and also growing in Nilgiri hills.

**SYNONYMS** : Dārvī, Dāruniśā

### REGIONAL LANGUAGE NAMES

Bengali	:	Darhaldi, Daaruharidraa
English	:	Indian barberry
Gujrati	:	Daaruhaldar
Hindi	:	Daaruhaldi, Darhald, Zarishka (Fruit), Chitraa
Malayalam	:	Maradarisina, Maramaanjal
Marathi	:	Daaruhalada
Oriya	:	Daaruhaldi
Punjabi	:	Chitra, Kasmal, Simlu, Sumlu, Daarhaldi
Telugu	:	Manupasupu
Urdu	:	Zarishk

### DESCRIPTION

#### a) Macroscopic

Young fruit bright red in colour but changes to blue black when mature, 10 to 12 mm long, 5 to 8 mm thick; ovoid; outer surface shows wrinkles when dried; seeds, 3 in each fruit, about 6 mm long, 2 to 3 mm thick, ovoid, and somewhat flattened; characteristic odour present taste slightly bitter.

#### b) Microscopic

**Pericarp** - Pericarp consists of a single layer radially elongated, lignified cells of epicarp covered with thick cuticle, mesocarp wide, composed of 20 to 25 layered

parenchymatous cells; some prismatic and clusters of calcium oxalate crystals present in this region; endocarp parenchymatous, single layered.

**Seed** -Testa shows two coats; outer coat comprising of 7 or 8 layers of lignified cells; epidermis of the outer coat consists of elongated cells, followed by 6 to 7 layers of parenchymatous cells; inner coat comprising of 4 to 6 layers of compactly arranged thin walled cells containing starch grains; individual starch grains simple to compound with 2 or 3 components, oval to spherical, variable in size, about 2 to 7  $\mu$  in diameter with a centric hilum; embryo parenchymatous.

**Powder** -Black-brown, taste slightly bitter; starch grains simple to compound with 2 or 3 components, oval to spherical variable in size; about 2 to 7  $\mu$  in diameter with a centric hilum, prismatic and clusters of calcium oxalate crystals; fibres; vessels reticulately thickened, thin walled tracheids with some pits; surface view of testa; elongated cells of epidermis.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	13 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the alcoholic extract of the drug on silica gel 'G' plate using *toluene: ethyl acetate* (90:10) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating the plate for ten minutes at 105<sup>0</sup>, shows spots at  $R_f$  0.11, 0.23, 0.34, 0.46, 0.80 & 0.93 (all violet). On spraying the plate with 5% *methanolic sulphuric acid reagent* and heating for ten minutes at 105<sup>0</sup>, it shows spots at  $R_f$  0.11, 0.28, 0.39, 0.66, 0.72 & 0.95 (all violet). On exposure to *iodine vapors*, spots appear at  $R_f$  0.23, 0.30, 0.82 and 0.93 (all yellow).

T.L.C. of the alcoholic extract of the drug on silica gel 'G' plate using *toluene: ethyl acetate: formic acid* (50:15:5) shows spots i.e. one light yellow and one red in UV, in iodine spots at  $R_f$  0.20, 0.49, 0.65, 0.75, 0.81, 0.87, 0.93 and 0.99 (all brown). On spraying with 10 % *sulphuric acid* and heating the plate for 10 minutes at  $105^0$ , spots appear at  $R_f$  0.12, 0.19, 0.26, 0.29, 0.35, 0.74, 0.83, 0.90 and 0.97 (all violet).

The alcoholic extract of the drug in solvent system *chloroform: methanol: ammonia* (60:30:1) shows one greenish spot at  $R_f$  0.94 in visible light. In UV, yellow spots appear at  $R_f$  0.15, 0.62, 0.80 and 0.96. On spraying with modified *Dragendorff's reagent*, orange spots appear at  $R_f$  0.87, 0.92 and 0.97.

**CONSTITUENTS** - Alkaloids: berberine, oxyberberine, berbamine, palmatine, jatrorrhizine, tetrahydropalmitine etc.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Amla
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Rucya, Pittaśamana, Viṣṭambhī

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmātisāra (diarrhoea due to indigestion), Aruci (tastelessness), Hṛllāsa (nausea), Jvara (fever), Pittaja atisāra (diarrhoea due to Pitta doṣa), Raktavikāra (disorders of blood), Tṛṣṇā (thirst), Vamana (emesis), Viṣavikāra (disorders due to poison), Yakṛtodara (enlargement of liver / hepatomegaly)

**DOSE** - Cūrṇa (powder) : 3 to 5 g

## DHAVA (Fruit)

Dhava consists of dried fruits of *Anogeissus latifolia* Wall. (Fam. Combretaceae), a large to moderate sized tree common throughout India, in deciduous forests ascending upto 1350 m in the Himalayas and in the South Indian Hills.

**SYNONYMS :** Gaura, Dhurandhara

### REGIONAL LANGUAGE NAMES

Bengali	:	Dhaauyaa gaachh
English	:	Axle wood
Gujrati	:	Dhaavado
Hindi	:	Baakali, Dhauraa, Dhav, Dhaavaa
Kannada	:	Dinduge
Malayalam	:	Vellanava, Malukkanniram
Marathi	:	Dhaavdaa, Dhaval
Oriya	:	Dhaau
Tamil	:	Vellanagai, Vellanamai
Telugu	:	Chirimaanu

### DESCRIPTION

#### a) Macroscopic

Fruit 5 to 6 mm long, 9 to 11 mm in diameter including 2 wings, coriaceous, compressed and packed horizontally into dense heads; containing 1-seed, 4 or 5 mm long, 7 or 8 mm in diameter; characteristic odour, tasteless.

#### b) Microscopic

**Pericarp** -Pericarp about 500  $\mu$  in depth shows two distinct regions: outer region is the epicarp having thick sclereid with an outer thick cuticle, followed by 6 to 9 layers of

thick walled, elongated cells of mesocarp; endocarp not distinct; prismatic and rosettes of calcium oxalate scattered in the region of mesocarp.

**Seed** -Seed coat about 140 to 220  $\mu$  thick, comprise of 6 to 11 layers of thin walled, elongated and highly compressed parenchymatous cells; cells of the seed coat also contain prismatic and rosette of calcium oxalate; 2 or 3 layers of thin walled cells of endocarp present beneath the seed coat followed by the embryo; cotyledons are composed of thin walled parenchymatous cells with brown pigment.

**Powder** -Dark brown, odour specific, tasteless, characterized by the presence of prisms and rosettes of calcium oxalate, sclereids, thick walled parenchymatous cells, thick walled fibres and vessels with bordered pits present.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	0.4 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	8 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the alcoholic extract of the drug on silica gel 'G' plate using *toluene: acetone: formic acid* (55: 40: 5) as mobile phase and when seen under UV light 365 nm shows fluorescent zones at  $R_f$  0.72 and 0.78 (both greenish); and on exposure to *iodine vapour*, spots appear at  $R_f$  0.16, 0.21, 0.48, 0.56, 0.80, and 0.93 (all yellow).

In *toluene: ethyl acetate: formic acid* (40:25:04), yellow colored spots appear in visible light. On spraying with *anisaldehyde sulphuric acid reagent* and heating for 10 minutes at  $105^{\circ}$ , spots at  $R_f$  0.19, 0.23 (both faint reddish), 0.30 (bluish black), 0.64, 0.75 (both reddish) 0.80 (blackish) and 0.92 (violet).

In *toluene*: *ethyl acetate* (93:7), under UV 365 nm intense blue spot at  $R_f$  0.36 appears. On spraying *vanillin sulphuric acid reagent* and heating for 10 minutes at  $105^{\circ}$ , spots appear at  $R_f$  0.28, 0.33, 0.43, 0.54, 0.60, 0.70, 0.78, and 0.83 (all violet).

**CONSTITUENTS** - Tannins, gallic acid, saponins, and flavonols like quercetin and myricetin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Rucya, Dīpana, Vātakara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aśmarī (calculus), Arśa (piles), Mūtrakṛcchra (dysuria), Medoroga (obesity), Pāṇḍu (anaemia), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Upadaṃśa (soft chancre)

**DOSE** - Cūrṇa (powder): 5 to 10 g

## **DHAVA (Stem Bark)**

Dhava consists of dried stem bark of *Anogeissus latifolia* Wall. (Fam. Combretaceae), a large to moderate sized tree common throughout India, in deciduous forests ascending upto 1350 m in the Himalayas and South Indian Hills.

**SYNONYMS** : Gaura, Dhurandhara

### **REGIONAL LANGUAGE NAMES**

Bengali	:	Dhaauyaa gaachh
English	:	Axle wood
Gujrati	:	Dhaavado
Hindi	:	Baakali, Dhaavaa, Dhauraa, Dhav
Kannada	:	Dinduge
Malayalam	:	Malukkanniram, Vellanava
Marathi	:	Dhaavdaa, Dhaval
Oriya	:	Dhaau
Tamil	:	Vellanagai, Vellanamai
Telugu	:	Chirimaanu

### **DESCRIPTION**

#### **a) Macroscopic**

Pieces of bark mostly about 4 to 6 cm long, 1.5 to 1.75 cm wide and 1 or 2 mm thick, hard, recurved, externally pale, fairly smooth having small ridges; inner surface pale brown, smooth but longitudinally striated; fracture clean; faint odour; taste, slightly bitter and astringent.

#### **b) Microscopic**

Mature bark consists of an outer 7 to 9 radially arranged layers of cork cells, followed by 20 to 24 layers of parenchymatous thin walled cells of phelloderm, both regions

containing prismatic and rosette crystals of calcium oxalate; secondary phloem very wide and characterized by the occurrence of numerous patches of sclereids, fibres, sieve tubes, companion cells and phloem parenchyma; crystals of calcium oxalate and granules of starch grains also present in cells; starch grains circular in appearance with a centric hilum and measure 6 to 13  $\mu$ .

**Powder** -Light brown, taste bitter, shows circular starch grains measuring 6 to 13  $\mu$ , numerous prismatic and rosettes of calcium oxalate, phloem fibres both simple and septate, thin walled, 155 to 200  $\mu$  long, 10 to 20  $\mu$  in width; thick walled fibres about 275 to 340  $\mu$  long, 9 to 20  $\mu$  in width with 6 to 11  $\mu$  wide lumen; sclereids of various shapes, measuring about 80 to 235  $\mu$  long and 25 to 75  $\mu$  wide, thin walled parenchymatous cells also present.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	11 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	11 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	20 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the alcoholic extract of the drug on silica gel 'G' plate of 0.2 mm thickness using *toluene: ethyl acetate* (93:7) as mobile phase and when seen under UV light 366 nm shows only one fluorescent zone at  $R_f$  0.10 (greenish). On spraying with *anisaldehyde sulphuric acid reagent* and heating the plate for 15 minutes at 105<sup>0</sup>, spots appear at  $R_f$  0.10 (black), 0.20 (pink), 0.30 (green), 0.34 (blue), 0.40 (green) 0.44 (pink), 0.50, 0.56 (both blue), 0.65 (black), 0.73 (pink), 0.86 (green), 0.93 (blue).

T.L.C. of the alcoholic extract in solvent system *toluene: ethyl acetate* (90:10) and on spraying with *vanillin sulphuric acid reagent* show spots appearing at  $R_f$  0.40 (violet), 0.58 (violet), 0.72 (brownish), 0.87 and 0.98 (both violet).

**CONSTITUENTS** - Phenolic compounds such as ellagic acid, flavellagic acid, and flavonols like quercetin, myricetin and procyanidin along with gallotannins, shikimic acid, quinic acid, amino acids, alanine and phenylalanine.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Rasāyana, Dīpana, Medoghna

**IMPORTANT FORMULATIONS** - Ayaskṛti, Nyagrodhādi Cūrṇa

**THERAPEUTIC USES** - Aśmarī (calculus), Arśa (piles), Karṇasrāva (otorrhoea), Kuṣṭha (Leprosy / diseases of skin), Mūtrakṛchra (dysuria), Medoroga (obesity), Pāṇḍu (anaemia), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Upadaṃśa (soft chancre), Visarpa (Erysepales)

**DOSE** - Kvātha (decoction) : 30 to 50 ml

## DVĪPĀNTARA DAMANAKA (Whole Plant)

Dvīpāntara Damanaka consists of the dried whole plant in flowering stage of *Artemisia absinthium* L. (Fam. Asteraceae), a herbaceous plant found in Kashmir and Nepal.

**SYNONYMS :** Koṇākāṇḍā, Sugandhidru, Śira ḥśūlakarī

### REGIONAL LANGUAGE NAMES

Bengali	:	Mastaru
English	:	Worm wood, Absinth
Gujrati	:	Mastaru
Hindi	:	Vilayati afsantin
Kannada	:	Titaveen, Vruvalu
Malayalam	:	Nilampala, Tirunitripachcha
Marathi	:	Serpana
Punjabi	:	Mastiyaaraa
Telugu	:	Moshipatri, Machipatri
Urdu	:	Afsanteen

### DESCRIPTION

#### a) Macroscopic

**Stem** Usually unbranched, internodes 4 to 5 cm in length, 0.5 to 5 mm in thickness; surface pale brown, longitudinally furrowed, with attached petiole or its scar at the nodal region; pubescent; fracture short and splintery in the bark, fractured surface yellowish; odour not characteristic; taste, bitter.

**Leaf** Crumpled and broken; measuring about 2 cm in length and 2 mm in breadth, easily getting detached from the stem; petiolate, ovate to obovate, pinnatifidly cut into 2 or 3 spreading linear or lanceolate, obtuse segments, hairy on both sides, greyish green in colour and bitter in taste.

**Flower head** Pedunculate, borne on a hairy receptacle of 1.5 to 5 mm in diameter; ligulate flower, many, yellow, heterogamous; stigma bilobed; stamens 5, anthers syngeneceious; ray florets, a few, dilated below; involucre of bracts, oblong, hairy, narrowly scarious; achenes, flat, elliptic oblong and black in colour.

## **b) Microscopic**

**Stem** Stem circular in outline, faintly elevated and furrowed at places, epidermis, covered with abundant trichomes of varying sizes and shapes; simple unicellular covering trichomes are 45 to 80  $\mu$  in length, multicellular of 2 to 4 celled, 140 to 150  $\mu$  in length; hooked or sickle shaped, 175 to 230  $\mu$  in length and 'T' shaped with uni or bicellular stalk, with spreading 245 to 250  $\mu$  long arms; glandular trichomes stalked, very short, measuring 2 to 20  $\mu$  in length with multicellular head; cortex collenchymatous; endodermis distinct, consisting of barrel shaped tangentially elongated, biconvex cells; pericycle, characterized by oval shaped well developed patches of lignified sclerenchyma usually lying above each of the vascular bundle; phloem very narrow, at places obliterated; xylem consisting of vessels, tracheids and thin walled fibres, vessels radially arranged, border pitted, annular or scalariform, and measure 230 to 240  $\mu$  in length and 20 to 35  $\mu$  in breadth; medullary rays lignified, radially elongated, uni to triseriate, especially in older stem; pith wide, cells parenchymatous, pitted and thick walled, secretory canals isolated and located towards the peripheral region of the pith.

**Leaf** Surface preparation of the leaf shows thick walled, slightly wavy, epidermal cells with faint striated cuticle and stomata of anomocytic type; trichomes plenty, identical with those of stem, 'T' shaped trichomes are maximum in number characterized with their long spreading arms measuring 295 to 350  $\mu$  in length, occasionally glandular trichomes appressed, with oval or bilobed heads.

**Powder** Pale yellowish-brown, extremely bitter in taste; with characteristic bitterish odour; 'T' shaped trichomes of leaf and stem, are plenty; other characters are, uniseriate multicellular trichomes of leaf and bracts; wooly trichomes of ray florets; anomocytic type

stomata of leaf; lignified somewhat rectangular shaped anther cells; triangular pollen grains, thick walled pitted cells of pith and groups of lignified fibres, and fragments of pitted and spirally thickened vessels of the stem.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	14 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	7 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not more than	11 per cent,	Appendix 2.2.8
Volatile oil	Not more than	0.1 per cent,	Appendix 2.2.12

### T.L.C.

T.L.C. of the volatile oil on silica gel 'G' plate (0.2 mm thick) using *toluene:ethyl acetate* (93:7) as mobile phase and when seen under UV 366 nm shows fluorescent spots at  $R_f$  0.47, 0.64, 0.70 and 0.82. On exposure to *iodine vapour*, spots appear at  $R_f$  0.28, 0.31, 0.35, 0.41, 0.55, 0.75 and 0.86.

**CONSTITUENTS** - Volatile oil (which contain  $\alpha$ -pinene,  $\beta$ -pinene,  $\beta$ -phellandrene, thujone, azulene, sabinyl acetate, etc.) and bitter principles absinthin and iso-absinthin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Ārtavajanana, Dīpana, Kaphahara, Kṛmighna, Mūtrala, Śothahara, Sugandhi, Vātahara, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Apasmāra (Epilepsy), Jīrṇajvara (chronic fever), Jalodara (ascites), Kṛmi (worm infestation), Kaṣṭhārtava (dysmenorrhoea), Karṇaśūla (otalgia), Mūtrakṛcchra (dysuria), Pakṣāghāta (Paralysis / Hemiplegia), Plīha roga (splenic disease), Sandhiśoṭha (arthritis), Śoṭha (inflammation), Udararoga (diseases of abdomen), Vātaroga (disease due to Vāta doṣa), Yakṛt roga (liver disorder)

**DOSE** - Cūrṇa (powder) : 1 to 2 g

## DVĪPĀNTARAŚATĀVARĪ (Root)

Dvīpāntara Śatāvarī consists of dried roots of *Asparagus officinalis* L. (Fam. Liliaceae), a shrub found in Europe and America, introduced in India and successfully cultivated at higher elevations in Kashmir and also in parts of plains.

**SYNONYMS :** Sūcigucchā

### REGIONAL LANGUAGE NAMES

Bengali	:	Hikua, Hillua
English	:	Asparagus, Sperage
Hindi	:	Halyun
Marathi	:	Halyun
Urdu	:	Haliyoon

### DESCRIPTION

#### a) Macroscopic

Root occurs in small pieces, 2 to 6 cm long and 0.2 to 0.5 cm thick; surface rough due to longitudinal wrinkles, root hairs and scars; creamish white externally and pale white internally; fracture hard and fibrous; odour, rancid, taste, disagreeable.

#### b) Microscopic

TS consists of an outer cuticle and a single layer of epiblema, cells polygonal; unicellular hairs present; below epidermis 3 or 4 rows of cork cells; cortical tissue consists of parenchymatous cells, more or less circular in outline with small intercellular spaces, and several cells show the presence of raphides; endodermal cells possess casparian strips on their radial walls; xylem bundles arranged in radial rows alternately with phloem and consists of vessels and tracheids; pith cells parenchymatous with a large number of intercellular spaces.

**Powder** Cream coloured, shows under microscope, cortical parenchyma with raphides; vessels with simple cross wall perforation plates, numerous small and large pits on the walls; tracheids lignified elongated and pointed with annular thickenings; fibres elongated and pointed at both the ends.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	10 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2.5 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	9 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	24 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of methanolic extract of the drug on a precoated silica gel 'G' plate using *chloroform: methanol: water* (65:35:10) as mobile phase and on spraying with *Liebermann Burchard reagent* and heating the plate for about five minute at 105<sup>0</sup>, shows spots at R<sub>f</sub> 0.65 & 0.50 (both light brown) and 0.24 (light yellow).

**CONSTITUENTS** - Saponin glycosides,  $\beta$ -sitosterol, saccharopine, 2-amino adipic acid, asparagusic acid, dihydroasparagusic acid, *S*-acetyl dihydroasparagusic acid, spirostanol glucoside, sarsasapogenin glycoside, asparasaponin I and asparasaponin II and nine steroid glucosides named as asparagosides A, B, C, D, E, F, G, H and I.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guna</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Hṛdya, Mūtrala, Pittahara, Vṛṣya, Vājīkaraṇa

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aśmarī (calculus), Kāmalā (Jaundice), Mūtrakṛcchra (dysuria), Śoṭha (inflammation), Vātarakta (Gout)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## ELAVĀLUKAM (Root)

Elavālukam consists of roots of *Prunus avium* L. (Fam. Rosaceae), a small tree with fascicled white flowers which appear along with the new leaves. The wild form of this species is often used as a stock for grafting cultivated varieties of cherry. The plant is found in Kashmir, Kumaon and Himachal Pradesh.

**SYNONYMS** :       Āluka, Vāluka, Eluka

### REGIONAL LANGUAGE NAMES

Bengali	:	Elavaaluka
English	:	Sweet Cherry
Hindi	:	Alubukhara, Aluvaalu, Gilaas, Aalubaalu
Kannada	:	Chary hannu
Oriya	:	Mitha cherry
Punjabi	:	Alubukhara
Telugu	:	Cherychettu, Alubakraapandu
Urdu	:	Alubalu, Alubukhara

### DESCRIPTION

#### a) Macroscopic

Root knotty and irregular, tortuous, with a dark grey bark up to 3.5 mm thick and transversely elongated brown lenticels; wood hard, yellow inside, yellowish-orange on the outer smooth surface; fracture, irregular, splintery; odour and taste not distinctive.

#### b) Microscopic

TS through the root shows a rather diffuse wood structure showing small isolated vessels, 60 to 70  $\mu$  in diameter, and abundant fibres; vessels mostly show simple to bordered pits and have simple perforations; fibres present in large groups and sometimes having fine

septa; parenchyma rare and if present, diffused or scattered; rays 1 to 4 seriate, several cells high, parenchymatous, made of rectangular cells possessing starch grains.

**Powder** Light brown, coarse and fibrous; taste and odour not distinct; powder microscopy shows vessels with simple and bordered pits, fibres in isolation or in groups, fragments of tissue showing ray parenchyma cells and fibres.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	8 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	5 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the alcoholic extract on pre-coated silica gel 'G' F<sub>254</sub> plate using *chloroform: methanol* (8:2) as mobile phase and on spraying the plate with *Natural Product reagent*, shows spots at R<sub>f</sub> 0.09 (pink), 0.23 (fluorescent spot), 0.39 (reddish brown), 0.46 (fluorescent spot), 0.64 (violet) and 0.87 (orange) at 366 nm.

**CONSTITUENTS** - Cyanogenic glycoside like D-mandelonitril-β- glucoside (prunasin).

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Pittahara, Śukraśodhana, Vedanāsthāpana, Vamana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Aruci (tastelessness), Kṛmi roga (worm infestation), Kaṇḍū (itching), Kuṣṭha (Leprosy / diseases of skin), Vraṇa (ulcer), Mūtraroga (urinary diseases), Raktapitta (bleeding disorder)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## ELAVĀLUKAM (Stem Bark)

Elavālukam consists of stem bark of *Prunus avium* L. (Fam. Rosaceae), a small tree with fascicled white flowers which appear along with the new leaves. The wild form of this species is often used as a stock for grafting cultivated varieties of cherry. The plant is found in Kashmir, Kumaon and Himachal Pradesh.

**SYNONYMS** : Āluka, Vāluka, Eluka

### REGIONAL LANGUAGE NAMES

Bengali	:	Elavaaluka
English	:	Sweet Cherry
Hindi	:	Aalubaalu, Alubukhara, Aluvaalu, Gilaas
Kannada	:	Chary hannu
Oriya	:	Mitha cherry
Punjabi	:	Alubukhara
Telugu	:	Alubakraapandu, Cherychettu
Urdu	:	Alubalu, Alubukhara

### DESCRIPTION

#### a) Macroscopic

Bark up to 3.5 mm in thickness, rough, dark grey outside, smooth and orange inside; usually exfoliating in 2 layers- outer thin greyish layer which recurves transversely on removal and forms a quill or a double quill, and the inner greenish yellow, thicker layer which remains straight or curved; lenticels scattered, elongated, spindle or oval shaped, transversely oriented, having a central slit and raised upper and lower margins, brown; stem bark may sometimes be associated with foliose lichens of greenish light grey colour; fracture, short, fibrous; odour, sharp; taste, bitter.

## b) Microscopic

The bark in TS often shows small layers of cork cells peeling off in a recurved manner from many layered corky tissue which is subtended by a few layers of clear, rectangular, thin walled cells of cork cambium; 2 to 3 layers of secondary cortex inner to cork cambium have highly flattened, tangentially elongated cells; secondary cortex parenchymatous, with circular or elongated cells; groups of small and large, usually up to 35  $\mu$  size stone cells and occasionally, rosettes of calcium oxalate crystals up to 30  $\mu$ , are scattered in the secondary cortex; cortex and phloem also have single or groups of characteristic thick walled, long, straight or tortuous, branched and un-branched fibres; the medullary rays run out into the secondary cortex to form funnel like patches.

**Powder** Brown, coarse, fibrous and fluffy, taste bitter; odour not distinct; microscopy shows characteristic thick walled, long, straight or tortuous, branched and un- branched fibres, and groups of cork cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	1 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	7 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	0.5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	11 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' F<sub>254</sub> plate using *butanone: ethyl acetate: acetic acid: water* (3:5:1:1) as mobile phase, and on spraying the plate with *Natural Product reagent*, shows spots at R<sub>f</sub> 0.44 and 0.53 (both fluorescent blue) and at R<sub>f</sub> 0.82 (dark zone) at 366 nm.

**CONSTITUENTS** - Cyanogenic glycoside like D-mandelonitril- $\beta$ -glucoside (prunasin), D-mandelonitrile- $\beta$ -gentiobioside dehydrowogonin 7-glucoside and chrysin 7-glucoside are

main components. Tectochrysin, apigenin 5-glucoside, genkwanin 5-glucoside and neosakuranine are the minor components.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Pittahara, Śukraśodhana, Vamana, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Aruci (tastelessness), Hṛdroga (heart diseases), Kaṇḍū (itching), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Mūtraroga (urinary diseases), Raktapitta (bleeding disorder), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder) : 1 to 3 g

## ERANḌAKARKAṬĪ (Fruit)

Eraṇḍakarkaṭī consists of dried pericarp of mature and unripe fruits of *Carica papaya* L. (Fam. Caricaceae), a small, fast growing tree, cultivated throughout India for its fruits and latex, which is a commercial source of enzyme papain.

**SYNONYMS :** Madhukarkaṭī, Gopālakarkaṭī

### REGIONAL LANGUAGE NAMES

Bengali	:	Papeyaa, Pappiyaa
English	:	Papaya, Melon tree, Pawpaw
Gujrati	:	Erandakaakadi, Papaiyu, Papita
Hindi	:	Papitaa
Kannada	:	Pirangi, Pappaay
Malayalam	:	Karmaasu, Pappaay, Karumatti
Marathi	:	Papaayaa, Papai
Punjabi	:	Erandakharbujaa
Tamil	:	Pappali
Telugu	:	Boppayi, Bobbaasi, Paringi

### DESCRIPTION

#### a) Macroscopic

Pericarp of fruit in pieces measuring upto 6 cm in length, 1.5 cm in width and 1 to 2 mm. thick; surface shrunken, epicarp portion dark greenish-brown, mesocarp cream to yellowish brown, leathery, odour characteristic; taste, bitter and mucilagenous.

#### b) Microscopic

Epicarp shows single layer of thin walled cells covered externally with thick cuticle; mesocarp a wide zone consisting of circular to oval parenchyma cells with scattered vascular

bundles and unbranched laticiferous ducts, endocarp 2 or 3 layers of compact thin walled parenchyma cells; some of the parenchyma cells of mesocarp contain rosettes of calcium oxalate crystals.

**Powder** - Shows fragments of parenchyma cells with adjoining laticiferous ducts, parenchyma cells containing rosettes of calcium oxalate crystals, scalariform and spiral xylem vessels, parenchyma cells with overlapping vessels, epidermal cells with anomocytic and anisocytic stomata and a few scattered rosettes of calcium oxalate crystals.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	14 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.5 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	2 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	25 percent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *toluene: ethyl acetate: acetic acid: methanol* (4.5:1:0.7:0.3) as mobile phase, on spraying the plate with *ethanolic sulphuric acid* (10%) reagent and heating at 110<sup>0</sup> for 10 minutes spots appear at R<sub>f</sub> 0.14,0.45,0.51,0.70, 0.75, 0.80 (all brown) and 0.23 (blue).

**CONSTITUENTS** - -β-carotene, papain, carpaine.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Madhura
<b>Guna</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Dīpana, Vātakara, Stanya, Hṛdya, Bṛṃhaṇa

**IMPORTANT FORMULATIONS** - Apakvaphalaniryāsa Lepa

**THERAPEUTIC USES** - Kṛmi (worm infestation), Kāsa (cough), Raktavikāra (disorders of blood), Śvāsa (Asthma), Vātarakta (Gout)

**DOSE** - Cūrṇa (powder) : 10 to 20 g

## ERANḌAKARKAṬĪ (Root)

Eraṇḍakarkaṭī consists of dried roots of *Carica papaya* L. (Fam.Caricaceae), a small fast growing tree, cultivated throughout India for its fruits and for latex, which is a commercial source of the enzyme papain, extracted from it.

**SYNONYMS :** Mdhukarkaṭī, Gopālakarkaṭī

### REGIONAL LANGUAGE NAMES

Bengali	:	Papeyaa, Pappiyaa
English	:	Melon tree, Papaya, Pawpaw
Gujrati	:	Erandakaakadi, Papaiyu, Papita
Hindi	:	Papitaa
Kannada	:	Pappaay, Pirangi
Malayalam	:	Karmaasu, Karumatti, Pappaay
Marathi	:	Papaayaa, Papai
Punjabi	:	Erandakharbujaa
Tamil	:	Pappali
Telugu	:	Bobbaasi, Boppayi, Paringi

### DESCRIPTION

#### a) Macroscopic

Roots cylindrical, in cut pieces upto 10 cm. long and 1.5 cm. thick; surface pale brown with longitudinal wrinkles and scars of rootlets; fracture, short and horny; odour and taste indistinct.

#### b) Microscopic

Root shows narrow cork consisting of rectangular and tangentially elongated cells; phellogen single layered, phelloderm consists of tangentially elongated parenchyma cells,

some of them containing rosettes of calcium oxalate crystals; phloem consists of sieve tubes, companion cells, phloem parenchyma and fibres; both xylem and phloem are traversed by multiseriate medullary rays; vessels show reticulate thickenings except vessels all the xylem elements are thin walled and non-lignified.

**Powder** -Powder shows thin walled parenchyma cells, some of them containing rosette of calcium oxalate crystals, fragments of cork cells, fibres with solid tapering or blunt ends and vessels with reticulate thickenings.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	18 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1.5 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	3 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	15 percent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *toluene: ethyl acetate: methanol: acetic acid* (4:5:2:0:2) as mobile phase, on spraying the plate with *ethanolic sulphuric acid* (10%) reagent and heating at 110<sup>0</sup> for 10 minutes; spots appear at R<sub>f</sub> 0.17,0.27,0.64,0.70, and 0.74(all brown).

**CONSTITUENTS** - Carpesanine, carpaine.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guna</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Mūtrala

**IMPORTANT FORMULATIONS** - Aśmarīharakaṣāya Cūrṇa

**THERAPEUTIC USES** - Aśmarī (calculus), Arśa (piles), Aruci (tastelessness), Kṛmi roga (worm infestation), Mūtraroga (urinary diseases), Raktapitta (bleeding disorder), Raktapradara (menorrhagia or metrorrhagia or both), Tvakroga (skin diseases), Udaraśūla (pain in the abdomen), Vātarakta (Gout), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder) : 2 to 6 g

## GANDHAŚIPHĀ (Whole Plant)

Gandhaśiphā consists of the whole plant of *Pavonia odorata* Willd. (Fam. Malvaceae), a pubescent herb found in the plains of India.

**SYNONYMS** : Picchila lomaśa ḥ

### REGIONAL LANGUAGE NAMES

Bengali	:	Sugandha-bala
Gujrati	:	Kalowalo
Hindi	:	Sugandha-bala
Kannada	:	Balarakkasi-gida
Malayalam	:	Kuruntotti
Marathi	:	Kaalaavaalaa
Tamil	:	Peramutti
Telugu	:	Chitti benda

### DESCRIPTION

#### a) Macroscopic

**Root** Pale brown, well developed, with lateral roots upto 0.75 cm in thickness, length variable, no characteristic odour; taste, slightly bitter.

**Stem** Green in colour, slightly hairy, variable in length and thickness; leaves intact, no characteristic odour; taste, slightly bitter.

**Leaf** Petiole upto 5 cm long with prominent midrib on both surfaces; leaf 2.5 to 5 cm long, roundish cordate, 3 to 5 lobed, lobes acute, distantly toothed, hairy on both surfaces, mildly aromatic, taste bitter.

## **b) Microscopic**

**Root** Outer cork crushed, inner cork 5 or 6 layered, cells rectangular, tangentially elongated; cortex parenchymatous, inner one or 2 layers discontinuously collenchymatous; groups of sclereids scattered in the cortex; endodermis indistinct; pericyclic fibres present; xylem consists of circular vessels and lignified parenchyma; uniseriate and multiseriate rays present; pith absent; druses and simple as well as compound starch grains present in all the regions.

**Stem** Epidermis single layered; cuticle present; unicellular slightly curved trichome present; cortex consists of 2 or 3 layers of hypodermal parenchyma followed by 1 or 2 layers of collenchyma with remaining 1 or 2 layers of parenchymatous cells; inner region of cortex showed alternating sclereids and fibres; endodermis indistinct; pericyclic fibres present; stele shows phloem and solitary, medium sized, many circular vessels embedded in lignified parenchyma; uniseriate or multiseriate rays filled with starch grains present; pith parenchymatous; druses, abundant particularly in phloem and simple as well as compound starch grains present throughout the ground tissues.

## **Leaf**

**Petiole** Circular in outline; epidermal cells single layered with cuticle; cortex consists of 1 or 2 layers of hypodermal chlorenchyma followed by 2 or 3 layers of collenchyma and 2 or 3 layers of parenchyma cells; isolated, collateral vascular bundles arranged in a circle, each capped by sclerenchyma; druses present in the phloem region; xylem vessels circular with lignified parenchyma; pith parenchymatous; simple and compound starch grains present throughout the cortex and pith.

**Midrib** Shows a protrusion on the adaxial side and a hemispherical projection on the abaxial side; epidermis single layered with cuticle; stellate hair as well as uniseriate, multicellular trichomes upto 14 cells in length with conical tip, and unicellular trichomes present on both sides; hypodermal layer consists of 2 to 4 layers of collenchyma cells; rest of the region parenchymatous; 4 or 5 big mucilage cells present on both the adaxial and abaxial side;

collateral crescent shaped median vascular bundle present, showing xylem towards adaxial and phloem on abaxial side; druses present in the phloem region.

**Lamina** Dorsiventral; epidermis single layered with cuticle; palisade parenchyma single layered; 2 or 3 layers of spongy parenchyma cells present; mucilage cells present in the mesophyll region; stomata anomocytic on both surfaces; cell walls wavy; stomatal number 10 to 15 / mm<sup>2</sup> on adaxial epidermis, 30 to 35 / mm<sup>2</sup> on abaxial epidermis; stomatal index 9 to 11 for adaxial epidermis and 15 to 17 for abaxial epidermis; palisade ratio 8 to 10; veinlet termination number 10 to 15; vein islet number 10 to 12.

**Powder** Brown, stellate, unicellular as well as uniseriate multicellular trichomes as described above present, druses 10 to 40 μ in size; starch grains simple and compound, individual starch grains measuring 5 to 10 μ in diameter; length of fibres 300 to 700 μ; and cork cells also seen.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	9 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	4 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	9 percent,	Appendix 2.2.8
Fixed oil	Not less than	4 per cent,	Appendix 2.2.9

#### **T.L.C.**

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (5:1.5) as mobile phase and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.18, 0.22, 0.40, 0.64, 0.71, 0.76, 0.80 and 0.87 (all green). Under UV 366 nm fluorescent zones appear at R<sub>f</sub> 0.18 (blue), 0.22, 0.31, 0.38, 0.44, 0.58 (all pink), 0.64 (blue), 0.73, 0.80 (both pink) and 0.93 (blue). On exposure to *iodine vapour* spots appear at R<sub>f</sub> 0.54, 0.71 and 0.77 (all brown). On dipping the plate in *vanillin-sulphuric acid*

*reagent* and on heating at 105° for 5 minutes spots appear at R<sub>f</sub> 0.15, 0.18 (both grey), 0.24 (violet), 0.43, 0.52, 0.62, 0.67 (all grey), 0.75 (yellow) 0.83 (green) and 0.94 (blue).

**CONSTITUENTS** - β-sitosterol; palmitic, stearic, oleic, linoleic, isovaleric and *n*-caproic acids; α - pinene and methyl eptenone, isovalaraldehyde, aromadendrin, azulene, pavonene, pavonenol.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Rūkṣa, Laghu, Sugandhi
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Balya, Dīpana, Jvaraghna, Kaphahara, Keśya, Mūtrala, Pācana, Pittahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aruci (tastelessness), Atisāra (diarrhoea), Chardi (emesis), Dāha (burning sensation), Hṛdroga (heart diseases), Hṛllāsa (nausea), Jvara (fever), Kuṣṭha (Leprosy / diseases of skin), Raktapitta (bleeding disorder), Śvitra (leucoderma / vitiligo), Tṛṣṇā (thirst), Visarpa (Erysepales), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## GRĪṢMACHATRAKA (Whole Plant)

Grīṣmachatraka consists of dried whole plant of *Mollugo cerviana* Seringe (Fam. Aizoaceae), an erect, slender annual, upto 20.0 cm high, found in dry and sandy areas commonly in Indian plains.

**SYNONYMS :** Uṣṇasundara

### REGIONAL LANGUAGE NAMES

Bengali	:	Ghimasak
Hindi	:	Jimasaka
Kannada	:	Parpataka
Malayalam	:	Parpatakapullu
Marathi	:	Pada
Oriya	:	Pitta Sag
Tamil	:	Parpadangam
Telugu	:	Parpatakamu

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap root yellow, thin, cylindrical and brittle.

**Stem** Branched, branches arises from the node, nodes upto 18 mm thick nodal distance of the stem ranges from 4 to 5.0 cm.

**Leaf** - Radical leaves present, tufted, linear-spathulate or obovate; cauline leaves, in whorls of 4 to 8 at each node of the branches, linear oblong or subspathulate.

**Flower** - Numerous in cymes; pedicel long filiform; perianth small, oval to oblong, obtuse with membranous margin; stamens 3 to 5; ovary globose, 3 to 5 celled; style very small; capsule as long as perianth, globose with many pink or yellowish seeds.

#### **b) Microscopic**

**Root** TS wavy in outline, epidermal cells vary in size and covered by a thin cuticle; cortex 4 to 5 cells deep, cells parenchymatous, laterally compressed without intercellular spaces; endodermis distinct, single layered of barrel-shaped parenchymatous cells; cells of pericycle smaller than endodermis; followed by 3 or 4 cells deep phloem; cambium 3 or 4 cells deep; xylem consists of vessels, tracheids, fibres and parenchyma.

**Stem** TS circular in outline; exhibits a thin cuticle covering the single layered epidermis followed by a parenchymatous hypodermis; cortex 5 to 8 cells deep, sclerenchymatous with narrow lumen; in the stelar region, alternate rings of phloem and xylem separated by 1 or 2 layered cambium; phloem narrow 2 or 3 cells deep and consists of sieve tubes, companion cells and phloem parenchyma; xylem consists of vessels, tracheids and fibres, the central portion occupied by sclerenchymatous pith.

**Leaf** TS of leaf consists of a single layered large rectangular upper and lower epidermis, covered with thin cuticle, interrupted by unicellular thick walled, lignified trichomes followed by single layered palisade cells on both the surfaces; in surface view the epidermal cells sinuous; stomata a few, anisocytic and paracytic present on lower side; spongy parenchyma 4 or 5 cells deep, cells angular; the whole leaf consists of 9 amphicribal vascular bundles, one in the midrib which is large and oval, while others smaller located in the mesophyll; all vascular bundles surrounded with a single layer of chlorenchymatous bundle sheath; xylem and phloem consists of usual elements.

**Powder** Powder greenish brown, microscopical examination shows, patches of wavy epidermal cells with stomata; parenchymatous cells of hypodermis; sclerenchymatous cell with narrow lumen of cortex, tracheids; thick walled, lignified, unicellular trichomes; many

small oval shaped yellowish brown coloured seeds; very minute, tricolpate pollen grains and groups of fibres.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	9.5 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	4 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 percent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *ethyl acetate: formic acid: acetic acid: water* (10:1:1:2) as mobile phase and when seen under UV 254 nm, spots appear at  $R_f$  0.13, 0.19, 0.27, 0.31, 0.39 and 0.47. On spraying with *anisaldehyde-sulphuric acid reagent* and heating the plate at 105° for 10 minutes, spots appear at  $R_f$  0.11 (blue), 0.19 (blue), 0.24 (green), 0.37 (blue), and 0.46 (yellow).

**CONSTITUENTS** - Flavonoid: orientin, vitexin and their 2'-*O*-glucosides.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Jvaraghna, Tr̥ṣṇāhara, Virecana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Jvara (fever), Dāha (burning sensation), Kāmalā (Jaundice), Prameha (metabolic disorder)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## GOKᅒURA (Whole Plant)

Gokᅒura consists of dried whole plant of *Tribulus terrestris* L. (Fam. Zygophyllaceae), an annual, rarely perennial, prostrate herb and a common weed of the pasture lands, roadsides and other waste lands, chiefly growing in hot, dry and sandy regions throughout India and upto 3,000 m in Kashmir.

**SYNONYMS** : Gokᅒuraka, Kᅒuraka, Trikaᅇᅇaka, Svādukaᅇᅇaka, Śvadaᅇᅇᅇᅇᅇᅇᅇ

### REGIONAL LANGUAGE NAMES

Assamese	:	Gokshura, Gokshuraka
Bengali	:	Gokshur, Gokhuree
English	:	Small caltrops, Land caltrops, Puncture vine
Gujrati	:	Nhana gokhru, Bethagokhru
Hindi	:	Gokhru, Chhotaagokshru, Hathichikar
Kannada	:	Neggilumullu, Neglu
Malayalam	:	Nerunji
Marathi	:	Sarate, Kate gokhru
Oriya	:	Gakhura, Gokshra, Gokharaa
Punjabi	:	Bhakhada, Bhakhar
Tamil	:	Nerinzil, Nerunjee
Telugu	:	Palleru
Urdu	:	Khar-e-khasak khurd

### DESCRIPTION

#### a) Macroscopic

**Root** - Cut pieces 7 to 18 cm long and 0.3 to 0.7 cm in diameter, slender, cylindrical, fibrous, frequently branched bearing a number of small rootlets, tough, woody and yellow to light brown in colour; surface becomes rough due to presence of small nodules; fracture, fibrous; odour, aromatic; taste, sweet and astringent.

**Stem** - Stem pieces cylindrical, distinct into nodes and internodes measuring about 1 to 5 cm in length and 0.5 to 2 cm in thickness; surface rough, creamish white to light yellow externally; transversely cut smooth surface light yellow towards periphery and creamish white in the centre; fracture short, fibrous; odour, unpleasant; taste, mucilaginous.

**Leaf** - Leaves paripinnately compound, leaflets in 3 to 7 pairs, commonly 5 pairs; each leaflet oblong with mucronate tip, entire margin, and short petiole, about 1.5 cm long and 0.3 to 0.5 cm broad; upper surface greyish-green and lower surface light green, appressed with dense white hairs; margin entire; odour not distinct, taste, slightly bitter.

**Fruit** - Fruit stalked, light or greenish-yellow, five-ribbed or angled, more or less spherical in structure and covered with short stiff or pubescent hairs, 1 cm in diameter with five pairs, of prominent short stiff spines, pointed downwards, about 0.5 cm in length; tips of spines almost meet in pairs, whole together forming pentagonal frame-work around fruit; ripe fruit separates into five segments of each cocci and each appears as single-fruit, each coccus semi-lunar or plano-convex in structure, one chambered, armed with a pair of spines, starting from its middle, containing four or more seeds; taste, slightly astringent.

## **b) Microscopic**

**Root** - TS primary root show a layer of epidermis followed by 4 to 5 layers of thin-walled parenchymatous cortex, endodermis distinct; pericycle enclosing diarch stele, in mature root, cork 4 to 6 layered, cork cambium single layered followed by 6 to 14 layers of thin-walled parenchymatous cells with varying number of fibres, distributed throughout; some secondary cortex cells show secondary wall formation and reticulate thickening; fibres found in groups resembling those of phloem; secondary phloem divided into two zones, outer zone characterized by presence of numerous phloem fibres with a few sieve tubes slightly collapsed, inner zone frequently parenchymatous, devoid of fibres often showing sieve tubes and companion cells; phloem rays distinct, a few cells get converted into fibres in outer region; cambium 3 to 5 layered; wood composed of vessels, tracheids, parenchyma and fibres and traversed by medullary rays; vessels scattered, arranged in singles or double towards inner side, in groups of three to four on outer side having bordered pits; tracheids long, narrow with simple pits; xylem parenchyma rectangular or slightly elongated with simple pits

and reticulate thickenings; xylem fibres a few; tracheids elongated with simple pits; medullary rays heterogeneous, 1 to 4 cells wide; starch grains and rosette crystals of calcium oxalate present in secondary cortex, phloem and medullary rays cells; a few prismatic crystals also present in xylem ray cells.

**Stem** - TS shows, single-layered epidermis of rectangular or isodiametric parenchyma cells with thick tangential walls; 5 to 8 layered cortex of round or oval parenchyma cells containing a few rosette crystals and pericyclic fibres in sporadic patches; phloem region narrow and conspicuous; xylem composed mainly of large, round xylem vessels and tracheids; medullary rays uniseriate to biseriate in continuation with phloem and consist of small radially arranged rectangular cells; pith consists of large round parenchyma cells; the cells of cortex, pith and medullary rays filled with round to oval, simple starch grains measuring 5 to 10  $\mu$  in diameter.

**Leaflet** - TS shows an isobilateral structure with a single layered upper and bilayered, cuticularized lower epidermis of isodiametric parenchyma cells interrupted at places by stomata and unicellular trichomes having swollen bases; palisade is a single layer of columnar cells present on both dorsal and ventral side of spongy mesophyll and upper one is continued over midrib region; spongy mesophyll consists of tightly packed oval parenchyma cells containing few large rosette crystals of calcium oxalate; vascular bundle in lamina and midrib enclosed within bundle sheath.

Midrib contains single meristele consisting of radially arranged xylem, phloem and patches of collenchyma cells on both dorsal and ventral side and 2 or 3 layers of large circular parenchyma cells inside lower epidermis.

**Fruit** - TS shows small epidermal cells of each coccus rectangular; unicellular trichomes abundance; mesocarp 6 to 10 layers of large parenchymatous cells, rosette of calcium oxalate crystals abundantly present; mesocarp followed by 3 to 4 compact layers of small cells containing prismatic crystals of calcium oxalate.

**Powder** - Light green, shows fragments of leaf and stem epidermis in surface view; sclereids of different shapes from fruit; simple unicellular trichomes; groups of fibres; pitted and spiral vessels, round to oval, simple starch grains measuring 5 to 10  $\mu$  in diameter and rosette crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	17 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	4 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	2 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	12 percent,	Appendix 2.2.8

## T.L.C.

T.L.C. of acetone extract (cold maceration at room temperature) of the drug on precoated silica gel 'G' 60 F<sub>254</sub> TLC plate of 0.2 mm thickness using *toluene: ethyl acetate* (7.5:2.5) as solvent system and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating at 105° for 10 minutes, shows spots at R<sub>f</sub> 0.22 (pale yellow), 0.37 (purple), 0.50 (violet), 0.55 (magenta), 0.71 (light yellow) and 0.77 (yellowish-green).

**CONSTITUENTS** - Alkaloids: Terrestriamide, tribulusamide A, B; steroidal saponins: terrestrosin C, D, E, F, G, H, I, J and K, terrestroneoside A and F, terreside A and B, terrestroside F; tribulosaponin A and B, tribulosin, protodioscin saponin C, prototribestin, terrestrosin J, isoterrestrosin B; flavonoid glycosides: isorhamnetin-3-gentiotrioside, quercetin-3-gentiobioside-7-glucoside; amide: moupinamide.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Balya, Bṛmhaṇa, Dīpana, Kaphahara, Keśya, Mūtrala, Pittahara, Śothahara, Vṛṣya, Vātahara, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Cyavanaprāśa Avaleha, Daśamūla Kvātha, Rāsnādi Kvātha, Daśamūla Ṣaṭpalaka Ghṛta

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Amlapitta (hyperacidity), Āntravṛddhi (Hernia), Aśmarī (calculus), Ardita (facial palsy), Arśa (piles), Hṛdroga (heart diseases), Indralupta (alopecia), Jvara (fever), Kāsa (cough), Mūtrāghāta (urinary obstruction), Mūtrakṛcchra (dysuria), Pakṣāghāta (Paralysis / Hemiplegia), Pradara (excessive vaginal discharge), Prameha (metabolic disorder), Raktapitta (bleeding disorder), Śūla (pain / colic), Śoṭha (inflammation), Śvāsa (Asthma), Sūtikāroga (puerperal disorders), Śītapitta (urticaria), Vātarakta (Gout)

**DOSE** - Cūrṇa (powder) : 3 to 6 g Kvātha (decoction): 50 to 100 ml

## GRANTHIMŪLA (Rhizome)

Granthimūla is the rhizome of the plant *Alpinia calcarata* Rosc. (Fam. Zingiberaceae) which is often cultivated and seen as an escape in eastern and southern India.

**SYNONYMS** : Śvetakulañjana

### REGIONAL LANGUAGE NAMES

Assamese	:	Sugandhi bach
Hindi	:	Safed Kulanjana
Malayalam	:	Toroni
Oriya	:	Chittaratha
Tamil	:	Nattarattai
Telugu	:	Dumparastramu

### DESCRIPTION

#### a) Macroscopic

Rhizome horizontal and branched; individual pieces tortuous, size ranging from 3 to 10 cm in length and 5 to 10 mm diameter in cross section; deep brownish orange externally, pale buff colour internally; prominently marked with wavy annulation at the nodes with scaly leaf bases; internodal length ranges from 6 to 12 mm, fracture is very tough, uneven and fibrous: odour, pungent; taste, spicy.

#### b) Microscopic

TS circular in outline; epidermis single layered; yellowish oil globules present in many cells of the inner rows of the cortex of polygonal thin walled parenchyma of different sizes; parenchymatous cells of the inner cortex contain plenty of oval or circular starch grains with faint concentric striations; vascular bundles many, scattered, more, grouped towards the centre; sclerenchymatous bundle sheath present.

**Powder-** Reddish brown, microscopy shows following structures: oval to elliptic starch grains 10 to 20  $\mu$  in size; parenchymatous tissue fragments with polygonal and elongated cells; elongated pitted stone cells with a narrow lumen of 50 to 200  $\mu$  in length and a few thin walled pitted stone cells with larger lumen; reddish brown and light yellow resinous pieces; cells with densely compact masses of starch granules; annular, reticulate, scalariform and spiral vessels.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	7 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	6 percent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *n-hexane: ethyl acetate* (8.6:1.4) as mobile phase, and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at 0.21, 0.27 (both pink), 0.37 (yellow), 0.40 (light violet), 0.46 (grey), 0.53 (pink) and 0.75 (grey).

**CONSTITUENTS** - Volatile oil rich in methyl cinnamate, cineol, camphor.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphaghna, Svarya, Śothahara, Śūlaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Hikkā (hiccup), Kāsa (cough), Prameha (metabolic disorder), Śvāsa (Asthma), Sandhiśūla (joint pain), Śūla (pain / colic)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## GULADĀUDĪ (Leaf)

Guladāudī consists of dried leaves of *Chrysanthemum indicum* L. (Fam. Asteraceae), a perennial, shrubby, erect plant with pinnately parted leaves. The plant is widely grown in gardens as an ornamental, and for worship in temple groves in the south. The various cultivated hybrids and their varieties are not included or used as a source of this drug.

**SYNONYMS :** Chinnapatrā

### REGIONAL LANGUAGE NAMES

Bengali	:	Chandramukhi
English	:	Chrysanthemum
Gujrati	:	Guldaaudi
Hindi	:	Guldaaudi
Kannada	:	Shevanti
Marathi	:	Chamanti, Shevanti
Punjabi	:	Chamanti
Tamil	:	Chamanti
Telugu	:	Bagaura
Urdu	:	Gule-dawoodi

### DESCRIPTION

#### a) Macroscopic

Leaves usually 5 to 8 cm long, 4 to 7 cm broad, thin, dull green to light brown, crumpled, papery; lamina simple, pinnatifid or partite, venation reticulate, margin entire, apex obtuse, base entire; petiole short, slightly winged; odour, aromatic; taste, slightly tingling.

#### b) Microscopic

**Petiole** -TS reveals a roughly hemispherical or cup shaped outline with slightly winged upper corners and gently concave upper margin; epidermis composed of rounded cells lined with cuticle and bearing scattered, multicellular trichomes with or without a 2-armed terminal cell; inner to epidermis are present 1 or 2 layers of chlorenchyma followed by ground tissue composed of parenchymatous cells and containing a few, scattered air cavities; the central, main vascular bundle is hemispherical or rounded in shape; xylem adaxial, containing mostly parenchyma; phloem abaxial; each wing contains one rounded, accessory bundle each with xylem facing obliquely towards inner side and phloem outside.

**Midrib** -Midrib convex on the lower side showing a cup like protuberance, and nearly plane on the upper with collenchyma patches adjacent to the epidermis on both sides; xylem vessels and parenchyma present towards the upper side while phloem oriented towards the lower side; vascular bundle surrounded by parenchyma which is more developed towards upper and lower sides.

**Lamina** -TS through leaf shows a dorsiventral structure; outer epidermis made of thin walled, parenchymatous, rounded or squarish cells; epidermis bears uniseriate, multicellular trichomes eccentrically with a two-armed terminal cell, and also bicellular glandular hairs; a surface preparation reveals upper epidermal cells with straight anticlinal walls and lower epidermal cells with slightly sinuous anticlinal walls, surfaces also show eccentric cicatrices and typical bicellular glands; anomocytic stomata present on both surfaces; stomatal index for upper surface 1 to 3 and that for lower surface 17 to 21; only one layer below the upper epidermis palisade like, rest of the lamina composed of almost rounded, loosely arranged cells with intercellular spaces and rich in chloroplasts, and occasional rudimentary vascular bundle; palisade ratio ranges from 3 to 5.

**Powder** Yellowish green, fine, odour aromatic, taste slightly tingling, under microscope shows epidermal fragments with characteristic bi-armed trichomes with stalk up to 150  $\mu$  long and arm cells up to 350  $\mu$  long, and bicellular glandular trichomes.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	21 percent,	Appendix 2.2.3

Acid-insoluble ash	Not more than	4 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	22 percent,	Appendix 2.2.8

### T.L.C.

T.L.C of alcoholic extract of the drug developed on silica gel 'G' 60 F<sub>254</sub> plate using *toluene: ethyl acetate: acetic acid* (5:4:1) as mobile phase and on spraying the plate with *Natural Products-Polyethylene Glyco reagent* and when seen under UV (366 nm), shows spots at R<sub>f</sub> 0.27 (flourescent cream), 0.40 (flourescent yellow) and 0.50 (light pink), 0.53 (light pink), and 0.56 (purple-pink)

**CONSTITUENTS** - Sesquiterpene lactones - angeloylcumambrin B, arteglaasin A and angleloylajadin. Essential oil from aerial parts contain di-and sesquiterpenoids  $\alpha$ -copaene,  $\beta$ -elumene,  $\beta$  - carophyllene,  $\beta$  - farnesene,  $\beta$  - humulene, germacrene-D,  $\alpha$ -silenene, curcumene, calamenene,  $\gamma$ -cadinene and T-murolol, and monoterpenoids myrcene, 1,8-cineol and bornyl acetate. Chrysanthenone and chrysanthenin glucoside. Aerial parts also contain lignans sesamin and fargesin, and flavonoid penduletin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Ropaṇa, Śūlapraśamana, Hṛdya

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ardhāvabhedaka (hemicrania / migraine), Mukhasphoṭa (ulcer in the mouth), Śiraḥśūla (headache), Tvakroga (skin diseases), Vraṇa (ulcer), Yuvānapiḍikā (pimples / acne vulgaris)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## HARITAMAÑJARĪ (Whole Plant)

Haritamañjarī consists of the dried whole plant of *Acalypha indica* L. (Fam. Euphorbiaceae), an annual herb up to 120 cm, occurring throughout the plains and hotter parts of India, as a weed.

**SYNONYMS :** Muktavarcā

### REGIONAL LANGUAGE NAMES

Assamese	:	Patrasaki, Mukuta manjari
Bengali	:	Muktajhuri
English	:	Indian Acalypha
Gujrati	:	Vanchi Kanto
Hindi	:	Kuppi, Aamaabhaaji
Kannada	:	Kuppigida
Malayalam	:	Kuppameni
Marathi	:	Khokli, Khajoti
Oriya	:	Indramaris, Nakachana
Punjabi	:	Kuppi
Tamil	:	Kupaaimeni
Telugu	:	Kuppichettu, Kuppinta, Muripindi

### DESCRIPTION

#### a) Macroscopic

**Root** - Vertical and branched; 2 to 8 mm in thickness, tortuous, rough; colour varies from grey to brown when dry, broken surface creamy yellow; fracture giving rise to a cloud of dusty particles; no characteristic smell; bitter.

**Stem** - Mature stem brownish and younger parts green, sparsely hairy, terete, 2 to 10 mm in thickness.

**Leaf** - Simple and alternate, dull to dark green to brownish; brittle when dry; petiole 1 to 7 cm, lower leaves with longer petiole, pubescent; lamina 2 to 5 cm long and 1 to 4 cm broad, ovate to rhombic ovate, tip acute, base cuneate, pale green below and dark green above, margin serrate and hairy; veins 5 to 7 pairs, generally alternate, usually 3 veins arising from the base, prominent and hairy below; midrib slightly raised on the upper surface, and prominent on the lower surface.

**Inflorescence** - Axillary, stalked, spike, 1 to 7 cm long; flowers unisexual, green, subsessile and encircled by a leafy, orbicular serrate bract of about 4 mm long and 5 to 8 mm broad; female flowers 5 to 15, basal, 2 mm across; male flowers numerous, minute; spike usually terminating in an allomorphic flower; fruits capsules, small and green; seeds minute, ovoid and pale brown.

#### **b) Microscopic**

**Root** - TS of the root circular in outline; cork consists of 8 to 10 rows of rectangular to tangentially elongated cells; secondary cortex consists of a few layers of slightly elongated, polygonal cells, followed by a broken ring of pericycle with sporadic sclerenchymatous patches, followed by small patches of phloem; xylem consists of vessels, tracheids and xylem parenchyma, all thick walled and lignified; medullary rays prominent, mostly uni or biseriate, rarely multiseriate; calcium oxalate crystals and laticiferous ducts absent, distinction from *A. fruticosa*, where both are present.

**Stem** - TS cylindrical in outline; uniseriate, multicellular trichomes with elongated cells and a tapering terminal cell and uni cellular trichomes present; below the epidermis 3 or 4 layers of collenchyma followed by 4 to 7 layers of cortical parenchyma present; pericycle of discontinued patches of sclerenchyma with 3 or 4 layers, capping the phloem; xylem continuous as a ring and consists of vessels, tracheids and parenchyma, thick walled and

lignified; pith consists of polygonal parenchymatous cells; abundant rosettes of calcium oxalate present throughout cortex and pith, ranging from 10 to 20  $\mu$  in diameter.

#### **Leaf -**

**Petiole** - TS of the petiole circular in outline; epidermal hairs are multicellular and uniseriate; epidermis followed by 6 to 7 layers of small angular parenchyma; 5 or 6 vascular bundles in variable sizes present as a broken ring; phloem a small patch over the xylem; pith consists of large parenchyma cells, some containing cluster crystals of calcium oxalate.

**Midrib** - TS of midrib shows a ridge on the adaxial side with a cap of three layered collenchyma cells just below the upper epidermis and a similar band of collenchyma on the abaxial side above the lower epidermis; below the collenchymatous patch is a single row of palisade tissue, which continues in the lamina; cortex consists of circular to polygonal parenchyma; vascular system consists of about 8 groups of bundles, consisting of xylem vessels above phloem elements.

**Lamina** - Dorsiventral, cuticle present, upper epidermis followed by a single layer of palisade tissue; mesophyll shows a series of clusters of calcium oxalate crystals; spongy mesophyll contains irregular polygonal cells; lower epidermal cells are similar to the upper epidermis; epidermal cells with slightly wavy walls in surface view; paracytic stomata on lower surface; stomatal index 2; palisade ratio 5 or 6; unicellular multiseriate trichomes are sparingly seen.

**Powder** - Powder light brown and slightly bitter, no odour; microscopic study shows rosettes and clusters of calcium oxalate crystals 10 to 20  $\mu$  diameter; multicellular uniseriate trichomes of 150 to 200  $\mu$  length and unicellular trichomes of about 120 to 160  $\mu$  length; orange brown resinous pieces; irregular granular masses; patches of epidermal parenchyma with paracytic stomata; fragments of pitted, scalariform, annular, and spiral vessels and wood parenchyma.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	14 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	3 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	10 percent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *n*-hexane: chloroform: methanol (1.5:7.5:1) as mobile phase, and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes shows spots at R<sub>f</sub> 0.32 (light violet), 0.38, 0.43 (both pink), 0.48, 0.66 (both light pink), 0.73 (light violet), 0.81 and 0.88 (both pink).

**CONSTITUENTS** - acalyphine, quinine, amides such as acalyphamide, sterols, a flavonol kaempferol and cyanogenic glycoside.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphaghna, Vāmaka, Sraṃsana, Kṛmighna, Mūtrala, Tvakdoṣahara, Āmadoṣahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Dantaśūla (toothache), Karṇaśūla (otalgia), Kāsa (cough), Sandhiśoṭha (arthritis), Śvāsa (Asthma), Vibandha (constipation)

**DOSE** - Cūrṇa (powder) : 3 to 5 g

Svarasa (juice) : 5 to 10 ml, 1 to 3 drops in Karṇaśūla

## HASTÍSUNḌĪ (Aerial Part)

HastísunḌĪ consists of dried aerial parts of *Heliotropium indicum* L. (Fam. Boraginaceae), an annual herb, 15 to 60 cm in height with densely hirsute ascending branches, found throughout the hotter parts of India along roadside and on waste lands.

**SYNONYMS :** Bhūraṇḍī, Śrihastini, Aśmariripu, Mahāśunḍī

### REGIONAL LANGUAGE NAMES

Bengali	:	Haathishundaa
English	:	Indian Turnsole
Gujrati	:	Haathisudhaan
Hindi	:	Haathisuondha, Haathisundha
Kannada	:	Chelubaalad a gida
Malayalam	:	Telkkat, Terkkat, Tekkit
Marathi	:	Bhurundi
Tamil	:	Telkodukkai
Telugu	:	Kodikki, Naagdanti

### DESCRIPTION

#### a) Macroscopic

**Stem** -Cut pieces 7 to 13 cm long and 0.3 to 1.1 cm in thickness, stout, hollow, pubescent with white stiff spreading hairs and longitudinal ridges; colour, brown; fracture, short; no odour; taste, bitter and astringent.

**Leaf** -Cordate, obtuse with sub-serrate margins; 2.5 to 10 cm long and 2.5 to 5 cm broad; rough, sparsely hairy; brownish, surface wrinkled, veins, prominent on lower surface; no odour; taste, bitter

b) Microscopic

**Stem** -TS shows, single-layered epidermis covered with thick cuticle with a few cells modified into unicellular trichomes; collenchymatous hypodermis; thick-walled parenchymatous cortex; a narrow zone of phloem containing patches of non-lignified phloem fibres; a comparatively larger zone of xylem composed mainly of tracheids and a few vessels, solitary or in groups of 2 or 3; rays uniseriate of radially elongated pitted parenchymatous cells; collapsed pith with a few remnants of parenchymatous cells attached to the xylem.

**Leaf -**

**Petiole** -TS of petiole shows an epidermis consisting of thick-walled rectangular cells interrupted at places by unicellular warty trichomes and glandular trichomes with unicellular head and 1 to 3 celled stalk; ground tissue composed of outer 8 to 10 layers of small, thick-walled oval parenchyma filled with brownish contents and inner 5 to 8 layers of large oval parenchyma cells; vascular bundles present in ground tissue unequal in size, collateral with abaxial phloem; central vascular bundle being large, with arc-shaped xylem and facing the concave side of the petiole while two small vascular bundles present in the wings.

**Midrib** -TS through midrib region shows a single layered upper and lower epidermis covered with thick cuticle and possessing a few long, tubercled unicellular trichomes with bulbous base; central zone of vascular bundles containing arc shaped xylem and covered by collenchymatous layer on upper and lower side.

**Lamina** -Dorsiventral; mesophyll composed of single layered palisade and 6 to 8 layers of spongy parenchyma; tanniferous sacs in the mesophyll and around the vascular bundles; stomata anomocytic; stomatal index 17 to 20.

**Powder** -Greenish-brown, shows vessels with spiral thickenings; numerous tracheids, entire or in pieces; pitted parenchymatous cells from medullary rays; long, unicellular trichomes; leaf epidermis in surface view with anomocytic stomata and unicellular trichomes.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 percent,	Appendix 2.2.2
Total ash	Not more than	12 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	4 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	12 percent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract of the drug on precoated silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *chloroform: methanol: ammonia* (80:13:2) as mobile phase and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating at 105<sup>0</sup> for 10 minutes, spots appear at R<sub>f</sub> 0.12 (violet), 0.27 (grey), 0.37 (grey), 0.51 (violet), 0.76 (violet), 0.86 (maroon), 0.90 (green) and 0.94 (red).

**CONSTITUENTS** - Pyrrolizidine alkaloids (heliotrine, indicine N-oxide), tannins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Tīkṣṇa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Jvaraghna, Vedanāhara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Sannipātajvara (high fever due to vitiation of all dosas), Śūla (pain / colic)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## INDĪVARA (Rhizome)

Indīvara consists of the rhizomes of *Monochoria vaginalis* Presl. Syn. *Pontederia vaginalis* Burm.f (Fam. Pontederiaceae), an aquatic herb with short, sub erect spongy root stock found in rice fields, ditches, margins of tanks and pools, swamps and marshes almost throughout India, ascending upto 1,500 m in the hills.

**SYNONYMS :** Bhagapatrā

### REGIONAL LANGUAGE NAMES

Malayalam : Karinkuvvalam

Tamil : Karunkuvalam, Cenkalunir kilanku

Telugu : Nirkanca

### DESCRIPTION

#### a) Macroscopic

Rhizome-clothed with leaf sheath, spongy roots, light in weight, size variable, dark greenish pink in colour; no odour; taste, salty.

#### b) Microscopic

**Rhizome** Epidermis single layered; cortical region distinct from the stelar region present; cortical region prominently aerenchymatous with large air chambers due to parenchymatous trabeculae; several small patches of tissues present among the trabeculae, some of which are of undifferentiated parenchyma while some show a strand or two of xylem and phloem; several of the air chambers show partition by a thin diaphragm of one or two layers of thin walled cells with minute intercellular spaces and cross- wall perforations; occasionally, a cortical bundle with well developed vascular tissues within a distinct endodermis and air chambers seen, beneath which a thick walled parenchymatous sheath of 6 or 7 layers of cells enclosing the xylem, phloem and parenchyma is present; cortical region also shows raphides, starch grains and amber coloured amorphous bodies staining bright red

with Sudan III in fair amounts, most of them displaced from their original positions; stelar region surrounded by endodermis, within which numerous patches of reduced vascular bundles containing a few xylem and phloem strands are seen; air spaces also sporadically present; starch grains similar to cortex present.

**Powder** Blackish pink, shows raphides, starch grains, parenchyma, vessel elements scalariform or pitted; non septate fibres 500 to 1000  $\mu$ ; circular starch grains 8 to 12  $\mu$  in diameter.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 percent,	Appendix 2.2.2
Total ash	Not more than	15 percent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	5 percent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 percent,	Appendix 2.2.7
Water-soluble extractive	Not less than	10 percent,	Appendix 2.2.8
Fixed oil	Not less than	1 percent,	Appendix 2.2.9

### T.L.C.

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (6:1) and 6 drops of *formic acid* as mobile phase and viewed under UV 254 nm, spots appear at R<sub>f</sub> 0.21, 0.26, 0.32, 0.42, 0.60 and 0.72 (all green). Under UV 366 nm, fluorescent zones appear at R<sub>f</sub> 0.11, 0.21 (all white), 0.29 and 0.70 (navy blue), 0.34, 0.42, 0.60, 0.63 (all reddish orange), 0.47 (violet) and 0.55 (pale blue). On exposure to *iodine vapour*, spots appear at R<sub>f</sub> 0.21, 0.29 (both yellowish brown), 0.37 (brown), 0.52, 0.69, 0.74 and 0.86 (all yellowish brown). On dipping in *vanillin-sulphuric acid reagent* and heated at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.21 (pale pink), 0.26 (reddish orange), 0.34(grey), 0.37 (pink), 0.47 (violet), 0.55 (pale violet), 0.63 (reddish brown), 0.72 (pale violet), 0.78, 0.86 (both grey) and 0.95 (violet).

**CONSTITUENTS** - Stigmasterol 3-O-beta-D-glucopyranoside.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Bṛ̥ṃhaṇa, Balya, Dāhpraśamana, Pittaśāmaka, Vṛ̥ṣya, Vāta-Kaphavardhaka

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Dāha (burning sensation), Daurbalya (weakness), Dhātukṣaya (tissue wasting), Raktapitta (bleeding disorder), Yakṛt vikāra (disorder of liver)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## **JALAKUMBHĪ (Whole Plant)**

Jalakumbhī consists of dried whole plant of *Pistia stratiotes* L. (Fam. Araceae), an aquatic monoecious stemless plant, rarely anchored by roots, and spreading with the help of stolons; found in water bodies in tropical and sub-tropical regions of India.

**SYNONYMS :** Kumbhikā, Vāriparṇī

### **REGIONAL LANGUAGE NAMES**

Bengali	:	Tokaapaanaa
English	:	Water lettuce
Gujrati	:	Jalakumbhi, Jalashamkhala
Hindi	:	Choti Jala-kumbhi, Jalakumbhi
Kannada	:	Antara gange
Malayalam	:	Akasa thamara, Kudapayal, Muttapayal
Marathi	:	Prasni, Gondali
Oriya	:	Borajhanji
Tamil	:	Akasa tamarai, Koditamarai
Telugu	:	Antara-Tamara, Nirubuduki
Urdu	:	Jalakumbhi

### **DESCRIPTION**

#### **a) Macroscopic**

Drug consists of rosette leaves arising on a condensed stem connected through short, soft, whitish, horizontal stolons and having long thin, wiry, fibrous branched roots arising in tuft from the lower portion of condensed stem opposite the leaves; roots dark brown or blackish in colour with dense, fine, filiform branches arising all along their length; length 5 to 10 cm, apical region covered over by root pockets, root hairs poorly developed; aerial parts pale green to yellowish brown; rosette consisting of 5 leaves on a condensed axis;

apetiolate, exstipulate, cauline, hairy, soft, shiny; margin smooth; roughly spatulate, apical portion expanded; proximal part strap shaped; veins parallel divergent, 3 to 6, usually 1 or 2, bifurcating towards the top portion; no fruits or flowers present.

#### **b) Microscopic**

**Leaf** - TS passing through the proximal part of leaf shows it to be isobilateral and flattened; ventral surface slightly ridged, while the dorsal side is fully convex; epidermal cells thin walled squarish or polygonal; cuticle absent: epidermis bearing abundant multicellular hairs varying widely in length from proximal to distal end of leaf but generally about 200 to 400  $\mu$  long and 29 to 36  $\mu$  wide, uniseriate with a characteristic bulbous base, which assumes a saucer like form in dried samples; terminal cell of hair when present drawn out or conical but more often incomplete and broken off; hair more abundant on the ventral side; stomata absent, mesophyll lacunate with some cells having spindle shaped raphides and star like druses of calcium oxalate crystals; occasionally some sub epidermal cells have brown pigments in them; circular groups of undifferentiated vascular tracts and mechanical tissues generally present in vertical rows of three; xylem and phloem cells poorly developed; leaf thinner towards the distal end; transection of the distal end shows ridges at regular intervals corresponding with main veins on both the surfaces; those on the lower surface more prominent; strands of mechanical tissue associated with the ridges, one occupying the centre of the upper ridge while another in the lower ridge; upper ridge become inconspicuous towards the distal tip of the leaf; in the lamina portion, 3 to 4 layers of subepidermal, thin walled cells, compactly arranged below the upper epidermis and have abundant and prominent chloroplasts; parenchymatous ground tissue towards the lower epidermis lacunate; druses and spindle shaped groups of raphides present in this region also.

#### **Stolon** -

The stolon is characterized by a ground tissue supporting longitudinal strands of undifferentiated mechanical elements and lacunae centrally; the outer 4 or 5 layers below the epidermis are without lacunae.

### **Powder-**

The powder reveals multicellular trichomes with characteristics bulbous basal cells and fragments of parenchyma cells; raphides upto 170  $\mu$  long and druses upto 40  $\mu$  in diameter are abundant.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	6 per cent,	Appendix 2.2.2
Total ash	Not more than	52 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	35 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	2 per cent,	Appendix 2.2.8

### **T.L.C.**

T.L.C. of the alcoholic extract on pre-coated silica gel 'G' plate of 0.2 mm thickness using *toluene: ethyl formate: formic acid* (5:4:1) as mobile phase and when seen under UV 366 nm shows spots at  $R_f$  0.36 and 0.40 (both pink). Spraying the plate with *anisaldehyde: sulphuric acid reagent* and on heating for ten minutes at 105<sup>0</sup> under UV 366 nm shows spots at  $R_f$  0.34 (cream) 0.38 (orange brown), 0.59 and 0.88 (both green).

**CONSTITUENTS** - Flavonoids like Vicenin, lucenin and cyanidina-3-glucoside.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Balya, Mūtrajanana, Śothahara, Tridoṣahara

**IMPORTANT FORMULATIONS** - Jalakumbhībhasmaprayogaḥ

**THERAPEUTIC USES** - Arśa (piles), Dāha (burning sensation), Galagaṇḍa (goitre), Jvara (fever), Kuṣṭha (Leprosy / diseases of skin), Mūtrakṛcchra (dysuria), Śoṣa (emaciation), Raktapitta (bleeding disorder)

**DOSE** - Cūrṇa (powder) : 3 to 5 g

Svarasa (juice) : 10 to 20 ml

## JĪVANTĪ (Root)

JĪvantī consists of dried roots of *Leptadenia reticulata* W. & A. (Fam. Asclepiadaceae), a much branched twining shrub, distributed throughout the plains of India, along hedges.

**SYNONYMS :** JĪvantī, Śākaśreṣṭ ha, JĪvanī

### REGIONAL LANGUAGE NAMES

Bengali	:	Jiwanti
English	:	Cork Swallow-wort
Gujrati	:	Dodee
Hindi	:	Dodi Shak, Jivanti
Malayalam	:	Atapatiyan
Marathi	:	Kheerakhodee, Kharkhoda
Tamil	:	Palalkkodi
Telugu	:	Palatige, Mukkutummudu

### DESCRIPTION

#### a) Macroscopic

Roots cylindrical, 5 to 7 cm in length and 1 to 3 cm in thickness, surface light brown to greyish brown with longitudinal wrinkles; fracture, tough; fractured surface creamish and horny; odour and taste indistinct.

#### b) Microscopic

Root shows cork consisting of rectangular and tangentially elongated cells, phellogen 1 to 2 layered; phelloderm consists of thin walled parenchyma cells with groups of stone cells and fibres scattered in the central and lower regions; phloem made up of sieve tubes, companion cells, parenchyma, fibres and stone cells being transversed by uni to multiseriate medullary rays, groups of fibres and stone cells present in outer phloem region, stone cells

are about 60  $\mu$  in length and 20  $\mu$  in width, fibres are upto 1300  $\mu$  in length; xylem represented by vessels, tracheids, fibres, parenchyma, interxylary phloem and uni to multi seriate medullary rays, all xylem elements except interxylary phloem thick walled and lignified; vessels drum shaped or elongated with bordered pits or scalariform thickenings, bordered pitted tracheids, fibres elongated with tapering or bifurcated ends present; xylem parenchyma simple pitted; rosettes of calcium oxalate crystals present in some of the parenchyma cells of phloem and phelloderm.

**Powder** - Powder shows rectangular to polygonal stone cells, vessels with bordered pits or scalariform thickenings, border pitted tracheids, fibres with tapering or bifurcated ends, thick walled parenchyma cells with simple pits and thin walled parenchyma cells with rosettes of calcium oxalate crystals.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	14 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1.5 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	3 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *chloroform: methanol: water* (4:3:1) as mobile phase and when seen under UV 254 nm shows spots at  $R_f$  0.01, 0.21, 0.26 (all blue), 0.54, and 0.75 (both white).

**CONSTITUENTS** - Hentriacontanol,  $\alpha$ - and  $\beta$ -amyrin, stigmasterol,  $\beta$ -sitosterol and flavonoids-diosmetin and luteolin.

#### **PROPERTIES AND ACTION**

**Rasa** : Madhura, Kaṣāya

**Guna** : Laghu, Snigdha  
**Vīrya** : Śīta  
**Vipāka** : Madhura  
**Karma** : Rasāyana, Balya, Cakṣuṣya, Grāhī, Vr̥ṣya, Bṛ̥ḥhaṇa, Stanyajanana, Viṣaghna, Tridoṣahara

**IMPORTANT FORMULATIONS** - Cyavanaprāśa, Brāhmarasāyana, Amṛtaprāśa ghr̥ta, Aśoka ghr̥ta, Bṛhatmāṣataila, Marmaguṭikā, Mānasamitravaṭaka, Śvāsahara kaṣāyacūr̥ṇa, Guḍūcyāditaila

**THERAPEUTIC USES** - Atisāra (diarrhoea), Dāha (burning sensation), Jvara (fever), Kṣaya (pthisis), Kāsa (cough), Śoṣa (emaciation), Mukharoga (disease of mouth), Naktāndhya (night blindness), Netraroga (diseases of the eye), Raktapitta (bleeding disorder), Tṛṣṇā (thirst), Urahkṣata (pulmonary cavitation), Vraṇa (ulcer)

**DOSE** - Cūr̥ṇa (powder): 3 to 6 g

## KANṬAKĪGULMA (Aerial Part)

Kanṭakīgulma consists of aerial parts of *Lycium barbarum* L. Syn. *L. europeum* (Fam. Solanaceae), a spinous shrub growing upto one metre or above, with small leaves and flowers, and occurs in the drier plains of central and southern peninsula.

**SYNONYMS :** Sitakāṇḍa, Chatrakeśara

### REGIONAL LANGUAGE NAMES

Gujrati	:	Gangro
Hindi	:	Chiritta
Marathi	:	Gangro
Punjabi	:	Ganger, Chirchitta
Urdu	:	Chirchitta

### DESCRIPTION

#### a) Macroscopic

Bulk drug consists of broken leaves, pieces of thorny twigs and pieces of stem 2 to 4 inches long and 0.3 to 0.6 cm thick; flowers and fruits may be present.

**Stem** -White or grey, angular to almost squarish in shape, with four prominent ridges, armed with sharp conical, short thorns, and occasional long ones which may bear leaves.

**Leaf** -Solitary or more commonly in fascicles, variously shaped as oblong-spathulate to linear-lanceolate measuring 4.5 to 6 cm long and 0.6 to 1.5 cm wide; attenuated into a short petiole which is continuous as the midrib in the leaf; obtuse tip; glabrous.

**Flower** -Flowers are solitary or in fascicles, regular, bisexual on a small pedicel about 1 or 2 cm long; calyx sepals 5, united to form a bell shaped or tubular calyx, 0.4 to 0.6 cm; corolla

petals 5, lavender to purplish, light purple to white in colour, united to more than half of the length towards the base to form a funnel shaped corolla tube, the rest of the portion spreading as free lobes, about 0.7 to 1.5 cm long; androecium stamens 5, free, adnate to the corolla tube, anther lobes united, filaments long; gynoecium carpels 2, united, ovary superior, two celled, ovules numerous in each locule.

**Fruit A** berry with persistent calyx; ovoid to oblong; bright red, dark red, or orangeish yellow in colour; about 0.8 to 2 cm long and 0.6 to 0.8 cm in diameter; seeds somewhat flat or discoid in shape, about 2 mm in diameter, embedded in the fleshy pulp of the fruit.

#### **b) Microscopic**

**Stem** -TS almost squarish in outline with four prominent ridges at the corners and four minor ridges at the centre of each side; epidermis made up of single layer of barrel shaped cells covered by cuticle; cortex composed of 4 or 5 layers of collenchyma and 3 to 4 layers of parenchyma; idioblasts present, several filled with large rosettes of calcium oxalate and a few packed with microsphenoidal crystals of calcium oxalate; patches of pericyclic fibres present; vascular bundles present below the ridges, consists of an outer ring of 5 or 6 rows of phloem, 2 or 3 layered cambium, a xylem with large groups of xylem vessels, xylem fibres, xylem parenchyma and interxylary phloem, alternating with smaller bundles with xylem vessels, xylem fibres, and xylem parenchyma; two vascular bundles opposite to each other present in the parenchymatous pith which also shows idioblasts filled with microsphenoidal crystals of calcium oxalate.

#### **Leaf -**

**Midrib** TS shows four vascular bundles; cortex made up of collenchyma and parenchyma; a few cells of idioblast in the ground tissue are filled with large rosettes of calcium oxalate; epidermis made up of barrel shaped cells covered by a cuticle and long warty trichomes

**Lamina** -Dorsiventral; upper epidermis followed by 2 or 3 layers of palisade tissue; a few idioblast present in palisade containing large rosettes of calcium oxalate, followed by 2 or 3 layers of spongy tissue.

**Powder** -Light green, taste slightly astringent; odour characteristic; shows fragments of lamina, rosettes of calcium oxalate crystals, long trichomes ranging from 48 to 105 mm in length, made up of two to three cells out of which the apical one is long, warty and caducous whereas the lower ones are small with smooth walls; xylem vessels, upper and lower epidermis made up of slightly wavy walls covered by paracytic stomata and trichomes or base of trichomes; epidermis of the stem in sectional view, radially cut medullary rays, fibres with thick walls and narrow lumen, non-septate, lignified, ranging from 35 to 70 mm in length.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	15 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	4.5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	20 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of methanolic extract on precoated silica gel 'G' 60 F<sub>254</sub> plate of 0.2 mm thickness using *chloroform: methanol* (9:1) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* followed by heating at 105<sup>0</sup> for 5 min, spots appear at R<sub>f</sub> 0.13 (blue), 0.26, 0.30, 0.39, 0.52 0.60 (all light purple), 0.78 (light pink), 0.87 and 0.96 (both pink).

**CONSTITUENTS** - Tropane alkaloid like atropine, streoidal sapogenin like diosgenin and flavonoids like quercetin and rutin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Cakṣuṣya, Dīpanīya, Mūtrala

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Dantaśūla (toothache), Jalodara (ascites), Kaṇḍū (itching), Raktārśa (bleeding piles)

**DOSE** - Cūrṇa (powder) : 2 to 5 g

## KARAPHTSA (Root)

Karaphsa consists of dried roots of *Apium graveolens* L. (Fam. Apiaceae), an erect herb with conspicuously jointed stems grown in Punjab, Haryana and Uttar Pradesh.

**SYNONYMS** : Dīpyaka

### REGIONAL LANGUAGE NAMES

Assamese	:	Bonjamani, Bonajain, Yamani, Ajowan
Bengali	:	Randhuni, Banyamani
Gujrati	:	Bodi Ajamo, Ajamo
Hindi	:	Ajmuda, Ajmod
Kannada	:	Oma, Ajavana, Omakki
Malayalam	:	Ayamodakum, Oman
Marathi	:	Ajmoda Ova
Oriya	:	Banajuani
Punjabi	:	Valjawain, Ajmod
Telugu	:	Nuranji vamu
Urdu	:	Karafs

### DESCRIPTION

#### a) Macroscopic

**Root-** Numerous, upto 15 cm long and 1.5 cm thick, filiform, tapering, rough, wrinkled, having root hairs; externally dirty white, internally pale in colour; fracture smooth; odour none; taste none.

#### b) Microscopic

TS root shows outer layer of periderm composed of cork cells, phellogen and phelloderm; followed by loosely arranged, thin walled parenchymatous cortex; secondary phloem region consists of sieve elements, phloem rays and phloem parenchyma, cells thin

walled and hexagonal; cambium composed of a few layers which separate secondary phloem from secondary xylem; secondary xylem consists of tracheids, vessels, xylem region traversed by uniseriate and beseriate medullary rays.

**Powder** Shows under microscope, vessels, some tailed, elongated walls with pits arranged in a scalariform manner; simple perforation; tracheid walls bear elongated pits; fibres elongated, pointed at both the ends, length ranging from 140 to 550  $\mu$  and breadth between 12 to 22  $\mu$  .

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	5 per cent,	Appendix 2.2.2
Total ash	Not more than	10 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	9 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	10 per cent,	Appendix 2.2.8
Volatile oil	Not less than	0.05 per cent,	Appendix 2.2.12

### T.L.C.

T.L.C. of essential oil and methanolic extract on silica gel 'G' precoated plate using *ethyl acetate: hexane* as mobile phase and when seen under UV light (365 nm) shows spot at  $R_f$  0.81 (pink to purple fluorescence). On spraying with 2% *vanillin-sulfuric acid* shows spot at  $R_f$  0.20 and on spraying with *Dragendorff's reagent - 50% sulfuric acid, with 2:4 dinitrophenylhydrazine*.

**CONSTITUENTS** -  $\alpha$ -Pinene,  $\beta$ -pinene, limonene, pentylbenzene,  $\beta$ -selenin, 3-*n*-butyl phthalide.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Kaṭu  
**Karma** : Dīpana, Kaphahara, Mūtrala, Svedajanana, Vātahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aśmarī (calculus), Bastiroga (diseases of urinary system), Gṛdhrasī (Sciatica), Hikkā (hiccup), Jalodara (ascites), Kaphaja Śīroroga (catarrhal siro-roga / sinusitis), Kaphajvara (fever due to Kapha doṣa), Mūtrāghāta (urinary obstruction), Mastiṣkadaurbalya (neurosthenia), Pṛṣṭhaśūla (lumbago), Pārśvaśūla (intercostal neuralgia and pleurodynia), Sarvāṅga śopha (anasarca), Śūla (pain / colic), Udaraśūla (pain in the abdomen), Udararoga (diseases of abdomen), Vātarakta (Gout), Yakṛtplīhā Vikāra (diseases of liver and spleen)

**DOSE** - Cūrṇa (powder) : 5 to 7 g

## KATUGULMA (Whole Plant)

Katugulma is the whole plant of *Toddalia asiatica* (L.) Lam. Syn. *Toddalia aculeata* Pers. (Fam. Rutaceae), a scandent, prickly large shrub found in almost all parts of peninsular India.

**SYNONYMS :** Hemamūlā

### REGIONAL LANGUAGE NAMES

Bengali	:	Kada-todali
English	:	Wild orange tree, Lopez tree, Forest pepper
Hindi	:	Jangli-kalimirch, Dahan, Kanja
Kannada	:	Kaadumenasu, Mullumastige
Malayalam	:	Kaka toddali
Marathi	:	Limri, Manger
Oriya	:	Tundpora
Tamil	:	Milagaranai, Kattumilagu, Milagu, Charanai
Telugu	:	Mirapagandra

### DESCRIPTION

#### a) Macroscopic

**Root** -Branched and woody; 8 to 20 mm in thickness; yellowish brown externally and cream coloured on cut surface; inner side of the root bark brown in colour; fracture hard and splintery; bitter and slightly aromatic.

**Stem** -Cylindrical, prickly, green, puberulent and more prickly when young, dark brown when mature; prickles greyish brown, stiff, recurved, 1 to 3 mm long; young prickles with reddish brown tip; young stem olive green when dry; mature stem brownish with lenticels, 4 to 10 mm in thickness; internodes 2.5 to 4 cm long.

**Leaf** -Palmately compound, alternate, with three leaflets, gland dotted; straw yellow to olive green; leathery; petiole 1 to 4 cm long and have 1 to 4 prickles at the base; lamina 4 to 9 cm long and 1 to 4 cm broad, glabrous; margin entire to crenate, base cuneate and sometimes slightly oblique, tip acute and notched; veins 15 to 26 pairs, midrib prominent and with a few prickles abaxially; highly aromatic.

**Inflorescence** -Axillary racemes or panicles of 6 cm length; peduncles armed, solitary or paired; flowers creamy yellow, 4 mm across; fruit a pea sized berry, globose, orange-red when ripe, seeds 1 to 3, hard and shiny.

#### **b) Microscopic**

**Root** TS shows cork consisting of 10 to 20 layers of elongated, lignified cells; cortex made of irregular or polyhedral parenchymatous cells; phloem not prominent; xylem thick walled, with pitted vessels, tracheids and xylem parenchyma; some cortical cells and xylem parenchyma contain resin; medullary rays usually bi or uniseriate and occasionally multiseriate, having starch grains.

**Stem** -TS of the stem is circular in outline; epidermis with small rectangular cells and a thick cuticle; followed by a cortex of 4 to 6 polygonal cells, some of which are yellowish brown having oil globules; some cortex cells also contain many small starch grains; cortex followed by a discontinuous ring of sclerenchyma of 3 or 4 layers forming pericycle; phloem consists of phloem parenchyma, companion cells and sieve tubes; xylem vessels often in multiples of 3 to 8 in radial rows; medullary rays prominent, pith parenchymatous; some pith cells contain small, cluster crystals of calcium oxalate and most peripheral pith cells contain many small starch grains.

#### **Leaf**

**Petiole** -TS almost circular in outline; epidermal cells thick walled, small and rectangular; cuticle present, a single layer of collenchyma followed by 6 to 8 layers of angular

parenchyma; pericycle sclerenchymatous as a discontinuous ring; stele is a ring; the phloem layer surrounds the xylem; pith parenchymatous.

**Midrib** -TS of the midrib shows an epidermis with a thin cuticle; it is followed by a small group of polygonal parenchymatous cells of 5 to 8 layers, with a part of palisade from the lamina on either side; stele is an interrupted ring, with vascular bundle in a crescent shape on the abaxial side and smaller one forming an arc on the adaxial side, parenchymatous patches in between; both have a sclerenchymatous cap followed by phloem and xylem; the protoxylem faces towards the central parenchymatous pith, 5 to 7 layers of parenchymatous cells form the ground tissue between stele and the abaxial epidermis.

**Lamina** -Upper epidermis followed by 2 or 3 layers of palisade cells; the mesophyll tissue has loosely arranged circular cells with lot of intercellular spaces; small cluster crystals of calcium oxalate present throughout the lamina; some cells of the lamina contain yellowish brown oil droplets; stomata anomocytic.

**Powder** -Yellowish brown, microscopy shows rosettes of calcium oxalate crystals 24 to 30  $\mu$  across and prisms; globular starch grains of about 7  $\mu$  across; brownish and yellowish brown resinous pieces; stone cells of 35 to 75  $\mu$  length; fibres of about 15  $\mu$  width; spiral, annular, reticulate, scalariform and simple and bordered pitted vessels; fragments of tracheids and epidermis with anomocytic stomata.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	6 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.4 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	3 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *hexane:chloroform:methanol* (7.5:2:0.5) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes shows spots at R<sub>f</sub> 0.14 (grey), 0.2 (light violet), 0.32 (pink), 0.52 (light brown), 0.66 (violet), 0.73 (pink) and 0.88 (light pink).

**CONSTITUENTS** - Alkaloids; toddaline, toddalinine, skimmianine and berberine. Other constituents include citric acid, an oil, resin, pectin and starch.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pācana, Dīpana, Śītapraśamana, Śothaghna, Svedana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Kaphavātavyādhi (disorders due to Kapha and Vāta doṣa), Aṅgamarda (body ache), Atisāra (diarrhoea), Jvara (fever), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Viṣamajvara (intermittent fever)

**DOSE** - Cūrṇa (powder): 0.5 to 2 g

## KEŚARĀJA (Whole Plant)

Keśarāja consists of dried whole plant excluding roots of *Wedelia chinensis* Merril Syn. *Wedelia calendulacea* Less (Fam. Asteraceae), a procumbent, perennial herb with light camphor-like odour, 0.3-0.9 m height, distributed in wet places throughout the country in plains.

**SYNONYMS** : Pitabhṛṅgarāja, Avanti

### REGIONAL LANGUAGE NAMES

Bengali	:	Bhrangaraja
Hindi	:	Pilaabhangraa
Kannada	:	Kalsarji, Gargari
Malayalam	:	Mannakkannunni
Oriya	:	Kesandara
Tamil	:	Manjalkarilaamkanni, Paatalai Kayyaantakarai
Telugu	:	Paccha guntagalijeru

### DESCRIPTION

#### a) Macroscopic

**Stem**- 2 to 4 mm in diameter; flat, nodes and internodes prominent, rooting at the lower nodes; slightly hairy; blackish brown in colour; fracture, short; slightly pungent in taste.

**Leaf**- Opposite, sessile, linear-oblong, oblanceolate, margin entire, scabrous with short white hairs or more or less glabrous; base tapering; dark green, odourless, tasteless; both fresh and dry leaves leave black stain on the fingers, when crushed as such or with water.

**Flower-** Heads solitary on long slender axillary peduncles with ray and disc florets, involucre bracts large, oblong obtuse, much longer than the disc floret; ray florets female, ligulate, ligule 2 or 3 toothed, yellow, style long acute and recurved; fruit achene, triquetrous, tip truncate, disc floret bisexual, tubular, limb elongated, five toothed, anther syngenesious, epipetalous, filament fine with hairy tips, style long, acute and fruit characters are the same as in ray floret; no pappus.

## **b) Microscopic**

**Stem** TS almost circular in outline, cuticle thin, some epidermal cells filled with yellowish contents, followed by 3 to 5 layers of collenchymatous hypodermis; cortex aerenchymatous, with large intercellular spaces, endodermis and pericycle distinct, latter in the form of sclerenchymatous cap over vascular bundles, cambium distinct, phloem consists of sieve tubes, companion cells and phloem parenchyma, xylem in the form of a continuous ring, pith large, collenchymatous with cells showing a little thickening at the angles.

### **Leaf**

**Midrib** - TS slightly convex in outline on the upper side, more convexed on the lower side, upper and lower epidermis covered by thin cuticle, 4 to 6 and 2 or 3 layers of collenchyma present adjacent to upper and lower epidermis respectively, bicollateral vascular bundles, 3 to 5 in number one median large and 2 or 4 lateral small, distinct sclerenchymatous bundle sheath present top and bottom of the bundle, xylem and phloem consist of usual elements, mesophyll parenchymatous, some cells filled with druses and rhomboidal crystals of calcium oxalate.

**Lamina** - Dorsiventral; both upper and lower epidermis covered with thin cuticle, in surface view both epidermis show an isocytic to anisocytic stomata, 2 types of trichomes, (i) long, unicellular, walls warty, with 9 to 12 radiating basal epidermal cells, (ii) small 3 to 5 celled, basal epidermal cells not differentiated; upper epidermis followed by single layered palisade parenchyma, spongy parenchyma 6 to 8 layered, loosely arranged; mesophyll traversed by a large number of veins, idioblasts containing druses and rhomboidal crystals of calcium oxalate present in this region, palisade ratio 3 or 4, vein islet 2 to 5 /mm<sup>2</sup> and vein

termination numbers 5 to 9 /mm<sup>2</sup> while trichome numbers 3 to 9 and stomatal index 12 to 14 on upper surface and 22 to 25 on lower surface of the leaf.

**Powder** Yellowish green, pleasant smell and bitter taste, on microscopic examination unicellular and multicellular trichomes; patches of epidermal cells of leaf with anisocytic stomata, idioblasts containing druses and prismatic crystals of calcium oxalate, palisade cells, groups of papillate epidermal cells of petals and bracts, endothelial cells, parenchymatous cells of anther lobe, pollen grains, acolpate, upto 10 μ in diameter with spinous exine, fibres of bundle sheath and pericycle, tracheids and vessels with spiral, scalariform and reticulate secondary wall thickenings.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	9.5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	17 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	31 per cent,	Appendix 2.2.8

### **T.L.C.**

T.L.C. of methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness, using *ethyl acetate: methanol: water* (7:3:1) as mobile phase and on spraying with *anisaldehyde-sulphuric acid reagent* and heating the plate at 105<sup>0</sup> for 10 minutes, spots appear at 0.47 (light yellow), 0.58 (light grey), 0.75 (blackish grey), 0.81 (light grey), 0.89 (yellowish orange) and 0.92 (light grey).

**CONSTITUENTS** - Coumestan (mixture of wedelolactone and demethylwedelolactone); norwedelic acid, norwedelolactone, tri-*o*-methylwedelolactone and β-amyirin.

### **PROPERTIES AND ACTION**

**Rasa** : Kaṭu, Tikta, Kaṣāya

**Guna** : Tīkṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Mūtrala, Hṛdya, Vṛṣya, Svedakara, Keśya,  
Balya

**IMPORTANT FORMULATIONS** - Grahaṇīmihira taila, Aśoka ghr̥ta, Bṛhat  
Viṣamajvarāntaka lauha

**THERAPEUTIC USES** - Arśa (piles), Atisāra (diarrhoea), Daurbalya (weakness), Hṛdroga  
(heart diseases), Indralupta (alopecia), Jvara (fever), Kṛmi (worm infestation),  
Kāmalā (Jaundice), Kāsa (cough), Pāṇḍu (anaemia), Plīhavṛddhi (splenomegaly), Śiraḥśūla  
(headache), Ślīpada (Filariasis), Strīroga (gynaecological disorders), Śūla (pain / colic),  
Śvāsa (Asthma), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## KETAKĪ (Stilt Root)

Ketaki consists of the stilt roots of *Pandanus odoratissimus* Roxb. Syn. *P. fascicularis* Lamk. *P. tectorius* Soland. ex Parkinson (Fam. Pandanaceae), a densely branched shrub, rarely erect, found along the coasts of India and in Andaman islands, forming a belt of dense, impenetrable vegetation above the high water mark.

**SYNONYMS** : Ketaka, Raja ḥpuṣpa, Sūcipuṣpa, Tṛṇaśūnya

### REGIONAL LANGUAGE NAMES

Bengali	:	Keya, Keori
English	:	Fragrant Screwpine, Screwpine, Caldera Bush
Gujrati	:	Kewado
Hindi	:	Keora, Kevadaa, Kewda
Kannada	:	Thaale hou, Kedage, Mundige, Kiyarige
Malayalam	:	Tazha, Taalampu
Marathi	:	Kevdaa
Oriya	:	Ketoki, Kia
Punjabi	:	Kevda
Tamil	:	Tazampu, Tazhai, Talai
Telugu	:	Mogali, Mogili
Urdu	:	Kewdaa

### DESCRIPTION

#### a) Macroscopic

Drug consists of chopped pieces of thick stilt roots, surface smooth bearing projections of circular root scars; colour ash brown, cut surface pale brown; fracture fibrous; no characteristic odour or taste.

## b) Microscopic

**Stilt root** - Cuticle thick; epidermis a single layer of tabular cells; cortex wide, outer zone of cortex consisting of irregular, loose, small polygonal, fairly thick walled parenchyma cells; inner zone consists of larger thin walled, circular, more compact parenchyma cells with small to wide scattered air chambers; numerous group of fibres present; stele consists of a distinct endodermis and a pericyclic layer, followed by phloem; ground tissue parenchymatous, numerous circular scattered xylem elements.

**Powder** - Brownish powder, revealing the presence of parenchyma cells, fibres with 400 to 600  $\mu$  length, lumen 12 to 16  $\mu$  width, some upto 700  $\mu$  in length; occasionally broad and narrow vessel elements with elongated pits also seen.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	4 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	8 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (5:1.5) as solvent system and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.13, 0.47, 0.71, 0.76 and 0.80 (all green). Under UV 366 nm, spots appear at R<sub>f</sub> 0.27, 0.31, 0.36, 0.44 0.56, 0.71, and 0.76 (all blue). On exposure to *iodine vapour*, spots appear at R<sub>f</sub> 0.13, 0.21, 0.50, 0.61, 0.73 and 0.98 (all brown). On dipping in *vanillin -sulphuric acid reagent* and on heating at 105<sup>0</sup> for 5 minutes spots appear at R<sub>f</sub> 0.16, 0.22, 0.27, 0.32, 0.48, 0.54, 0.70, 0.75, 0.89 and 0.96 (all grey).

**CONSTITUENTS** - Physcion; *p*-hydroxybenzoic acid, cirsilineol, *n*-triacontanol,  $\beta$ -sitosterol, Stigmasterol, campesterol, daucosterol, stigmast-4-en-3, 6-dione, andamarine, piperidine.

**PROPERTIES AND ACTION**

**Guna** : Snigdha, Laghu  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Balya, Dehadārdhyakara, Hṛdya, Pittaśāmaka, Rasāyana, Stambhana

**IMPORTANT FORMULATIONS** - Bālaketakyādi Kaṣāya

**THERAPEUTIC USES** - Gulma (abdominal lump), Jvara (fever), Mūtrakṛcchra (dysuria), Pradara (excessive vaginal discharge), Raktapitta (bleeding disorder), Tvakroga (skin diseases)

**DOSE** - Cūrṇa (powder) : 1 to 2 g  
Kvātha (decoction) : 30 to 50 ml

## KĪṬAMĀRĪ (Leaf)

Kīṭamārī consists of the leaves of *Aristolochia bracteolata* Lam. Syn. *A. bracteata* Retz. (Fam. Aristolochiaceae), a slender, decumbent, glabrous perennial, occurring in plains throughout India.

**SYNONYMS :** Śṛṅgapuṣpī, Kītāri, Dhūmrpatrā

### REGIONAL LANGUAGE NAMES

Bengali	:	Kiramar
English	:	Bracteated birthwort
Gujrati	:	Kidaamaari
Hindi	:	Kitmaar, Kiramar, Kitmaari, Kidaamaari
Kannada	:	Kathhekirubanagida
Malayalam	:	Aduthinapalai, Atu-tinlap
Marathi	:	Kidaamaari, Kidemaar
Oriya	:	Paaniri
Punjabi	:	Kitamar
Tamil	:	Aadu-tinna-palalai
Telugu	:	Gadida gadapa, Tella iswari

### DESCRIPTION

#### a) Macroscopic

Leaves very variable in size, reniform or broadly ovate, cordate at base with a wide shallow sinus, crenulate, undulate, glabrous above and glaucous beneath, finely reticulately veined; petiole 1 to 2.5 cm long, nerves impressed; taste bitter, feebly aromatic when crushed, but not characteristic.

## b) Microscopic

### *Leaf-*

**Petiole** - TS almost angular in outline, with one depression on the upper and two depressions on the lower surface; epidermis single layered followed by 3 or 4 rows of collenchyma; below the ridges about 4 or 5 layers of chlorenchyma present; vascular bundles five in number arranged in a shallow arc; ground tissue parenchymatous.

**Midrib** - Midrib shows a slightly convex outline adaxially, and almost circular abaxially; epidermal cells single layered; the upper and lower sub-epidermal region composed of 2 to 4 layers of collenchyma; a single vascular strand present; ground tissue is made up of parenchyma cells; unicellular epidermal hairs present on abaxial epidermis.

**Lamina** - TS shows dorsiventral structure; epidermis single layered, composed of rectangular cells; trichome occasional on upper surface, simple and unicellular; palisade single layer; spongy tissue composed of loosely packed circular to oval cells; vascular strands present; stomata anomocytic, present on both epidermis; in surface view, adaxial epidermal cells straight walled, but abaxial cells rather wavy; stomatal number 6 to 9 / mm<sup>2</sup> for adaxial epidermis and 23 to 27 / mm<sup>2</sup> for abaxial epidermis ; stomatal index for adaxial epidermis 6 to 12 and for abaxial epidermis 16 to 24; palisade ratio 5 or 6; vein islet number 8 to 12.

**Powder** -Greyish green, shows the presence of palisade cells, fragments of epidermis with straight or slightly wavy walls and anomocytic stomata, parenchyma and collenchyma cells seen, vessels with helical, mostly scalariform and occasionally pitted thickenings on walls observed.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	10 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1.3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	12.8 per cent,	Appendix 2.2.7

Water-soluble extractive	Not less than	25.5 per cent, Appendix 2.2.8
Fixed oil	Not less than	5.3 per cent, Appendix 2.2.9

### T.L.C.

T.L.C. of methanolic extract on precoated aluminium silica gel 'G' 60 F<sub>254</sub> plate of 0.2 mm thickness using *toluene: ethyl acetate: formic acid* (5:1.5:0.5) as mobile phase and when seen under UV 366 nm shows fluorescent spots at R<sub>f</sub> 0.15 (blue), 0.20, 0.26 (both white), 0.36 (blue), 0.43, 0.46 (both pink), 0.49 (blue), 0.56 (light pink), 0.62 (bluish pink), 0.66 (dark blue), 0.74 (blue), 0.79, 0.86, 0.91 (all pink), 0.96 (dark blue). Under UV 254 nm, spots appear at R<sub>f</sub> 0.20, 0.36, 0.49, 0.56, 0.75, 0.86, 0.96 (all green). On dipping in *vanillin - sulphuric acid* and heating the plate for 5 minutes at 105<sup>0</sup> shows spots at R<sub>f</sub> 0.15, 0.20, 0.26, 0.36, 0.43, 0.46, 0.49, 0.56, 0.62, 0.66, 0.74, 0.79, 0.86, 0.91 and 0.96 (all grey).

**CONSTITUENTS** - Aristolochic acid; magnoflorine; *N*-acetylnornuciferine; aristolactam; β-sitosterol and ceryl alcohol.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Garbhāśayottejaka, Kaphahara, Kāsahara, Kṛmighna, Kuṣṭhaghna, Rucya, Vātahara, Virecana, Viṣaghna, Vraṇaśodhana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Kṛmi (worm infestation), Kaṣṭhārtava (dysmenorrhoea), Sandhiśūla (joint pain), Śītapitta (urticaria), Śoṭha (inflammation), Tvakroga (skin diseases), Viṣamajvara (intermittent fever), Vicarcikā (eczema), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## KUMĀRĪVETRA (Rhizome)

Kumārīvetra consists of the rhizomes of *Calamus thwaitesii* Becc. (Fam. Areaceae), an unarmed, erect or high climbing cane palm without stout stem, common in the evergreen forests of Western Ghats.

**SYNONYMS :** Suṣira kāṇḍa ḥ

### REGIONAL LANGUAGE NAMES

Kannada	:	Jeddu betta, Kumaari betta
Malayalam	:	Valiya chural
Marathi	:	Veta
Tamil	:	Vanchi

### DESCRIPTION

#### a) Macroscopic

Drug consists of chopped pieces of rhizome with a few intact roots; bark dark brown and smooth; external surface shows remnants of root scars; cut surface reddish brown; fracture, fibrous; no characteristic taste or odour.

#### b) Microscopic

**Rhizome** Epidermis single layered, followed by a hypodermis of 5 to 6 layers of sclerenchymatous fibres; cortex shows 3 regions of parenchyma zones; a few outer layers are loosely arranged and circular; in most of the middle layers, they are elongated with scattered groups of fibres and those in the inner most layers again circular and loosely arranged similar to the outermost; cortex separated from the stelar region by 2 or 3 layers of laterally elongated parenchymatous cells; stelar region is made up of parenchymatous ground tissue; vascular bundles present in patches, with a large cap of sclerenchyma fibres towards peripheral side and a smaller patch of thick walled parenchyma towards interior; phloem

tissue present above vessels; silica bodies also observed in the phloem region; starch grain present throughout the parenchymatous ground tissue.

**Powder-** Brownish, parenchyma cells circular, elongated or irregular shaped; scalariform vessels elements, tubercled silica bodies, simple circular starch grains up to 35  $\mu$  present; fibres thick walled with narrow lumen and thin walled with broad lumen observed.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	6 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	8 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	7 per cent,	Appendix 2.2.8
Fixed oil	Not less than	0.98 per cent,	Appendix 2.2.9

### **T.L.C.**

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (9:1) as mobile phase and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.13, 0.18, 0.27, 0.33, 0.49, 0.56 and 0.82 (all green). Under UV 366 nm fluorescent zones appear at R<sub>f</sub> 0.29, 0.38, 0.49, 0.60 and 0.98 (all blue). On dipping in *vanillin-sulphuric acid* and heating at 105<sup>0</sup> for five minutes, spots appear at R<sub>f</sub> 0.16 (pink), 0.26 (grey), 0.33 (blue), 0.44 (pink), 0.56 (pink) 0.62 (grey), 0.76 (grey), 0.80 (pink) and 0.88 (blue).

**CONSTITUENTS** - No report on the chemical constituents of the rhizome is available.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta

**Vipāka** : Kaṭu

**Karma** : Dāhapraśamana, Grāhī, Jvaraghna, Kuṣṭhaghna, Pittahara, Varṇya

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Atisāra (diarrhoea), Jvara (fever), Kuṣṭha (Leprosy / diseases of skin), Prameha (metabolic disorder), Raktapitta (bleeding disorder), Visarpa (Erysepales), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## **KUSUMBHA (Fruit)**

Kusumbha consists of dried fruits of *Carthamus tinctorius* L. (Fam. Asteraceae), an erect annual herb, 30 to 90 cm high with spinously serrate leaves, cultivated throughout India for the oil from fruits and a dye from flowers.

**SYNONYMS :** Pāvakam, Vahniśikham, Vastrarañjana

### **REGIONAL LANGUAGE NAMES**

Bengali	:	Kusum, Barre
English	:	Safflower, Parrot seed, Bastard saffron
Gujrati	:	Kusumbo, Kusumbi, Karad
Hindi	:	Kusum, Barre
Kannada	:	Kusubeeegida, Kusumekalu
Malayalam	:	Chendurakam, Kuyimpu
Marathi	:	Kardai, Kardi
Punjabi	:	Kusum
Tamil	:	Kusam, Kartum
Telugu	:	Kusumbaa, Sendurakam, Senturakam
Urdu	:	Kusuma

### **DESCRIPTION**

#### **a) Macroscopic**

Fruit 8 to 12 mm long and 5 to 8 mm broad achenes, compressed, faintly ribbed, muricate, creamy, tapering into a beak which is suddenly dilated into a whitish cup-like disc beneath the pappus; seed small, albuminous, oval, slightly flattened on lateral sides 6 to 10 mm long and 4 to 6 mm broad, enclosed in the achene with a thin and papery seed coat; surface rough, orangeish brown and slightly acrid in taste.

## b) Microscopic

TS oval in outline, pericarp enclosing the seed; pericarp differentiated into epicarp consisting of a single layer of thick walled, pitted, lignified cells with semilunar thickening on outer radial walls; mesocarp consists of stone cells of varying shapes and sizes, 5 to 6 cells deep in the middle and 18 to 20 cells deep at the chalazal end; endocarp 3 or 4 cells deep and differentiated from mesocarp by a single layered oil cells; testa single layered with thick palisade like cells, with prominent linea lucida, followed by tegmen; tegmen consists of a single layered parenchymatous outer epidermis, followed by 4 to 6 cells deep reticulated parenchymatous mesophyll with prismatic crystals; inner epidermis of tegmen lignified and single layered; a single vascular bundle extends upto the micropyle; the endosperm cells rectangular.

**Powder** Creamish brown, microscopy shows, pitted cells of epicarp, patches of sclerenchymatous stone cells of varying shapes and sizes from pericarp, reticulate parenchyma of mesophyll; parenchymatous cells of endosperm containing aleurone grains; oil cells, palisade like cells of testa; thick walled epidermal cells of inner epidermis of tegmen.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4.5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	8 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of methanolic extract on silica gel 'G' plate of 0.2 mm thickness using *toluen: ethyl acetate: formic acid* (7:3:0.5) as mobile phase and when seen under UV light 254 nm shows spots at  $R_f$  0.26, 0.38 0.53 and 0.70. On spraying with *anisaldehyde sulphuric acid*

*reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at R<sub>f</sub> 0.27 (grey), 0.35 (brown), 0.48 (faint grey), 0.52 (grey), 0.70 (brown), 0.73 and 0.81 (both bluish black).

**CONSTITUENTS** - Lignan glucoside (matairesinol, monoglucoside), glucose, maltose, raffinose, luteolin-7-O-glucoside, N-(P-coumaroyl) tryptamine, campesterol, cholesterol,  $\beta$ -sitosterol and its glucoside,  $\Delta^7$ -stigmasterol, myristo-oleo-linolein, myristodilinolein, palmitooleolinolein, palmito-dilinolein, stearo-oleolinolein, stearo-dilinolein, dioleolinolein, oleo-dilinolein, trilinolein.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya, Tikta, Kaṭu
<b>Guṇa</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Mūtrala, Sarvadoṣaprakopaka, Svedajanana, Vidāhī, Virecana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Aśmarī (calculus), Daurbalya (weakness), Kāmalā (Jaundice), Kaṣṭārtava (dysmenorrhoea), Mūtrakṛcchra (dysuria), Pratiśyāya (coryza), Raktapitta (bleeding disorder)

**DOSE** - Cūrṇa (powder): 2 to 4 g

## **KUSUMBHA (Leaf)**

Kusumbha consist of dried leaves of *Carthamus tinctorius* L. (Fam. Asteraceae), an erect annual herb, 30 to 90 cm high with spinously serrate leaves, cultivated throughout India, for its fruits that yield edible oil and a dye from flowers.

**SYNONYMS :**       Vastrarañjana, Pāvaka, Kausumbha

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Akharij, Jhartam
Bengali	:	Kusum phool
English	:	Bastard saffron, Safflower
Gujrati	:	Kusumbo
Hindi	:	Kusum, Kusumb
Kannada	:	Kusubbi, Kasube
Malayalam	:	Kuyimpu, Chentukam
Marathi	:	Kardai, Kardi
Oriya	:	Kusum
Punjabi	:	Kusum
Tamil	:	Senturkam
Telugu	:	Kusumulu
Urdu	:	Kusum

### **DESCRIPTION**

#### **a) Macroscopic**

**Leaf** Sessile, oblong or ovate-lanceolate, spinously serrate, waxy, entire, dark green on upper side and pale green on lower side.

## b) Microscopic

**Midrib-** TS shows an outline that is deeply convex on the abaxial side and slightly convex, on the adaxial side; 1 or 2 layered upper and a single layered lower epidermis covered externally with striated, thick cuticle and interrupted by glandular and non-glandular trichomes; glandular trichomes more on the lower side; ground tissue differentiated into 3 or 4 layered collenchymatous tissue followed by 2 or 3 layered parenchyma on both upper and lower sides of vascular bundle; vascular bundle single, median, closed, followed by 3 or 4 and 8 to 10 layers of thick sclerenchymatous cells capping the vascular bundle on upper and lower side respectively; xylem vessels in radial rows on upper side; phloem 3 or 4 layered in sclerenchymatous region; idioblasts filled with rosette crystal of calcium oxalate.

**Lamina-** Isobilateral; both upper and lower epidermis covered with thick striated cuticle; surface views of both epidermis show unicellular to multicellular ordinary trichomes with acute apex as well as glandular trichomes that are club shaped with single celled stalk and 4 to 8 celled, head; cell walls of both the epidermis straight; anisocytic stomata present on lower side; palisade parenchyma 2 or 3 layered; spongy parenchyma 3 to 6 layers deep and loosely arranged; mesophyll traversed by a number of veins; showing the vascular bundles surrounded by sclerenchymatous bundle sheath. Palisade ratio 3 or 4, vein islet no. 6 to 11/mm<sup>2</sup> and vein termination 6 to 14/mm<sup>2</sup> respectively, stomatal index 23 to 30 on the upper surface and 25 to 33 on the lower surface of the leaf.

**Powder** Green in colour, on microscopic examination shows non glandular unicellular to multicellular trichomes with acute apex; club shaped grandular trichomes with single celled stalk and 4 to 8 celled head; lower epidermis with anisocytic stomata; idioblast with rosette crystals of calcium oxalate; patches of sclerenchyma from bundle sheath; fibres; vessels with scalariform thickenings and palisade cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	19 per cent,	Appendix 2.2.3

Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	20 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	23 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *toluene: ethyl acetate* (8:2) as mobile phase and when seen under UV 366 nm, spots of red colour appear at  $R_f$  0.32, 0.40, 0.54, 0.69 and 0.83.

**CONSTITUENTS** - Hinesol- $\beta$ -D-fucopyranoside, 1-pentadecene.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātakara, Pittakara, Kaphahara, Dīpana, Madanāśaka, Balya

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aśmarī (calculus), Bādhīrya (deafness), Daurbalya (weakness), Mūtrakṛcchra (dysuria), Mūtravikāra (urinary diseases), Netraroga (diseases of the eye), Pralāpa (delirium), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Yoniroga (disease of female genital tract), Pradara (excessive vaginal discharge)

**DOSE** - Cūrṇa (powder): 2 to 4 g

## **KUSUMBHA (Flower head)**

Kusumbha consist of dried flower heads of *Carthamus tinctorius* L. (Fam. Asteraceae), an erect annual herb, 30 to 90 cm high with spinously serrate leaves, cultivated throughout India, for its fruits that yield edible oil and a dye from flowers.

**SYNONYMS :** Kausumbha, Pāvaka, Vastrarañjana

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Akharij, Jhartam
Bengali	:	Kusum phool
English	:	Bastard saffron, Safflower
Gujrati	:	Kusumbo
Hindi	:	Kusum, Kusumb
Kannada	:	Kasube, Kusubbi
Malayalam	:	Chentukam, Kuyimpu
Marathi	:	Kardai, Kardi
Oriya	:	Kusum
Punjabi	:	Kusum
Tamil	:	Senturkam, Kusumb
Telugu	:	Kusumulu
Urdu	:	Kusum

### **DESCRIPTION**

#### **a) Macroscopic**

Orangeish yellow, cylindrical capitulum 1 to 3 cm long, usually sessile, solitary or sometimes in small distant clusters on long, slender, leafless branches; outer involucre bracts, green 2 to 3 cm in length and 1 to 2 cm in breadth, ovate, acute, with broad scarious margins; inner bracts linear oblong, subobtusate, with scarious margins; ligules narrow,

shortly and bluntly 5-toothed at apex; flowers differentiated into three types of florets- ray, disc and neuter; ray florets 3.0 to 4.0 cm long, peripheral, sessile, bracteate, pistillate, petals 5, gamopetalous with valvate aestivation, ovary bicarpellary, syncarpous, unilocular, with single ovule, placentation basal, style simple, 2 to 3.0 cm long; disc florets calyx and corolla similar to rayflorets, usually male, 5 stamens, epipetalous, alternating with petals, anther syngenesious, introrse, longitudinally dehiscent; neuter florets peripheral, 3.0 to 4.0 cm long, calyx pappus like on base, petals 5, 0.5 to 0.6 cm long, gamopetalous, linear in shape, androecium and gynoecium as rudimentary organs; fruit achene upto 1 cm in length, compressed, faintly ribbed, muriculate, tapering into a beak which is suddenly dilated into a whitish cup-like disk beneath the pappus.

#### **b) Microscopic**

**Midrib-** TS shows an outline deeply convex on the abaxial and slightly convex on the adaxial side; 1 or 2 layered upper and a single layered lower epidermis covered externally with striated, thick cuticle and interrupted by glandular and non-glandular trichomes; glandular trichomes more on the lower side; mesophyll differentiated into 3 or 4 layered collenchymatous tissue followed by 2 or 3 layered parenchyma on both the upper and lower sides of vascular bundle; vascular bundle single, median, closed; sclerenchymatous cells cap the vascular bundle on upper and lower side; xylem in radial rows on upper side; phloem 3 or 4 layered; idioblast filled with rosette crystal of calcium oxalate in the sclerenchymatous region.

**Lamina-** Isobilateral; both upper and lower epidermis covered with thick striated cuticle surface views of both epidermis show non-glandular, unicellular trichome with acute apex and club shaped glandular trichome with single celled stalk and 4 to 8 celled head, cell walls of both the epidermis straight, anisocytic stomata present on lower side; palisade parenchyma 2 or 3 layered; spongy parenchyma 3 to 6 layer deep and loosely arranged, mesophyll traversed by number of veins with vascular bundles surrounded by a sclerenchymatous bundle sheath.

**Powder-** Yellowish green, on microscopic examination shows groups of angular epidermal cells with stomata of bracts, unicellular non-glandular, unicellular trichome with acute apex and club shaped glandular trichome with single celled stalk and 4 to 8 celled head; trichomes; round, tetraporate, pollen grains 22 to 27  $\mu$  in diameter; oil cells from seeds, and wavy epidermal cells of petals; stone cells, thin walled and reticulate parenchyma from seed, thick walled parenchyma of peduncle and vessels; pollen grains round, tetraporate, 20 to 27  $\mu$  in diameter.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C of methanolic extract on silica gel 'G' plate of 0.2 mm thickness using *toluene: ethyl acetate: formic acid* (7:3:0.5) as mobile phase and when seen under UV light 254 nm spots appear at  $R_f$  0.13, 0.22 0.27, 0.38 and 0.45. On spraying with *anisaldehyde-sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at  $R_f$  0.19 (yellow) 0.37 (blue) 0.56, 0.67 and 0.89 (all purple).

**CONSTITUENTS** - Contains a dye of flavonoid, Carthamin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Laghu
<b>Vīrya</b>	:	Kaṭu
<b>Vipāka</b>	:	Uṣṇa
<b>Karma</b>	:	Kaphahara, Svedajanana, Dīpana, Keśarañjana, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Kaṣṭhārtava (dysmenorrhoea), Kāsa (cough), Mūtrakṛcchra (dysuria), Pratiśyāya (coryza), Raktapitta (bleeding disorder), Romāntikā (measles), Śvāsa (Asthma), Visphoṭaka (blisterous eruption), Yoniroga (disease of female genital tract)

**DOSE** - Cūrṇa (powder): 2 to 4 g

## LAGHU HARITAMAÑJARĪ (Root)

Laghu haritamañjarī consist of roots of *Acalypha fruticosa* Forsk.(Fam. Euphorbiaceae), a strong smelling pubescent bushy shrub upto 2.5 m in height covered with yellow waxy glands commonly found in plains from Orissa to Tamilnadu, Karnataka and Kerala.

**SYNONYMS :** Laghu-Kuppī

### REGIONAL LANGUAGE NAMES

Hindi	:	Chinni-Ka Jhar, Chinni
Kannada	:	Chinni, Chinnimara, Chinnigida
Malayalam	:	Sinni-maram
Marathi	:	Khokali
Tamil	:	Chinni
Telugu	:	Chinna kuppi

### DESCRIPTION

#### a) Macroscopic

Root consists of long unbranched tap root with lateral roots, cut into pieces of 3 to 5 cm in length and 0.75 to 1.5 cm in diameter; dark brown outside and cut surface yellowish; fracture, short; no characteristic odour and taste.

#### b) Microscopic

**Root** - Epiblema crushed; parenchymatous cortical cells shows the presence of laticifers and large druses; stone cell patches present; phloem narrowphloem parenchyma occasionally having druses; vessel circular, mostly solitary, sometimes in radial groups of 2 to 4 widely spaced in a large zone of xylem parenchyma; rays uniseriate to occasionally biseriate; pithparenchymatous, some cells contain large druses.

**Powder-** Light brown, taste bitter, reticulate and pitted vessels, druses, stone cells, fibres and xylem parenchyma present.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.5 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	2 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	5 per cent,	Appendix 2.2.8
Fixed oil	Not less than	1 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness, using *toluene:ethyl acetate:formic acid* (5:1.5: 0.5) as mobile phase and when seen under UV 366 nm shows spots at R<sub>f</sub> 0.5 (blue), 0.67 (fluorescent blue), 0.83 (fluorescent green). Under UV 254 nm, spots appear at R<sub>f</sub> 0.33, 0.39 (both green), 0.67 (pale blue), 0.89, 0.94 (both green).

**CONSTITUENTS** - Arjunolic acid.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Kaphahara, Pācana, Sraṃsana, Vamana, Vraṇaropaṇa

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## LAGHUPATRA VAR ṢĀBHŪ (Whole Plant)

Laghupatra varṣābhū consists of the whole plant of *Trianthema decandra* L. (Fam. Ficoideaceae (Aizoaceae), a much branched prostrate, procumbent annual herb, occurring as a weed all over peninsular India.

**SYNONYMS :** Dvijāyāṅgī

### REGIONAL LANGUAGE NAMES

Bengali	:	Gadabani, Goda-cani
Hindi	:	Gadabani
Kannada	:	Bilikomme, Gaija soppu
Malayalam	:	Vellutha thazhuthama
Marathi	:	Tultuli
Oriya	:	Puruni saga
Tamil	:	Vellai caranai
Telugu	:	Tellagalijeru

### DESCRIPTION

#### a) Macroscopic

**Root** -Cylindrical, gradually tapering, measuring upto 8 cm long and upto 0.5 cm in thickness, surface brown, smooth, lateral roots sparse; fracture entire, fractured surface smooth with a thin bark and central whitish wood; odour and taste indistinct.

**Stem** -Herbaceous, sparsely branched, procumbent, angular and striate, surface glabrous, fracture entire; odour and taste indistinct.

**Leaf** -Simple, opposite, unequal, petiolate, petioles 0.6 to 1.4 cm long, puberulous, amplexicaul at the base; lamina obovate, 1.5 to 2.5 cm broad and 2.0 to 2.5 cm long apiculate, tapering towards the base, margin entire, unicostate pinnate reticulate venation

with 3 to 5 pairs of lateral veins, adaxial surface dark green and the abaxial light green, glabrous, odour and taste indistinct.

#### **b) Microscopic**

**Root** -TS shows anomalous secondary growth with 6 to 8 seriate cork with rectangular, tangentially elongated cells; cork cambium present; cortex 3 or 4 seriate, composed of isodiametric, parenchymatous cells with intercellular spaces and containing rosettes of calcium oxalate crystals; vascular tissue contains 5 to 6 rings of xylem, alternating with a ring of phloem; phloem rings comparatively narrower; composed of sieve tubes with compound sieve plates, companion cells, phloem parenchyma and phloem fibres; xylem composed of vessels, and parenchyma; numerous xylem fibres measuring 10 to 15  $\mu$  in width and 200 to 310  $\mu$  in length; simple pits present; xylem parenchyma scanty.

**Stem** -TS shows no secondary growth and has epidermis single layered, composed of rectangular, tangentially elongated thin walled compactly arranged parenchymatous cells; cortex made of 10 to 16 layers of thin walled, parenchymatous cells with intercellular spaces; some of the cortical cells contain rosettes of calcium oxalate crystals; stele large with a narrow ring of vascular bundles and a wide central pith; 20 to 25 vascular bundles are arranged in the form of a ring; vascular bundles conjoint, collateral, open and endarch., phloem present with sieve tubes, companion cells, phloem parenchyma and phloem fibres; xylem fibres and parenchyma scanty; pith is composed of thin walled, isodiametric, parenchymatous cells possessing intercellular spaces; some containing rosettes; medullary rays narrow.

#### **Leaf -**

**Midrib** -TS shows a notch in the adaxial side and ridge on abaxial surface; epidermis with cuticle, cell walls nearly straight or slightly wavy in surface view; ground tissue parenchymatous; vascular bundle arranged in an arc, phloem abaxial and xylem adaxial, both xylem and phloem contain fibres, parenchyma, xylem vessels with annular and spiral thickenings.

**Lamina** -TS of lamina shows the presence of cuticle, an epidermis of tabular cells, palisade in a single row, spongy cells loosely arranged, parenchymatous; vascular bundle with a bundle sheath, cells filled with eccentric starch grains; rosettes present in spongy layer, trichomes absent; stomata present on both upper and lower epidermis, more on lower epidermis, paracytic; epidermal cells in surface view polygonal, with straight or slightly wavy walls; stomatal index of adaxial epidermis 16 or 17 and that of abaxial surface 18 or 19, costal cells elongated and narrow.

**Powder** -Greenish grey, freely flowing, and contains polygonal epidermal cells with slightly wavy walls as seen in surface view, paracytic stomata, xylem elements with annular and spiral thickenings, calcium oxalate rosettes (roots of *T. portulacastrum* contain rosettes of calcium oxalate, and roots of *Boerhaavia diffusa* show raphides, and prisms of starch grains).

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	22 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	8 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	12 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	27 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane: ethyl acetate* (9:1) shows under UV 366 nm spots at  $R_f$  values 0.16 (blue), 0.39 (violet), 0.69 (blue) and 0.74 (blue); on exposure to *iodine vapour* spots appear at  $R_f$  values 0.16, 0.20, 0.39, 0.50, 0.69, 0.78 and 0.82, and on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear with  $R_f$  values 0.16, 0.20, 0.39, 0.50, 0.58, 0.69, 0.74, 0.78 and 0.82.

**CONSTITUENTS** - Saponins and alkaloid punarnavine.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Mūtrala, Sraṃsana, Śūlaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Apasmāra (Epilepsy), Ardhāvabhedaka (hemicrania / migraine), Hṛdayaroga (heart disease), Kāmalā (Jaundice), Kāsa (cough), Pāṇḍu (anaemia), Śoṭha (inflammation), Śvāsa (Asthma), Uraḥkṣata (pulmonary cavitation), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## LOHITANIRYĀSA (Exudate)

Lohitaniryāsa consists of exudate of stem of *Dracaena cinnabari* Balf. f. (Fam. Agavaceae), a tall tree reaching upto to 8 m, found in the Indian Ocean island of Suqutra (Socotra), off the coast of Somalia in Africa. It is imported into India.

**SYNONYMS** : Śonitavarṇā, Lohita kṣīrī

### REGIONAL LANGUAGE NAMES

English	:	Dragon's blood
Gujrati	:	Hiraadakhana
Hindi	:	Hiraadokhi, Khoonkharaabaa
Kannada	:	Khunkhaaraa
Malayalam	:	Kandamurgarittam
Marathi	:	Khunkharaabaa
Punjabi	:	Khoonakharaabaa
Tamil	:	Kandamurgarittam
Urdu	:	Damm-ul- Akhwain

### DESCRIPTION

#### a) Macroscopic

Bright red coloured powder; odour and taste nil.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	2 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	8 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	95 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	2 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on silica gel 'G' plate using *chloroform:methanol* (9.5:0.5) as mobile phase and when seen under UV 254 nm shows spots at  $R_f$  0.15, 0.25, 0.36, 0.69, 0.79 and 0.84; under 366 nm shows spots at 0.16 (blue), 0.27 (blue), 0.38 (blue) 0.44 (green), 0.73 (blue) and 0.79 (dark); and on spraying with *anisaldehyde sulphuric acid reagent* and heating the plate for 5 minutes at 105<sup>0</sup> spots appear at  $R_f$  0.18 (purple), 0.27 (yellow), 0.35, 0.45, 0.57, 0.67, 0.78 and 0.82 (all orange).

**CONSTITUENTS** - 2-Hydroxychalcone, 7-hydroxy-3-(3-hydroxy-4-methoxybenzyl) chroman, S)- 7, 3'-dihydroxy-4'-methoxyflavan and 4-hydroxy-2-methoxydihydrochalcone

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Raktastambhana, Saṅgrāhī, Vraṇaropaṇa

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Atisāra (diarrhoea), Pravāhikā (dysentery), Raktārśa (bleeding piles), Raktapitta (bleeding disorder), Raktapradara (menorrhagia or metrorrhagia or both), Raktasrāva (bleeding disorder), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 1 to 2 g

## MĀDHAVĪ (Flower)

Mādhavī consists of the dried flowers of *Hiptage benghalensis* L. (Fam. Malpighiaceae), a large woody, much branched climbing shrub with young parts silky, growing widely, chiefly in damp places, throughout India and Andaman Islands, up to an altitude of 1,500 m.

**SYNONYMS :** Atimuktā, Atimuktaka, Mādhaīlata

### REGIONAL LANGUAGE NAMES

Bengali	:	Maadhivilataa
English	:	Clustered Hiptage
Gujrati	:	Maadhavi, Ragatpiti
Hindi	:	Maadhavi, Anetaa
Kannada	:	Maadhavi, Vasantadhuti
Malayalam	:	Sitaampu
Marathi	:	Madhumaalati, Haladvel
Punjabi	:	Boromali
Tamil	:	Benkar
Telugu	:	Maadhavi, Kurukkathi

### DESCRIPTION

#### a) Macroscopic

Drug consists of a mixture of entire, shrivelled flowers and detached floral parts; flower bisexual, regular, 1.2 to 2.0 cm across, racemes terminal and axillary, pedicellate, pedicel 1.5 to 2 cm in length; calyx 5, persistent, polysepalous, externally densely pubescent, lobes oblong, obtuse, 6 to 9 mm long and 3 to mm broad, central fleshy and thin near margin with a large oblong basal gland measuring 5 to 7 mm in length and 2 to 3 mm in breadth; corolla 5, polypetalous, 1.5 to 2 cm broad and 2 to 2.5 cm long, smooth, silky, orbicular,

clawed, fringed on the margin; uppermost fragment broader and yellowish; stamens 10 encircling the disc, one being larger than other nine, anther bilobed, pistil one, consisting of swollen ovary, with three winged like appendages one being larger and hairy; carpels 3, syncarpous, style one, longer than stamens, stigma 1, ovules 3.

#### **b) Microscopic**

**Powder-** Creamish grey, shows fragments of rectangular shaped epidermal cells of calyx in the surface view along with multicellular, uniseriate trichomes, and their detached broken pieces scattered as such; fragments of epidermal cells of petals in surface view with straight, polygonal walls and diacytic stomata, abundant spherical pollen grains exhibiting 3 to 5 germ pores and distinct smooth exine and intine; fragments of parenchyma of petals containing rosette crystals of calcium oxalate; abundant pitted lignified fibrous sclereids with broad lumen and pointed or blunt apex often exhibiting occasional swelling at places, and twisted or bifurcating ends; fibrous layer and papillose epidermis of anther.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	10 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.5 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	30 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' plate (0.2 mm using *toluene-ethyl acetate* (9:1) as mobile phase and on spraying with *vanillin sulphuric acid reagent* and heating the plate for about 10 minutes at 110<sup>o</sup>, shows spots at R<sub>f</sub> 0.27, 0.43, 0.49 and 0.96.

**CONSTITUENTS** - No report on the chemical constituents of the flower is available.

#### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Tridoṣaghna, Kuṣṭhaghna

**IMPORTANT FORMULATIONS** - Candrakalā rasa

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Kṛmi roga (worm infestation), Kaṇḍū (itching), Pāmā (eczema), Raktapitta (bleeding disorder), Sthaulya (obesity), Tvakroga (skin diseases)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## MATSYAPATRIKĀ (Whole Plant)

Matsyapatrikā is the whole plant of *Merremia tridentata* (L.) Hall. f. Syn. *Ipomoea tridentata* (L.) Roth. (Fam. Convolvulaceae), a prostrate herb occurring widely in the plains throughout India as a weed.

**SYNONYMS :** Prasārinī Keralīya

### REGIONAL LANGUAGE NAMES

Malayalam : Talaneeli

Oriya : Bhuin Kumdda

Tamil : Mutiyarkunthal, Irippanpul, Savolikkoti

Telugu : Sitasavaram

### DESCRIPTION

#### a) Macroscopic

**Root** -Yellowish brown, individual pieces tortuous, 2 to 4 mm diameter, with a brownish bark and creamy wood; broken surface yellowish; fracture fibrous; no odour or taste.

**Stem** -Yellowish brown and brittle, minutely hairy; internodes 1 to 2 cm in length; fracture fibrous, broken surface yellow; pith hollow.

**Leaf** -Simple, alternate, dull green to brown, rarely brittle; petiole 1 to 2 mm long, minutely hairy; lamina 1 to 5 cm long and 0.2 to 0.6 cm broad, linear lanceolate, mucronate, generally glabrous, but base minutely hairy, 3 to 4 lobed, hastate to lobed-hastate, lobe tips mucronate; margin entire; veins 5 to 7 pairs, alternate, rarely opposite, prominent below.

**Flower** Inflorescence cymose, rarely solitary, axillary, peduncle 1.5 to 3 cm, base hairy, brownish; pentamerous, funnel shaped; about 1.5 cm across, sepals five, stamens five and unequal, style slender, stigma bifid, ovary globose, bicarpellate.

**Fruit** -Capsule, dry dehiscent, up to 6 mm across, globose, yellowish brown, surface smooth; seeds 4, angularly ovate, 2 to 3 mm. glabrous, dark brown to black in colour.

## **b) Microscopic**

**Root** -TS shows cork tissue composed of transversely elongated cells; the cortex consists of 7 to 10 layers of tangentially elongated, narrow and thin walled cells containing many, simple, small, rounded starch grains and clusters of calcium oxalate crystals; latex present in thin walled, brown coloured, circular cells; cortex followed by phloem with sieve tubes, companion cells and phloem parenchyma, some of which contain small starch grains; xylem continuous as a ring; medullary rays mostly uniseriate and rarely biseriate.

**Stem** -TS shows an outline slightly 4 angled; epidermis a layer of rectangular cells, followed by a cortex of polygonal parenchymatous cells with small intercellular spaces; some show yellowish brown latex; cortex followed by a layer or two of a broken pericycle of small stone cells; vascular bundles 7 to 8; external phloem continuous and wavy; xylem consists of wide vessels and tracheids; internal, perimedullary phloem not continuous; pith, where present, with irregular thin walled polygonal cells having plenty of starch grains.

## **Leaf-**

**Midrib** -TS shows a depression on the adaxial side; epidermis of rectangular cells followed by 4 to 6 layers of thick walled parenchymatous cells, many of which contain cluster crystals of calcium oxalate; xylem with 4 to 7 rows of xylem vessels arranged in a semicircle; phloem seen just below the xylem, followed by about 5 layers of polygonal parenchyma cells; just above the lower epidermis a single layer of chlorenchyma present. The lower epidermal cells broader and thick walled.

**Lamina** -Upper epidermis followed by 2 to 3 layers of elongated palisade cells; spongy mesophyll with loosely arranged 2 to 3 layers of cells; stomata anomocytic; unicellular and multicellular uniseriate trichomes present at the leaf base and at the junction of the petiole, on upper surface only.

**Powder** -Brown, has no characteristic odour and slightly bitter; microscopic observation shows compact rectangular parenchyma; globular and clustered starch grains of about 5  $\mu\text{m}$  across; granular crystals of calcium oxalate; reddish brown resinous masses; irregular colourless masses; multicellular uniseriate trichomes of about 180  $\mu\text{m}$  in length; unicellular trichomes of about 40 to 150  $\mu\text{m}$ ; long wiry fibres; patches of polygonal epidermal parenchyma with anomocytic stomata; spiral vessels; reticulate vessels; bordered pitted vessels and tracheids.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	10 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *n*-hexane: ethylacetate: methanol (5:4:1) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes shows spots at R<sub>f</sub> 0.10 (grey), 0.28, 0.35, 0.42, 0.47, 0.55, 0.67 (all pink), 0.73 (yellow) and 0.8 (pink).

**CONSTITUENTS** - Flavonoids like diosmetin, luteolin, diosmetin-7-*O*- $\beta$ -glucoside and luteolin -7-*O*- $\beta$ glucoside.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Guru, Sara
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Arśoghna, Bhedana, Sandhānīya, Sara, Vṛṣya

**IMPORTANT FORMULATIONS** - Prasāranīda- taila (keraliya)

**THERAPEUTIC USES** - Arśa (piles), Dhātuḥṣaya (tissue wasting), Pakṣāghāta (Paralysis / Hemiplegia), Sandhiśoṭha (arthritis), Śoṭha (inflammation), Vibandha (constipation), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 3 to 6 g

Svarasa (juice) : 5 to 10 ml

## **MEDĀ (Rhizome)**

Medā is the dried rhizome of *Polygonatum cirrhifolium* Royle (Fam. Liliaceae), a stout herb found in temperate Himalayas from Shimla eastward to Bhutan and Manipur upto an altitude of 1500 to 3300 m.

**SYNONYMS :** Manichidrā, Dharā, Sutrāgrapatrā

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Meda
Bengali	:	Meda
Gujrati	:	Meda
Hindi	:	Medaa
Kannada	:	Medhaa
Malayalam	:	Meda
Marathi	:	Meda
Oriya	:	Meda
Punjabi	:	Meda
Telugu	:	Meda

### **DESCRIPTION**

#### **a) Macroscopic**

Rhizome tuberous, branched or show large circular scars where they have broken off, outer surface smooth, greyish in colour, longitudinally wrinkled when dried, marked with transverse rings of leaf scars and also shows scars of aerial stem on upper side; numerous roots arise from surface; fracture short, fibrous; odour, aromatic, taste, bitter.

## b) Microscopic

**Rhizome**- TS shows about 10 layers of cork cells with thick cuticularised outer wall, followed by ground tissue, with numerous scattered vascular bundles; vascular bundles collateral, each associated with a group of fibres, usually arc-shaped or occasionally nearly surrounding the bundle; cells of the ground tissue small, loosely arranged and contain numerous rounded to oval starch grains measuring 8 to 14  $\mu$  in diameter and raphides and prismatic crystals of calcium oxalate; endodermis not distinct.

**Powder** - Light brown, taste bitter, starch grains simple, rounded to oval measuring 8 to 14  $\mu$  in diameter; variable size of prismatic crystals of calcium oxalate and raphides; border- pitted and reticulately thickened vessels; fibres elongated, thick walled, measuring about 550 to 800  $\mu$  long and 12 to 26  $\mu$  wide, tracheids with lumen width 8 to 12  $\mu$ .

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	25 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	62 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the alcoholic extract of the drug on silica gel 'G' plate using *chloroform: glacial acetic acid :methanol: water* (5:2:2:1) as mobile phase and when seen under UV 365 nm spots appear at  $R_f$  0.54, 0.71 and 0.85 (all greenish). On spraying with *anisaldehyde sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup> spots appear at  $R_f$  0.44, 0.56 (both bluish) and 0.73 (black), 0.85 (brownish).

**CONSTITUENTS** - Steroidal saponins (diosgenin), proteins and resins.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Picchila, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Balya, Bṛmhaṇa, Garbhadā, Jīvanīya, Kaphavardhaka, Pauṣṭika, Pittahara, Stanyajanana, Vṛṣya

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Aśoka ghr̥ta

**THERAPEUTIC USES** - Bālaroga (disease of children), Bhagandara (fistula-in-ano), Gulma (abdominal lump), Kāmalā (Jaundice), Kārśya (emaciation), Kāsa (cough), Kṣaya (pthisis), Naktāndhya (night blindness), Netrasrāva (chronic dacrocystitis or epiphora), Rājyakṣmā (Tuberculosis), Raktapitta (bleeding disorder), Śoṣa (emaciation), Śvāsa (Asthma), Timira (cataract), Visarpa (Erysepales)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## NĀDĪHINGU (Exudate)

Nāḍīhiṅgu is the dried resinous exudation from the shoot tip of *Gardenia gummifera* L. f. Syn. *G. arborea* Roxb. (Fam. Rubiaceae), a large shrub occurring in moist deciduous forests of India.

**SYNONYMS :** Hiṅgunāḍikā

### REGIONAL LANGUAGE NAMES

Bengali	:	Dikamali
English	:	Gummy Gardenia
Gujrati	:	Dikaamaari, Maaladi
Hindi	:	Naadihingu, Dikaamaali
Kannada	:	Dikkaamalli
Malayalam	:	Somanaadikaayam, Gandharaajan
Marathi	:	Dikemaali
Punjabi	:	Dikaamaali
Tamil	:	Tikka malli
Telugu	:	Tellamanga, Karinguva

### DESCRIPTION

#### a) Macroscopic

Globular droplets between 1 and 3 mm in size, shiny, smooth and translucent; sulphur yellow to golden yellow in colour, gradually turning brown with age, broken surface shiny and smooth; fracture brittle when dry but sticky when fresh; has a characteristic smell of asafoetida and tastes slightly bitter.



**Vipāka** : Kaṭu

**Karma** : Vātahara, Kaphahara, Dīpana, Vātānulomaka, Pācana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ādhmāna (flatulence with gurgling sound), Agnimāndya (digestive impairment), Ajīrṇa (indigestion), Āmadoṣa (products of impaired digestion and metabolism), Aruci (tastelessness), Gulma (abdominal lump), Hikkā (hiccup), Kṛmi (worm infestation), Medoroga (obesity), Udaraśūla (pain in the abdomen)

**DOSE** - Cūrṇa (powder) : 1 to 3 g

## NĀHĪ (Whole Plant)

Nāhī consists of the whole plant of *Enicostemma axillare* (Lam.) A. Raynal. Syn. *E. littorale* Blume, *E. hysoppifolium* (Willd.) Verd. (Fam. Gentianaceae), an erect herb, 50 to 60 cm high, found throughout the greater parts of India upto an altitude of 500 metres, more commonly in coastal areas and damp habitats.

**SYNONYMS** : Māmajjaka, Nāgajihvā

### REGIONAL LANGUAGE NAMES

Gujrati	:	Maamijvaa, Maamejvaa
Hindi	:	Naay, Naai, Chhotaa Kiraayataa
Kannada	:	Karibandit, Sogade
Malayalam	:	Vellaruku, Vellari
Marathi	:	Kadvi naai
Punjabi	:	Bahuguni
Tamil	:	Vellaruku
Telugu	:	Chhevvu-kurti, Gulvidi
Urdu	:	Naay

### DESCRIPTION

#### a) Macroscopic

**Root** - Root 2 to 4 mm in diameter, taproot dull white in colour surface slightly rugose; lateral roots not abundant; odour not specific; taste, bitter.

**Stem** - Provided with many erect or procumbent branches, readily rooting at nodes, bearing small white flowers in whorled axillary clusters; no odour; taste, bitter.

**Leaf** - Leaves opposite, sessile, shape and size very variable, midrib depressed on adaxial and prominent on abaxial side, upto 6 to 7cm long and about 1.25cm, broad, narrow linear or linear oblong, glaucous; odour nil; taste, bitter.

#### **b) Microscopic**

**Root** - TS shows circular outline; epidermis single layered, with large and smaller cells; trichomes unicellular; cortex parenchymatous with large irregular airspaces; endodermis and a few layers of pericycle well defined; stele nearly circular in the central region with scattered vessels among thick walled parenchyma cells; medullary ray uniseriate; pith absent.

**Stem** - Stem is quadrangular in outline with narrow wings; epidermis single layered with barrel shaped cells; winged corners show outer collenchyma and inner parenchyma; a cortical zone consisting of circular parenchymatous cells with intercellular spaces; endodermis well developed; vascular bundle bicollateral; xylem vessels arranged singly or in radial rows in a circle along with xylem parenchyma; medullary rays uniseriate; pith parenchymatous; starch grains present.

#### **Leaf-**

**Midrib** - TS shows prominent bulge abaxially, consisting of collenchymatous cells; collateral vascular bundle present; ground tissue consists of thin walled parenchymatous cells, more loosely packed on the abaxial side.

**Lamina** - Epidermis single layered; papillae occur occasionally on both the epidermis; walls in surface view wavy, more so in the lower epidermis; stomata anisocytic; mesophyll consists of slightly vertically elongated palisade cells below the upper epidermis followed by loosely packed layers of spongy cells; stomatal number for adaxial epidermis 1 to 3/mm<sup>2</sup> and for abaxial epidermis 2 to 4/mm<sup>2</sup>; stomatal index for adaxial epidermis 18 to

22, and for abaxial epidermis 20 to 24; palisade ratio 20 to 22; vein islet number 12 to 14 and veinlet termination number 7 or 8.

**Powder** - Greenish, epidermal fragments with anisocytic stomata; ray cells present; vessel elements, and starch grains upto 5  $\mu$  in size present; fibres with wide lumen also seen.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	9 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	16 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	28 per cent,	Appendix 2.2.8
Fixed oil	Not less than	5 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> (0.2 mm thickness) using *toluene: ethyl acetate* 6:1 + 6 drops of *formic acid*, under UV 254 nm shows spots at R<sub>f</sub> 0.27, 0.30, 0.40, 0.51, 0.54, 0.62 and 0.70 (all green). Under UV 366 nm fluorescent zones shows at R<sub>f</sub> 0.22, 0.27 (both white), 0.34 (pink), 0.38 (violet), 0.40, 0.51 (both magenta), 0.58 (blue), 0.62 (dark magenta), 0.66 (magenta) 0.70 (navy blue) are seen. On exposure to *iodine vapours*, spots are observed at R<sub>f</sub> 0.18, 0.25, 0.32 (all yellowish brown), 0.40, 0.47, 0.51 (all green), 0.58 (yellowish brown), 0.64 (green), 0.72, 0.80, and 0.94 (all yellowish brown). On dipping the plate in *vanillin - sulphuric acid reagent* and heating at 105<sup>o</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.22 (blue), 0.27 (pink), 0.34 (violet), 0.44 (green), 0.51, 0.58 (both violet), 0.62 (green), 0.68, 0.76, 0.80 (all violet), 0.86 (blue) and 0.94 (violet).

**CONSTITUENTS** - Flavonoids like genkwanin, apigenin, isovitexin, swertisin, saponarin, swertiamarin, betulin, enicoflavin, gentiocrucine, gentianine, erythrocentaurine, ephelic acid glycoside, sylswertisioside, isoswertisin-5-*O*-glucoside; sylswertisin-5-*O*-glucoside.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātānulomaka, Pittahara, Kaphahara, Dīpana, Pācana, Viṣaghna

## IMPORTANT FORMULATIONS - Vāyucchaya Surendra Taila

**THERAPEUTIC USES** - Kṛmi (worm infestation), Śoṭha (inflammation), Madhumeha (Diabetes mellitus), Medoroga (obesity), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Tvakroga (skin diseases), Viṣamajvara (intermittent fever), Vibandha (constipation), Yakṛt daurbalya (poor function of liver)

**DOSE** - Cūrṇa (powder) : 1 to 3 g

## **NIKOCAKA (Kernel)**

Nikocaka consists of kernels of *Pinus gerardiana* Wall. (Fam. Coniferae), a medium sized tree growing in North-Western Himalayan region between 1900 to 4000 m. It is removed from the pine nut known and used as Chilgoza in trade.

**SYNONYMS :** Cilagoja

### **REGIONAL LANGUAGE NAMES**

English	:	Chilgoza pine, Edible pine, Neosa pine
Gujrati	:	Chilgojhaa
Hindi	:	Chilgozaa, Neoza, Gunobar, Rhee
Kannada	:	Chilgojha
Malayalam	:	Chilgojha
Marathi	:	Chilgoza, Galgoja
Oriya	:	Chilgojha
Punjabi	:	Mirrigaljoj, Mirri, Chiri, Chirrigaljoja
Telugu	:	Chilgoja
Urdu	:	Chilgozah

### **DESCRIPTION**

#### **a) Macroscopic**

Off-white in colour; oval in shape and pointed at the micropylar end; ranging from 1.5 to 2 cm long; oleaginous; possess a delicate terebinthine flavour; odour sweet.

#### **b) Microscopic**

TS is circular in outline shows epidermis covered with cuticle followed by wide ground tissue; collapsed layer; inner parenchymatous region which has 8 to 10 vascular bundles arranged in a ring, cells of the ground tissue are filled with starch grains and oil

globules; vascular bundles consist of a centrally located xylem encircled by a phloem, with an external bundle sheath.

**Powder** -Yellowish white, polygonal, thin walled, barrel shaped epidermis in surface view; abundant simple, spherical starch grains scattered as such and in parenchyma cells of ground tissue; fragments of xylem vessels.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	3 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	28 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	18 per cent,	Appendix 2.2.8
Fixed oil	Not less than	43 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C. of the alcoholic extract on precoated silica gel 'G' 60 plate using *petroleum ether: diethyl ether: acetic acid* (9:1:0.1) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes shows spots at R<sub>f</sub> 0.10, 0.14, 0.18, 0.22 (all purple), 0.37 (dark purple) and 0.87 (light purple).

**CONSTITUENTS** - Palmitic, stearic, oleic and linoleic acids; palmito-dilinolein, stearo-dilinolein, palmito-oleolinolein, stearo-oleolinolein, trilinolein, oleodilinolein, dioleolinolein and triolein.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guna</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura

**Karma** : Śleṣma-niḥsāraka, Bṛṃhaṇa, Balya, Dhātuvardhana, Kaphakara, Pittakara, Raktaprasādaka, Uttejaka, Vṛṣya, Vātahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Apasmāra (Epilepsy), Ardita (facial palsy), Hikkā (hiccup), Kāsa (cough), Kṣata (wound), Kṣaya (pthisis), Kaṭiśūla (lower backache), Pāṇḍu (anaemia), Pārśvaśūla (intercostal neuralgia and pleurodynia), Pakṣavadha (paralysis / hemiplegia), Sandhivāta (arthritis due to Vāta doṣa), Śvāsa (Asthma), Vātarakta (Gout)

**DOSE** - Cūrṇa (powder): 10 to 20 g

## PANASA (Root Bark)

Panasa consists of dried root bark of *Artocarpus heterophyllus* Lamk. Syn. *A. integrifolia* L.f.(Fam. Moraceae), a medium to large evergreen tree common in Western Ghats and cultivated throughout India for its fruits.

**SYNONYMS :** Mūlaphalada, Apuṣpaphalada, Atibṛhatphala

### REGIONAL LANGUAGE NAMES

Assamese	:	Kanthal
Bengali	:	Katal, Kantal, Kathal, Phanas
English	:	Jack-fruit tree, Indian Jack fruit
Gujrati	:	Phanus
Hindi	:	Kathar, Kathal, Katahala
Kannada	:	Hebba alasu, Alasa, Halasu
Malayalam	:	Chakka
Marathi	:	Phanasa
Oriya	:	Panasa, Ponoso
Punjabi	:	Katahala
Tamil	:	Pala
Telugu	:	Panasa
Urdu	:	Katahal

### DESCRIPTION

#### a) Macroscopic

Bark upto 5 to 8 cm long, 2 to 4.5 cm wide and 4 to 12 mm thick, greyish to reddish brown with longitudinal ridges and circular to tangentially elongated lenticels; fracture, short, showing creamish interior; odour taste and indistinct.

## b) Microscopic

Bark shows cork consisting of rectangular and tangentially elongated cells; phellogen 1 to 2 layered; phelloderm shows thin walled parenchyma cells, groups of stone cells and fibres present in lower phelloderm region; phloem a wide zone consisting of sieve tubes, companion cells, phloem parenchyma, fibres and stone cells being traversed by multiseriate medullary rays; stone cells and fibres in groups of varying dimensions scattered throughout the phloem region; the stone cells are upto 70  $\mu$  long and upto 30  $\mu$  wide and fibre measuring about 1450  $\mu$  in length ; a large number of prismatic and rhomboidal crystals of calcium oxalate scattered in parenchyma cells of phloem and phelloderm.

**Powder** -Shows rectangular to polygonal stone cells with wide lumen and simple pits, fragments of fibres with tapering ends, thin walled parenchyma cells with prismatic and rhomboidal crystals of calcium oxalate, fragments of cork cells and numerous scattered rhomboidal and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	19 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	10 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	3 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *toluene: chloroform: ethyl acetate* (2:2:1) as mobile phase and on spraying with *ethanolic sulphuric acid* and heating the plate at 105<sup>0</sup> for 10 minutes shows spots at R<sub>f</sub> 0.30, 0.36, 0.43, (all light green), 0.52 (purple), 0.67 (green) and 0.87 (purple).

**CONSTITUENTS** -  $\beta$ -sitosterol, cycloartenone, cycloartenol; tannins.

## PROPERTIES AND ACTION

**Rasa** : Kaṣāya, Tikta  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Grāhī, Pittahara, Stambhana, Tvakdoṣahara, Vātavardhaka, Viṣṭambhakāraka

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Atisāra (diarrhoea), Dāha (burning sensation), Raktapitta (bleeding disorder), Śoṭha (inflammation), Tvakroga (skin diseases)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## PĀPATAḤ (Root)

Pāpaṭaḥ consists of the root pieces of *Pavetta indica* var. *tomentosa* Hook. Syn. *P. tomentosa* Roxb. (Fam. Rubiaceae), a stout bushy shrub, reaching about 9 m high, occurring throughout the deciduous forests of India, as an under growth.

**SYNONYMS :** Pāpaṭī

### REGIONAL LANGUAGE NAMES

Assamese	:	Gobor sitha
Bengali	:	Kukurchuda, Jui
English	:	White Pavetta
Gujrati	:	Papat
Hindi	:	Kankra, Papari, Kathachmpa
Kannada	:	Pavati, Pappadi, Paavatlegida
Malayalam	:	Pavatta
Marathi	:	Papadi, Kakra
Oriya	:	Katha pengu
Punjabi	:	Papadi
Tamil	:	Pavattai
Telugu	:	Konda papata, Duyi papata, Papata kammi

### DESCRIPTION

#### a) Macroscopic

Root pieces measuring 4 to 12 cm long and 1 to 3 cm in thickness, outer surface smooth, light brown; fracture entire, fractured surface smooth with very thin, dark brown easily detachable bark and a central light yellowish, tough, wood; odour and taste indistinct.

#### b) Microscopic

TS of the mature root shows a thin, stratified bark and an extensive wood; bark composed of cork, 3 to 8 layers of thick walled isodiametric, compactly arranged cells interrupted by lenticels; cork cambium uniseriate, cells tangentially elongated-thin walled; cortex, parenchymatous, cells isodiametric, compactly arranged; secondary phloem with sieve tubes, abundant phloem parenchyma and thick walled lignified phloem fibres, solitary or in groups, wood hard, close grained, pores very small, vessels numerous, arranged singly in radial rows; with circular bordered pits arranged alternately in vertical rows; xylem parenchyma thick walled, filled with rhomboid crystals of calcium oxalate; xylem fibres abundant, polygonal with thick lignified pitted walls, surrounding the xylem vessels, lumen very narrow; medullary rays short, numerous, fine to very fine.

**Powder** -Brownish-grey, patches of cork tissue with stratified cells, vessels with bordered pits, phloem and xylem fibres, ray cell fragments in tangential view and rhomboid calcium oxalate crystals.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	3 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	9 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane: ethyl acetate* (8:2) as mobile phase and when seen under UV 366 nm shows fluorescent spots at  $R_f$  0.5, 0.64, 0.93 and 0.97 (all blue); on exposure to *iodine vapour* spots appear at  $R_f$  0.15, 0.28, 0.50, 0.64, 0.93 and 0.97 (yellow); on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup> shows spots at  $R_f$  values 0.15, 0.46, 0.64, 0.75, 0.93 and 0.97.

**CONSTITUENTS** - Fixed oil.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Balya, Kaphaghna, Mūtrala, Varṇya, Virecana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Kāmalā (Jaundice), Kaṇḍū (itching), Mūtraroga (urinary diseases), Śoṭha (inflammation), Udararoga (diseases of abdomen), Vibandha (constipation), Visphoṭa (blister)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## PARṆAYAVĀNĪ (Leaf)

Parṇayavānī consists of the leaves of *Coleus amboinicus* Lour. Syn. *C. aromaticus* Benth. (Fam. Lamiaceae), an aromatic, succulent perennial herb commonly cultivated in gardens throughout India and found wild in Rajasthan.

**SYNONYMS :** Yavānīgandhā

### REGIONAL LANGUAGE NAMES

Bengali	:	Paatharchur, Paterchur
English	:	Country borage, Indian borage
Gujrati	:	Ovaapaan
Hindi	:	Pattaajvaayana
Kannada	:	Karpurahalli, Penova
Malayalam	:	Kannikurukka, Panikkurukka, Navarayilla
Marathi	:	Paan-Ovaa
Oriya	:	Hemakedara, Amarpoi
Punjabi	:	Patharchura
Tamil	:	Karpuravalli
Telugu	:	Kapparillaku, Vamu-aku

### DESCRIPTION

#### a) Macroscopic

**Leaf** -Leaves green, opposite, hispidly villous, broadly ovate, crenate, succulent, upto 9 cm in width, petiolate, nerves impressed, odour, pleasantly aromatic; taste, pungent.

## **b) Microscopic**

**Petiole** -TS shows a slightly concave outline on the adaxial side and convex on the abaxial side, epidermis a single layer of laterally elongated cells, followed by collenchyma of 2 or 3 layers; vascular bundles collateral, four in number of which two lateral abaxial bundles are larger and two lateral adaxial are smaller; ground tissue of thin walled parenchymatous cells; glandular trichomes; unicellular, and non-glandular uniseriate multicellular.

**Midrib** -TS shows a hemi- spherical protrusion on the abaxial side and has a light depression on the adaxial side; 2 or 3 layers of collenchyma situated just above the abaxial epidermis and below the adaxial epidermis; palisade layer continuous over the midrib also; ground tissue consists of parenchyma cells; a solitary vascular bundle present in the centre.

**Lamina** -Dorsiventral, adaxial and abaxial epidermis composed of rectangular cells, the abaxial cells being distinctly smaller; stomata diacytic, lie flush with the epidermal surface; subjacent to adaxial epidermis three, or occasionally even more, layers of slightly vertically elongated, columnar, closely arranged palisade cells are seen; following the palisade 4 or 5 layered spongy tissue composed of nearly rounded closely arranged cells with intercellular spaces seen; trichomes glandular and non-glandular; uniseriate, non-glandular trichomes 3 to 6 celled, curved and progressively tapering; glandular provided with a two celled stalk of which the lower cell is the longer and the second that subtends the globular unicellular head nearly discoid; exhausted glandular hairs smaller in size also seen; stomatal number 12 to 14 / mm<sup>2</sup> for adaxial epidermis and 16 to 24 / mm<sup>2</sup> for abaxial epidermis; stomatal index for adaxial epidermis is 11 to 14 and for abaxial epidermis 18 to 22; palisade ratio 2 or 3; vein islet number 10 to 13 and vein termination number 2 or 3.

**Powder** Green, bitter to taste and characteristic odour; shows epidermal cells in surface view, with slightly wavy walls; diacytic stomata; both uniseriate as well as

glandular trichomes; broad and narrow vessel elements also seen, collapsed trichomes seen in the surface view of epidermis.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	16 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	23 per cent,	Appendix 2.2.8
Fixed oil	Not less than	2.8 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C. of chloroform extract on precoated aluminium silica gel 'G' 60 F<sub>254</sub> plate of 0.2 mm thickness using *toluene: ethyl acetate* (6:1) as mobile phase and when seen under UV 366 nm, spots appear at R<sub>f</sub> 0.10, 0.14, 0.64 (all pink), 0.73 and 0.80 (both dark pink). Under UV 254 nm, spots appear at R<sub>f</sub> 0.14, 0.27, 0.33, 0.64, 0.73, 0.80 (all green) and on dipping the plate in *vanillin-sulphuric acid* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.14, 0.27, 0.33, 0.64, 0.73 and 0.80 (all grey).

**CONSTITUENTS** - Oleanolic acid; crategolic acid; pomolic acid; euscaphic acid; tormentic acid; ursolic acid and 2 $\alpha$ ,3 $\alpha$ ,19 $\alpha$ ,23-oxalacetic acid; cirsimaritin; sitosterol glucoside; salvingenin; quercetin; 6-methoxygenkwanin; chrysoeriol; ethyl salicylate; g-terpinene;  $\beta$ -salinene; luteolin; apigenin; eriodictol; p-cymene;  $\alpha$  and  $\beta$ -pinene; taxifolin; thymol; carvacrol; myrcene, 1,8- cineole; eugenol;  $\beta$ -caryophyllene.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu

**Karma** : Dīpana, Kaphahara, Malasaṅgrāhiṇī, Pācana, Rucya, Vātahara, Vedanāsthāpana, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ādhmāna (flatulence with gurgling sound), Agnimāndya (digestive impairment), Ajīrṇa (indigestion), Aruci (tastelessness), Atisāra (diarrhoea), Grahaṇī (colitis / ulcerative colitis), Gulma (abdominal lump), Hikkā (hiccup), Hṛddaurbalya (weakness of the heart), Jīrṇaśvāsa (chronic asthma), Kāsa (cough), Kṛmi (worm infestation), Mūtrakṛcchra (dysuria), Mūtraroga (urinary diseases), Mūtrāśmarī (Urinary calculus), Śvāsa (Asthma), Udararoga (diseases of abdomen), Unmāda (mania / psychosis), Visūcikā (Gastro-enteritis with piercing pain)

**DOSE** - Svarasa (juice) : 5 to 10 ml

## PATRASNUHĪ (Latex)

Patrasnuhī consists of the fresh or dried latex of *Euphorbia nivulia* Buch.-Ham. (Fam. Euphorbiaceae), a spiny spurge growing upto 10m high, found in the dry and rocky regions practically throughout India and is often grown in hedges. Latex is collected by draining it from freshly cut leaves and stems.

**SYNONYMS :** Bahukaṅṭaka, Vajrī, Patta Karie, Sehuṅḍa

### REGIONAL LANGUAGE NAMES

Bengali	:	Dandaa thohara, Sij
Gujrati	:	Thorkantalo, Thor
Hindi	:	Katthohar, Sij
Kannada	:	Yela kalli
Malayalam	:	Ilakalli
Marathi	:	Sabar, Tepari
Oriya	:	Kath sigu
Tamil	:	Iaikkalli
Telugu	:	Akujemudu
Urdu	:	Zakum

### DESCRIPTION

#### a) Macroscopic

**Fresh** Milky white liquid, bitter taste, distinct and unpleasant odour.

**Dry** Brown in colour, lumpy, malleable to brittle with a dusty surface, bitter to taste and odour indistinct.

## b) Microscopic

**Fresh** A small portion of latex mounted in glycerin shows starch grains, oval or dumb bell shaped with 3 lobed extremities; a few occur in clusters of 20 to 50  $\mu$  in diameter; oval shaped individual starch grains measure 5 to 10  $\mu$ ; oil globules also seen stained in Sudan III, no associated vegetable debris found.

**Dry** -A small portion of residue after softening over water bath and clearing with 5 % KOH and mounted in glycerin, shows oval shaped starch grains 5 to 10  $\mu$  in diameter, dumb bell shaped starch grains with 3 lobed extremities and grains occurring in clusters 30 to 40  $\mu$  in diameter; oil globules also seen.

## Solubility

Fresh latex soluble in Alcohol, 1N NaOH (aq) and 50 % H<sub>2</sub>SO<sub>4</sub>

Dry latex insoluble in Alcohol and 1N NaOH (aq); partially soluble in 50 % H<sub>2</sub>SO<sub>4</sub>

Fluorescence Analysis in both day and UV (254 nm) light

Fresh latex in 1N NaOH (aq) cream in day light and light green in UV light.

Dry latex in 1N NaOH (aq) yellow in day light and light green in UV light.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	2 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.12 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	29 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	7 per cent,	Appendix 2.2.8
Fixed oil	Not less than	21 per cent,	Appendix 2.2.9

## T.L.C.

T.L.C of dichloromethane extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> (0.2 mm thickness) using *toluene: ethyl acetate* (6:0.5) as mobile phase and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.17, 0.20, 0.39, 0.44, 0.63, 0.71 and 0.80 (all green). On

exposure to *iodine vapours* spots appear at R<sub>f</sub> 0.17, 0.22, 0.32, 0.44 and 0.80 (all brown). On dipping the plate in *vanillin-sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.16 (blue), 0.22, 0.26 (both violet), 0.32 (blue), 0.39, 0.44 (both violet), 0.56, 0.64 (both blue) and 0.82 (violet).

**CONSTITUENTS** - Cyclonivuliaol; cycloartenol; cycloeucalenol; cycloart-25-en-3-β-24-diol.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Tīkṣṇa, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Bhedana, Dāhaka, Lekhana, Virecana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Bhagandara (fistula-in-ano), Kuṣṭha (Leprosy / diseases of skin), Śvāsa (Asthma), Udararoga (diseases of abdomen)

**DOSE** - Kṣīra (latex): 125 to 250 mg

## PIṄDATAGARA (Rhizome)

Piṅdatagara consists of the dried rhizomes of *Asarum europaeum* L. (Fam. Aristolochiaceae), an evergreen plant with glossy foliage, occurring in Europe and temperate Mediterranean regions. The rhizomes are imported into India.

**SYNONYMS :** Dvīpāntara Tagara, Kaṭupatra, Pārasika tagara

### REGIONAL LANGUAGE NAMES

English	:	Common Asarbacca, Foal foot
Hindi	:	Tagar ganthoda, Asaarun, Upana
Marathi	:	Gathi tagara
Oriya	:	Rukuna, Hatapochha
Telugu	:	Chepututaku
Urdu	:	Asaarun, Asaroon

### DESCRIPTION

#### a) Macroscopic

Rhizomes are available in the form of pieces of about 2 to 4 cm long and 0.7 to 1.5 cm in thickness, irregular in shape, hard, external appearance dark brown and warty due to scars of leaf bases, inflorescences and lateral branches; cut surface is slightly coarse, dark coloured with a layer of thin bark, and a ring of vascular tissue; odour characteristically aromatic; taste, indistinct.

#### b) Microscopic

Irregular in outline, bark contains cork, cork cambium, secondary cortex and phloem; cork 3 to 6 seriate, composed of tangentially elongated, rectangular, compactly arranged, stratified, thick walled, suberised cells; cork cambium uni or biseriate, composed of rectangular, compactly arranged, thin walled cells; secondary cortex composed of

tangentially elongated thin walled, loosely arranged cells containing tannin as shown by a dark brown colour on treatment with a mixture of freshly prepared 5% w/v Ferric Chloride solutions in 90% alcohol and 25% Basic Lead Acetate solution in carbondioxide free water; endodermis and pericycle crushed; endodermis single layer, cells barrel shaped, compactly arranged, radial and tangential walls are thickened and turn reddish in phloroglucinol and also in Sudan III; pericycle 2 or 3 seriate, composed of compactly arranged isodiametric cells; secondary phloem has sieve tubes, companion cells, extensive phloem parenchyma and phloem fibres; sieve tubes short with thin walls, and simple sieve plates, one or two companion cells are associated with each sieve tube; phloem parenchymatous cells are elongated tangentially, often collapsed completely in some places leaving large spaces; cells store tannin and oil globules, xylem is smaller, with 12 to 20 in patches, arranged in the form of a ring, each patch containing vessels, parenchyma and fibres; vessels upto 80  $\mu$  in width and upto 250  $\mu$  in length, with oblique end walls and a simple perforation plate; protoxylem elements possess spiral thickenings and metaxylem vessels have bordered pits arranged alternately; xylem fibres scanty, upto 450  $\mu$  in length, lignified with thick walls; pith crushed.

**Powder** -Dark brown in colour, oily, fine, not free flowing, and forms clumps; shows the presence of cork tissue, parenchyma, fibres and xylem vessels; xylem fibres 225 to 350  $\mu$  in length, thick walled with simple pits; vessels 180 to 250  $\mu$  long, having spiral thickenings; pitted, wide and short vessels are also present; end walls, oblique with simple perforation plates

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	6 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	20 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	25 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the alcoholic extract on silicagel 'G' plate using *n-hexane: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm shows spots at R<sub>f</sub> 0.20 and 0.37 (both blue); on exposure to *iodine vapour*, spots appear at R<sub>f</sub> 0.20, 0.37 and 0.55 (all yellow); on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup> spots appear at R<sub>f</sub> values 0.20, 0.37, 0.45, 0.55 and 0.61.

**CONSTITUENTS** -  $\alpha$ -Agrofuran, chalcone diglycoside,  $\alpha$ -asarone, diasarone-1, diasarone-2, *trans* & *cis*-isoasarones, fixed oil and volatile oil.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Amla, Kaṣāya
<b>Guṇa</b>	:	Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphaghna, Nāḍībalya, Śirovirecana, Śvayathuvilayana, Svedajanana, Tīkṣṇavirecana, Vāmaka, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Anārtava (Amenorrhoea), Apasmāra (Epilepsy), Ardita (facial palsy), Avarodhajanya Kāmalā (obstructive Jaundice), Gṛdhrasī (Sciatica), Jalodara (ascites), Mūtrāvarodha (uninary obstruction), Netraroga (diseases of the eye), Pakṣavadha (paralysis / hemiplegia), Pārśvaśūla (intercostal neuralgia and pleurodynia), Plīha roga (splenic disease), Śūla (pain / colic), Yakṛt śoṭha (Hepatitis)

**DOSE** - Cūrṇa (powder) : 1 to 3 g

## PĪTA-KĀÑCANĀRA (Bud)

Pīta-kāñcanāra consists of dried, mature flower buds of *Bauhinia racemosa* Lamk. (Fam. Caesalpiniaceae), a small bushy and crooked, deciduous tree distributed throughout India, common in sub-Himalayan tract from the Ravi eastwards to Bengal, Central and South India.

**SYNONYMS :** Pītapuṣpaka

### REGIONAL LANGUAGE NAMES

Bengali	:	Bauraj, Sada Kanchana
Gujrati	:	Aasotaro, Asundro, Apta
Hindi	:	Asanta, Ashta
Kannada	:	Banne, Kadu manthara, Arelu, Mandara, Akilu
Malayalam	:	Mandarum
Marathi	:	Aapataa, Ashtaa
Oriya	:	Kanchana
Punjabi	:	Kosundra, Taur
Tamil	:	Atthi, Malai-atti, Malai-mandarai
Telugu	:	Ari, Are, Pacchare
Urdu	:	Kachnal

### DESCRIPTION

#### a) Macroscopic

Flower buds 1.5 cm to 2.5 cm in length and 3 to 7 mm in diameter, apex acute, base tapering with attached pedicel measuring up to 2 cm in length, surface light brown to greyish brown with longitudinal fine wrinkles; fragile; calyx limb spathaceous, 5 toothed, reflexed; petals oblanceolate, as long as calyx limb; stamens 10, all perfect; odour and taste indistinct.

## b) Microscopic

**Calyx-** TS of sepal more or less circular in outline with 5 to 6 ridges and a central hollow core; epidermis on both surfaces with anomocytic stomata, 1 to 3 celled small covering trichomes, measuring upto 150  $\mu$  in length, present on lower surface: 4 to 5 layers of collenchyma cells present below each ridges of lower epidermis; mesophyll represented by aerenchyma; numerous vascular bundles arranged in a row in the mesophyll, vascular bundles below each ridge being larger in comparison to others; rosettes of calcium oxalate crystals present in some of the cells of aerenchyma.

**Corolla-** Petal shows single layered epidermis followed by mesophyll composed of circular to oval parenchyma cells; a number of small vascular bundles present in a row in the mesophyll; most of the parenchyma cells adjoining vascular bundles contain yellow to yellowish orange pigments.

**Powder-** Powder shows fragments of epidermis of petal with straight walls, epidermis of sepal with anomocytic stomata and 1 to 3 celled covering trichomes, some cells of mesophyll containing rosettes of calcium oxalate crystals, scalariform and spiral vessels with adjoining parenchyma cells containing pigments ; covering trichomes, isolated rosettes of calcium oxalate crystals ; pollen grains circular with smooth exine and entine measuring upto 100  $\mu$  in diameter and thick walled parenchymatous antheridial cells with adjoining scalariform vascular elements.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	6 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	16 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	28 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on silica gel 'G' plate using *toluene: chloroform: ethyl acetate* (2:2:0.5) as mobile phase and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.37, 0.54, 0.60 and 0.77 (all white), 0.40, 0.65 and 0.84 (all pink).

**CONSTITUENTS** - Flavonoids like Quercetin, isoquercetin.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittakaphaśāmaka, Saṅgrāhī, Kapha-vātahara, Pittahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Bhūtavikāra (psychotic syndrome), Dāha (burning sensation), Galagaṇḍa (goitre), Gaṇḍamālā (cervical lymphadenitis), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Tṛṣṇā (thirst), Vidāha (burning sensation), Viṣamajvara (intermittent fever)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## RAKTA CITRAKA (Root)

Rakta Citraka consists of the dried roots of *Plumbago indica* L. Syn. *P. rosea* L. (Fam. Plumbaginaceae). The plant is a perennial undershrub, with alternate entire leaves. Flowers are rose coloured in terminal spikes with gland dotted calyx and fruit a single seeded pyxidium; occurs all over India, cultivated or as an escape; roots of the plant are harvested at maturity and are dried in shade.

**SYNONYMS :** Analanāmā

### REGIONAL LANGUAGE NAMES

Assamese	:	Ranga agyachit
Bengali	:	Rakto chita, Lal chitra
English	:	Lead wort, Rosy flowered lead wort
Gujrati	:	Lal-chitrak, Rato-chatro
Hindi	:	Lal-chita, Rakta-chita
Kannada	:	Kempacitramulam, Kempu chitramula
Malayalam	:	Chuvannakkoduveli
Marathi	:	Lal chitrak
Oriya	:	Rangachitaparu
Tamil	:	Kotivel, Cenkotivel
Telugu	:	Errachitramulam
Urdu	:	Cheetaa

### DESCRIPTION

#### a) Macroscopic

The roots are available in the form of thin slices and small pieces, slices 0.7 to 1.2 cm in diameter and the pieces 0.2 to 0.5 cm thick 2 or 3 cm long, surface dark brown, vertically fissured, marked by transversely elongated lenticels, fracture entire, surface smooth with

wide light coloured bark, and a narrow, light yellow hard central wood; odour, indistinct; taste, sweetish.

### **b) Microscopic**

TS shows peripheral bark and central wood, bark 1.0 to 2.0 mm in thickness and consists of cork, cork cambium, secondary cortex and secondary phloem, cork 8 to 10 seriate, composed of tangentially elongated, rectangular, compactly arranged, stratified cells with suberised walls the cells are filled with tannins, cork is interrupted by lenticels; cork cambium uniseriate, composed of tangentially elongated, barrel shaped, thin walled cells; secondary cortex scanty, containing tannins and starch grains; secondary phloem consists of usual elements and fibres, xylem consists of vessels, tracheids, fibres and parenchyma; vessels of various sizes arranged characteristically in uniseriate radiating rows with reticulate thickenings; xylem fibres 400 to 600  $\mu$  long and 20 to 30  $\mu$  wide.

**Powder** - Yellowish brown, powder consists of cork cells, secondary cortex cells with tannins, sieve tubes, fibres and xylem vessels with reticulate and pitted thickenings.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	10 per cent,	Appendix 2.2.8

### **T.L.C.**

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm, shows spots at  $R_f$  0.35, 0.53, 0.82 and 0.96. On spraying with *Dragendorff's reagent*, spots appear at  $R_f$  0.53, 0.82 and 0.96 and on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate at 105<sup>0</sup> for 10 minutes, spots appear at  $R_f$  0.35, 0.53, 0.82 and 0.96.

**CONSTITUENTS** - Quinones and naphthaquinones such as isoshinanolone, plumbagic acid vanillic acid and zeylanone.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu, Tikta
<b>Karma</b>	:	Dīpana, Grāhī, Pācana, Rasāyana, Rucya

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Grahaṇī (colitis / ulcerative colitis), Kāsa (cough), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Pāṇḍu (anaemia), Sikatāmeha (Lithuria), Śoṭha (inflammation), Śūla (pain / colic)

**DOSE** - Cūrṇa (powder) : 0.5 to 2 g

## ROHITAKA (Stem Bark)

Rohitaka consists of dried stem barks of *Tecomella undulata* (Sm.) Seem. (Fam. Bignoniaceae), a small tree distributed in the drier parts of the North-West and Western India, ascending to an altitude of 1,200 m in the outer Himalayas and often cultivated in gardens for its beautiful flowers.

**SYNONYMS :** Dāḍima puṣpa, Dāḍimacchada

### REGIONAL LANGUAGE NAMES

Bengali	:	Harinahada, Roda rayana
English	:	Rohituka tree
Gujrati	:	Rohido
Hindi	:	Roheda
Kannada	:	Mullumuntala
Malayalam	:	Chemmaram
Marathi	:	Rohida
Punjabi	:	Rohira
Tamil	:	Malampulvan
Telugu	:	Rohitaka

### DESCRIPTION

#### a) Macroscopic

Bark in curved pieces, measuring 5 to 8 mm in thickness; outer surface greyish brown with longitudinal furrows, transverse irregular cracks and vertically elongated lenticels; inner surface smooth, buff to light brown; fracture tough; fractured surface horny; taste and odour indistinct.

## b) Microscopic

Bark shows wide cork consisting of rectangular and tangentially elongated cells, rhytidoma present; phelloderm not distinguishable; phloem a wide zone comprising of sieve tubes, companion cells, phloem parenchyma and fibres, being traversed by uni to multi seriate medullary rays, fibres arranged in tangential rows extending from one medullary ray to another alternating with bands of ceratenchyma; fibres long, thickwalled, lignified with tapering or peg like or bifurcated ends and measure upto 1680  $\mu$  in length; rosettes of calcium oxalate crystals present in a large number of parenchyma cells; occasionally parenchyma cells also contain prismatic crystals of calcium oxalate and circular to oval starch grains measuring 2 to 5  $\mu$  in diameter with hilum like a point in the centre.

**Powder** -Shows fragments of cells of ceratenchyma, fibres with tapering or peg like or bifurcated ends, parenchyma cells containing prismatic and rosettes of calcium oxalate crystals and starch grains; isolated rosettes and prismatic crystals of calcium oxalate crystal and starch grains.

The bark of *Aphanamixis polystachya* (Wall.) Parker (Fam.Meliaceae), Syn. *Amoora rohitak*, also known as Rohitak can be distinguished by the presence of stone cells in phelloderm, uniseriate medullary rays, crystal fibres in the phloem region and absence of rosettes of calcium oxalate crystals.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	15 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *toluene: ethyl acetate: methanol: acetic acid* (4:5:2:0:2) as mobile phase and when seen under UV 254 nm shows spots at R<sub>f</sub> 0.15, 0.27 (both blue), 0.56 (light green), 0.62, 0.70, 0.74 and 0.82 (all fluorescent white).

**CONSTITUENTS** - Tecomin (veratroyl β-D-glucoside), *n*-triacontane, *n*-heptacosane, *n*-nonacosane, *n*-triacontanol, *n*-octacosanol, β-sitosterol.

### PROPERTIES AND ACTION

**Rasa** : Kaṭu, Kaṣāya, Tikta  
**Guṇa** : Laghu, Rūkṣa, Sara  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Rucya, Raktaprasādana, Medohara, Stanya, Viṣaghna

**IMPORTANT FORMULATIONS** - Rohitakāriṣṭa, Rohitaka lauha, Yakṛtśūla vināśinī Vaṭikā

**THERAPEUTIC USES** - Gulma (abdominal lump), Kṛmi (worm infestation), Kāmalā (Jaundice), Karṇaroga (disease of ear), Kuṣṭha (Leprosy / diseases of skin), Medoroga (obesity), Netraroga (diseases of the eye), Plīhodara (splenomegaly), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Śūla (pain / colic), Śvetapradara (leucorrhoea), Vibandha (constipation), Vraṇa (ulcer), Yakṛt roga (liver disorder)

**DOSE** - Cūrṇa (powder) : 3 to 6 g  
Kvātha (decoction) : 50 to 100

## ŚĀLA (Heart Wood)

Śāla consists of dried heartwood of *Shorea robusta* Gaertn. (Fam. Dipterocarpaceae), a large sub-deciduous tree, found extensively in parts of North-East and Central India.

**SYNONYMS :** Sala

### REGIONAL LANGUAGE NAMES

Bengali	:	Shaalgaach
English	:	Saltree, Shaal tree
Gujrati	:	Shaalvriksh
Hindi	:	Saal, Sakhuaa, Saakhu
Kannada	:	Kabba, Saal
Malayalam	:	Saalvriksham, Mulappumarutu
Marathi	:	Shaalvriksh, Raalechaavriksha
Oriya	:	Salva, Shaaluaagachha
Punjabi	:	Shala
Tamil	:	Saalam
Telugu	:	Guggilam

### DESCRIPTION

#### a) Macroscopic

Heartwood in blocks and cut cylindrical pieces, 10 to 12 cm long, 5 to 8 cm broad and 1 to 2 cm thick, surface smooth with fine longitudinal and interlocked striations; transversely cut surface finely granulated; pores larger, distinctly visible, coarse; texture very hard, strong, tough and heavy; pale brown when young and turning reddish brown with age.

## b) Microscopic

Growth ring indistinct; concentric bands of gum ducts represents false growth marks; diffuse porous, vessels scattered, large to moderately large, fairly distinct, mostly solitary in short radial multiples of 2 or 3, pitted, pits simple to bordered, sometime occluded with tylosis; xylem parenchyma scanty to abundant, distinct as thin sheath around the vessel pore or groups of vessels, often confluent connecting adjacent vessels and also diffused; fibres in tangential bands; medullary rays fine to moderately broad, heterogenous, 3 to 6 seriate and 5 to 12 celled long; vertical gum duct present in long tangential bands appearing as white concentric lines at irregular intervals.

**Powder** -Reddish brown, on microscopic examination shows parenchymatous cells; pitted vessels with simple and bordered pits, occluded with tyloses; fibres and gum ducts, radially medullary rays with large group of fibres.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	2 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.7 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	1.5 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *toluene:ethyl acetate: formic acid* (5:5:1) as mobile phase and when seen under UV 254 nm, spots appear at  $R_f$  0.14, 0.25, 0.31, 0.41, 0.55, 0.64 and 0.72. Under UV 366, spots appear at  $R_f$  0.13, 0.17, 0.21, 0.26, 0.30, 0.35 (all brown), 0.57, 0.60, 0.64, 0.68, 0.75 and 0.85 (all blue).

**CONSTITUENTS** - Bergenin, shoreaphenol, chalcone, 4'-hydroxychalcone-4-*O*- $\beta$ -D-glucopyranoside, 12 $\alpha$ -hydroxy-3-oxo-olenano-28,13-lactone.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya
<b>Guṇa</b>	:	Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Medohara, Vraṇaśodhana, Grāhī, Viṣaghna, Vedanāsthāpana, Stambhana, Kṛmighna

## IMPORTANT FORMULATIONS - Ayaskṛti, Elādi ghṛta

**THERAPEUTIC USES** - Agnidāha (burns), Kaṇḍū (itching), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Pāṇḍu (anaemia), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Śoṭha (inflammation), Upadaṃśa (soft chancre), Vātavyādhi (disease due to Vāta doṣa), Viṣavikāra (disorders due to poison), Vidradhi (abscess), Vraṇa (ulcer), Yoniroga (disease of female genital tract), Karṇaroga (disease of ear), Bādhīrya (deafness), Asthibhagna (bone fracture)

**DOSE** - Cūrṇa (powder) : 3 to 6 g  
Kvātha (decoction) : 50 to 100 ml

## ŚĀLAPARNĪ (Whole Plant)

Śālaparnī consists of dried whole plant of *Desmodium gangeticum* DC. (Fam. Fabaceae), a nearly erect undershrub, 0.6 to 2 m high, growing wild almost throughout India in the plains and Western Ghats, and upto 1500 m in the north upto Sikkim.

**SYNONYMS** : Sthirā, Triparnī, Vidārigandhā, Aṃśumatī

### REGIONAL LANGUAGE NAMES

Bengali	:	Shalpaani
Gujrati	:	Saalvan, Sameravo
Hindi	:	Sarivan, Saalapaani, Salpan
Kannada	:	Murelchonne, Kolakannaru
Malayalam	:	Orila
Marathi	:	Saalvan, Sarvan
Oriya	:	Saloparnni, Salpatri
Punjabi	:	Sarivan, Shalpurni
Tamil	:	Pulladi, Orila, Moovilai
Telugu	:	Kolakuponna, Kolaponna
Urdu	:	Shalwan

### DESCRIPTION

#### a) Macroscopic

**Root** -Tap root, poorly developed, but lateral roots 15 to 30 cm long, and 0.1 to 0.8 cm thick, uniformly cylindrical with a number of branches; surface smooth bearing a number of transverse, light brown lenticels, bacterial nodules frequently present; light yellow; fracture fibrous; odour not characteristic; taste, sweetish and mucilaginous.

**Stem** -Stem slender, upto 1.0 cm in diameter, branched, somewhat angular, clothed with appressed greyish hairs, external surface brown, internal pale yellow; fracture, short; taste, slightly bitter.

**Leaf** -Leaf unifoliate, petiolate, stipulate, linear, oblong, acute or slightly acuminate, striate at the base, about 6 to 13 cm long and 3.5 to 7 cm broad, margins somewhat wavy, upper surface glabrous and green, lower surface pale and clothed with dense, soft, whitish appressed hairs.

## **b) Microscopic**

**Root** -Mature root shows cork, 3 to 7 layers of thin-walled, tangential elongated cells, having a few prismatic crystals of calcium oxalate; cork cambium single layered; secondary cortex 4 to 10 layers of thin-walled, tangentially elongated cells having a few isolated cortical fibres; secondary phloem composed of parenchyma, sieve tubes, companion cells and fibres; traversed by phloem rays; sieve tubes collapsed in outer region, but intact in inner region; phloem fibres slightly elongated, lignified; phloem rays uni to multiseriate, 4 cells wide and 4 to 15 cells high; outer xylem region having 1 or 2 growth rings, consisting of vessels, tracheids, xylem parenchyma, and xylem fibres, traversed by xylem rays; vessels, lignified, large, narrow, with both reticulate thickenings or bordered pits; xylem parenchyma with rectangular or slightly elongated cells, resembling those of phloem parenchyma in shape but larger in size; xylem rays thick-walled possessing simple pits, 1 to 5 cells wide and 4 to 12 cells high; simple, round to oval starch grains measuring 7 to 25  $\mu$  in diameter and prismatic crystals of calcium oxalate present in secondary phloem and secondary xylem.

**Stem** -TS shows, single layered epidermis of small, oval parenchyma cells covered with thick brownish cuticle and interrupted at places by multicellular trichomes; a hypodermis consisting of 3 or 4 layers of oval collenchyma cells; 4 to 6 layers of cortex of oval parenchymatous cells interspersed with groups of sclereids; a narrow zone of secondary phloem composed of parenchyma, sieve elements and a few phloem fibres present; a well developed secondary xylem consisting of large round xylem vessels occurring singly or in groups of 3 or 4, thick-walled tracheids, groups of fibres; uni- to biseriate medullary rays of

radially elongated cells; a few large circular, pitted cells of pith filled with starch grains and prismatic crystals of calcium oxalate.

**Leaf** -TS of leaf shows dorsiventral lamina consisting of a single layered cuticularized epidermis on both surfaces interrupted at places by unicellular warty trichomes; bilayered palisade of columnar cells; 3 or 4 layered spongy mesophyll of circular parenchyma cells; 1 to 4 centrally located vascular bundles in midrib region consisting of radially arranged xylem, phloem and capped by patch of sclerenchyma cells on ventral side; 2 or 3 layered patch of collenchyma below upper epidermis and 3 or 4 layers of circular parenchyma inside lower epidermis in midrib region.

**Powder** -Shows cork in surface view, patches of oval parenchyma cells of cortex containing starch grains; fragments of radially cut medullary rays; stone cells of different sizes; leaf epidermis in surface view showing paracytic stomata; pitted vessels; prismatic crystals of calcium oxalate and round, simple or 2 to 4 compound starch grains.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	8 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2.5 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	10 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of ethanolic extract (cold maceration at room temperature) of the drug on precoated silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluen: ethyl acetate:formic acid* (6:3:1) as solvent system and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating at 105<sup>0</sup> for 10 minutes, shows spots at R<sub>f</sub> 0.56 (brown), 0.15 (violet), 0.24 (brownish-purple), 0.38 (brownish-purple), 0.41 (brownish-purple), 0.49 (orange), 0.73 (brown), 0.81 (red), 0.87 (green) and 0.96 (magenta).

**CONSTITUENTS** - Alkaloids; flavonoids, desmocarpan, desmocarpin, pterocarpan, desmodin, gangetin, gangetinin; others: 2-(NN-dimethylamino) acetophenone

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Madhura
<b>Guna</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Balya, Bṛṃhaṇa, Mūtrala, Rasāyana, Tridoṣahara, Vātahara, Vṛṣya

**IMPORTANT FORMULATIONS** - Daśamūlāriṣṭa, Daśamūla Kvātha

**THERAPEUTIC USES** - Arśa (piles), Atisāra (diarrhoea), Chardi (emesis), Jvara (fever), Kāsa (cough), Kṛmi (worm infestation), Kṣata (wound), Mūtrakṛcchra (dysuria), Prameha (metabolic disorder), Santāpa (emotional stress), Śoṣa (emaciation), Śoṭha (inflammation), Śukradaurbalya (seminal stress), Śvāsa (Asthma), Vātaroga (disease due to Vāta doṣa), Viṣamajvara (intermittent fever), Viṣavikāra (disorders due to poison)

**DOSE** - Cūrṇa (powder): 6 to 12 g

Kvātha (decoction): 50 to 100 ml

## ŚAMĪ (Leaf)

Śamī consists of the leaves of *Prosopis cineraria* Druce Syn. *P. spicigera* L. (Fam. Leguminosae Mimosaceae), a small to moderate sized tree found in the dry and arid regions of India.

**SYNONYMS :** Keśahantrī, Saktuphalā, Śaṅkuphalikā, Tuṅga

### REGIONAL LANGUAGE NAMES

Bengali	:	Sain, Shami
English	:	Spunge tree
Gujrati	:	Kheejado, Sami
Hindi	:	Chhonkar, Sami, Chhikur, Jhand, Khejra
Kannada	:	Banni, Kabanni
Malayalam	:	Parampu, Tambu, Vahni
Marathi	:	Sami, Saunder
Oriya	:	Shami
Punjabi	:	Jand
Tamil	:	Vanni
Telugu	:	Jammi

### DESCRIPTION

#### a) Macroscopic

Bipinnately compound leaves with pulvinus, borne on a rachis 2 to 8 cm long; loose pinnae and pinnules present; pinnae 7 to 12 pairs, each pinna bearing 7 to 12 pairs of pinnules, pinnule oblong rounded and mucronate, 8 to 10 mm long, 2 to 3 mm broad.

## **b) Microscopic**

***Rachis*** - TS roughly triangular with abaxial side rather curved, and adaxial a blunt pyramid; cuticle thick, epidermis single layered, unicellular trichome present; cortex of large parenchymatous cells, a few outer layer being chlorenchymatous, more on the adaxial side than on abaxial side; vascular system ectophloic siphonostele consisting of a central main bundle and two adaxial accessory bundles with sclerenchyma cap; a thin parenchymatous plate present in the central bundle between the two shallow arcs of xylem surrounded by phloem; a thick sclerenchymatous bundle sheath with stone cells and fibres surrounds the stele; xylem elements generally in radial rows.

***Petiole*** - Almost triangular, with a projection on abaxial side; trichomes unicellular, long, ground tissue chlorenchymatous, more so on adaxial side than on abaxial side, rest being parenchymatous, with minute intercellular spaces; vascular system consists of central main bundle and two adaxial lateral accessory bundles with sclerenchyma cap; a thin parenchymatous plate present in the central bundle between the two shallow arcs of xylem surrounded by phloem; 3 or 4 layers of sclerenchymatous bundle sheath present comprising stone cells and fibres; vessels angular, thin walled, solitary; thick walled fibres present.

### ***Leaf-***

***Midrib*** Cuticle thick; epidermis single layered; palisade parenchyma of 2 or 3 layers over the midrib region, a central large vascular bundle present with xylem and a wide conspicuous patch of sclerenchyma fibres below the phloem; large parenchyma cells present on the abaxial side extend upto the lower epidermis.

***Lamina*** Isobilateral; cuticle thick; epidermis single layered; palisade parenchyma 3 to 5 layers on the adaxial side and 2 or 3 layers on the abaxial side; spongy parenchyma present in middle region; epidermis in surface view showed straight walls and unicellular trichome present in both the epidermis; stomata present in both surfaces with overarching subsidiary cells, stomatal number for lower epidermis 32 to 35 / mm<sup>2</sup>, upper epidermis 29 to 32 / mm<sup>2</sup>; stomata paracytic; palisade ratio for upper epidermis 5 to 7, lower epidermis 2 to 4, stomatal index 9 to 12, vein islet number 14 to 16, veinlet termination number 28 to 32.

**Powder** Greenish, no characteristic odour and taste, unicellular trichomes, stone cells and elongated stone cells from sclerenchymatous bundle sheath, fibres of upto 450 ñ present, simple circular starch grains 3 to 10 in diameter, scalariform and pitted vessels present.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	14 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	21 per cent,	Appendix 2.2.8
Fixed oil	Not more than	4 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene:ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm, shows spots at R<sub>f</sub> 0.14, 0.20, 0.26, 0.30 (all pink), 0.33 (dark pink) 0.44 (white), 0.48 (pink), 0.54 (navy blue), 0.86 (pink) and 0.90 (white). On exposure to *iodine vapour*, spots appear at R<sub>f</sub> 0.14, 0.23, 0.26, 0.28, 0.33, 0.40, 0.44, 0.48 and 0.90 (all yellowish brown). On dipping the plate in *vanillin-sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.14, 0.23, 0.33, 0.38 (all grey), 0.44 (dark blue), 0.48 (dark violet), 0.83 (blue), 0.90 and 0.95 (both violet).

**CONSTITUENTS** - Rich in tannin, volatile fatty acid.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu, Kaṣāya
<b>Guna</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Arśoghna, Kṛmighna, Kapha-pittahara, Kuṣṭhaghna, Recaka, Saṅgrāhaka, Vātakara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Atisāra (diarrhoea), Bālagraha (psychotic syndrome of children), Bhrama (vertigo), Kṛmi (worm infestation), Kāsa (cough), Kuṣṭha (Leprosy / diseases of skin), Netraroga (diseases of the eye), Raktapitta (bleeding disorder), Śvāsa (Asthma), Viṣavikāra (disorders due to poison)

**DOSE** - Cūrṇa (powder): 3 to 5 g

## SAURABHANIMBA (Leaf)

Saurabhanimba consists of the dried leaves of *Murraya koenigii* (L.) Spreng Syn. *M. koenigii*. Spreng (Fam. Rutaceae), a small tree reaching upto 6 m with dark grey bark and aromatic leaves, found and cultivated almost throughout India and the Andaman Islands upto an altitude of 1,500 m, for its culinary uses as a flavouring spice.

**SYNONYMS :** Surabhinimba, Kaiṭarya, Kaiḍarya

### REGIONAL LANGUAGE NAMES

Assamese	:	Narasingha
Bengali	:	Bansang, Kariaphulli
English	:	Curry leaf
Gujrati	:	Gornimb, Kadhilimdo
Hindi	:	Mitha neem, Kadhi Patta, Kadi Patta
Kannada	:	Karibaevu
Malayalam	:	Kariveppu
Marathi	:	Kadhinim, Poospala, Godnimb
Oriya	:	Bhursunga
Punjabi	:	Kadhi Patta
Tamil	:	Karivempu, Karuveppilei
Telugu	:	Karivepaku, Karivemu

### DESCRIPTION

#### a) Macroscopic

Leaves - compound, imparipinnate, petiolate, exstipulate, rachis 11 to 20 cm long; leaflets 11 to 25, shortly petiolulate, arranged alternately on the rachis; lower pairs comparatively smaller in size, obliquely ovate, 2 to 5 cm in length and 1 to 2.5 cm in width, tip acute to obtuse, margin crenate-dentate, glabrous adaxially and pubescent abaxially with

interspersed gland dots; main vein one and lateral veins 14 to 20 pairs; odour, characteristically aromatic; taste, acrid.

#### **b) Microscopic**

**Rachis** TS shows epidermis a single layer of isodiametric cells covered by thick cuticle; unicellular, non-glandular, curved, gradually tapering trichomes measuring 37 to 45  $\mu$  long and 2 to 5  $\mu$  broad, present; base of trichome swollen and embedded in epidermis, cortex many layered, parenchymatous, hypodermal cortical cells are smaller, isodiametric, compactly arranged, inner cortical cells are larger, elongated tangentially, loosely arranged with intercellular spaces; abundant pyramidal calcium oxalate crystals measuring 12 to 25  $m$  in length and 5 to 15  $\mu$  in breadth, several showing twinning, present in cortical cells; cortex in the hypodermal region is traversed by lysigenous cavities; vascular bundle is encircled by a ring of 2 or 3 layered sclerenchymatous pericycle and consists of vessels with annular and spiral thickenings, arranged in radiating rows, xylem parenchyma and xylem fibres with thick walls; phloem is situated towards the periphery of xylem ring and contains sieve tubes, companion cells, phloem parenchyma and phloem fibres; medullary rays uniseriate, numerous, with cells containing calcium oxalate crystals; pith large, made up of thin walled parenchymatous cells, several of which are pitted.

#### **Leaf**

**Midrib** TS flat towards adaxial surface and ridged towards abaxial surface; unicellular, non glandular trichomes arise from the abaxial epidermis; adaxial and abaxial hypodermis bi or tri seriate, composed of isodiametric collenchymatous cells; collenchymatous cells of both the surfaces possess single and twinned rhomboid calcium oxalate crystals, ground tissue composed of loosely arranged, thick-walled isodiametric parenchymatous cells; vascular bundle forms an arc with adaxial xylem and abaxial phloem; xylem comprises of vessels with annular and spiral thickenings, xylem parenchyma and fibres; phloem contains sieve tubes, phloem parenchyma and phloem fibres.

**Lamina** -TS shows both the adaxial and abaxial epidermis covered by a cuticle; abaxial epidermal cells narrow and laterally elongated while those on adaxial surface slightly radially elongated; palisade biseriate, concentric starch grains of 3 to 5  $\mu$  diameter are found in spongy cells, spongy parenchyma made up of loosely arranged chlorenchyma; lysigenous cavities present; epidermal cells of lamina in surface view are elongated, straight walled and polygonal; in costal region they are elongated and thin walled; stomata more on abaxial surface than on adaxial; paracytic; stomatal index of abaxial epidermis 16 to 18 and of adaxial epidermis 13 to 15; unicellular, non glandular, gradually tapering, curved trichomes measuring 80 to 160  $\mu$  long and 6 to 15  $\mu$  broad are distributed on the abaxial epidermal layers; trichomes numerous on costal region and fewer on intercostal regions, leaving cicatrices after detachment.

**Powder** -Slightly oily, characteristically aromatic, acrid, light greenish; epidermal cells, unicellular thick walled, long trichomes gradually tapering towards the tip from rachis and lamina; stomata, palisade cells, collenchyma, vessels with annular and spiral thickenings and pyramidal crystals of calcium oxalate, several showing twinning nature.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	20 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	34 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of alcoholic extract on precoated silicagel 'G' plate using *n-hexane: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm, shows spots at  $R_f$  0.17, 0.27, 0.55, 0.64, 0.82, 0.90; on spraying the plate with modified *Dragendorff's reagent*, spots appear at  $R_f$  0.15, 0.17 and 0.27. On spraying with 5% *methanolic sulphuric acid reagent* and

heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at R<sub>f</sub> 0.10, 0.15, 0.17, 0.27, 0.55 and 0.64.

**CONSTITUENTS** - Alkaloids like koenidine, koenigine, koenimbine, mahanimbine, muconine murrayacine and volatile oils.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṣāya, Tikta, Madhura
<b>Guṇa</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kapha-pittahara, Rucya, Dīpana, Pācana, Viṣaghna, Varṇya

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Atisāra (diarrhoea), Chardi (emesis), Dāha (burning sensation), Duṣṭa vṛāna (non-healing ulcer), Jvara (fever), Kaṇḍū (itching), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Prameha (metabolic disorder), Pravāhikā (dysentery), Śūla (pain / colic), Śoṣa (emaciation), Śopha (oedema), Śvitra (leucoderma / vitiligo)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

Svarasa (juice) : 10 to 20 ml

## ŚITIVĀRAKA (Seed)

Śitivāra consists of seeds of *Celosia argentea* L. (Fam. Amaranthaceae), an erect glabrous annual herb, 30 to 90 cm high, with conical to oblong feathery flowering spikes found commonly growing as a weed in cultivated fields throughout India upto an altitude of 1500 m.

**SYNONYMS :** Sirivālikā, Kuraṇḍa, Kuraṇṭikā, Śitavāra, Śrīvāra, Sitivāra

### REGIONAL LANGUAGE NAMES

Bengali	:	Sushunimaak, Shushunishaak
English	:	Silver spiked cock's comb
Gujrati	:	Laanpadi, Lonpadi
Hindi	:	Siriyaari, Suravaali, Siravaari
Marathi	:	Kuradu, Karadu, Surali
Punjabi	:	Suravaali
Tamil	:	Pannaikkeerai
Urdu	:	Suravaali

### DESCRIPTION

#### a) Macroscopic

Seeds lenticular, smooth, shining black or brown, 0.9 to 1.8 mm in diameter, hilum prominent, present in a pit; embryo curved; no odour; taste, bland.

#### b) Microscopic

TS of seed shows testa, composed of a thin epidermis and groups of reddish columnar cells arranged in pyramid structures on an inner horizontal layer of thick walled elongated cells; yellow collapsed integument lined internally by cuticle; a layer of lignified squarish

cells; endosperm of polygonal parenchymatous cells containing numerous aleurone grains and fixed oil.

**Powder** Light grey, shows fragments of deep brown to reddish testa of polygonal cells bearing reticulate network of pits; lignified cells showing striation in surface view; parenchymatous cells of endosperm containing numerous aleurone grains and fixed oil; and parenchymatous cells of embryo.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	3 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	7 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the alcoholic extract of the drug on precoated silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene:ethyl acetate* (95:7) as mobile phase and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating with 105<sup>0</sup> for 10 minutes, spots appear at R<sub>f</sub> 0.12 (violet), 0.20 (greenish-grey), 0.31 (yellow), 0.36 (violet), 0.59 (violet) and 0.78 (purple).

**CONSTITUENTS** - Nonpeptide, celogenamide, celosian, an acidic polysaccharide.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Madhura, Kaṭu
<b>Guṇa</b>	:	Rūkṣa, Guru, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura

**Karma** : Tridoṣahara, Bastiśodhaka, Saṃgrāhī, Mūtrala, Vṛṣya, Snehana, Medhya, Rasāyana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aśmarī (calculus), Arśa (piles), Atisāra (diarrhoea), Gulma (abdominal lump), Hṛdroga (heart diseases), Jvara (fever), Mūtrāghāta (urinary obstruction), Mūtrakṛcchra (dysuria), Plīha roga (splenic disease), Raktavikāra (disorders of blood), Śopha (oedema)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## ŚIVA-NĪLĪ (Root and Stem)

Śiva-nīlī consists of the dried roots and stems of *Indigofera aspalathoides* Vahl ex DC. (Fam. Fabaceae), a stiff silvery, hoary under shrub with trifoliate leaves, found in the plains of South India.

**SYNONYMS :** Bhū- nīlī

### REGIONAL LANGUAGE NAMES

English	:	Wiry indigo
Kannada	:	Shiva-malli, Nila
Malayalam	:	Sivanar vayambu, Manneli
Marathi	:	Shiva-nimba
Tamil	:	Sivanarvembu
Telugu	:	Nela vempali

### DESCRIPTION

#### a) Macroscopic

**Root** -Roots 8 to 10 cm long 2 to 5 mm thick, cylindrical, bearing lateral roots, light brown, surface smooth with transverse lenticels; fracture entire, fractured surface shows a thin bark and a compact light coloured central cylinder of wood; odour and taste indistinct.

**Stem** -Stem pieces 2 to 5 mm in thickness and of various lengths; surface smooth, dark brown, with vertical series of lenticels, fracture short, fractured surface fibrous, with a thin bark, thick pale coloured wood and a central narrow pith; odour and taste indistinct.

#### b) Microscopic

**Root** TS circular, shows cork composed of tangentially elongated, rectangular, compactly arranged, stratified, thick walled, suberised cells some filled with tannins; secondary cortex multiseriate, composed of loosely arranged, isodiametric, parenchymatous

cells; and some cells filled with numerous rhomboidal calcium oxalate crystals of about 6 to 12  $\mu$  size; phloem consists of fibres along with other phloem elements; wood wide with numerous xylem elements and fibres; vessels aggregated in groups of 2 to 4; wall thickenings scalariform and reticulate, xylem fibres numerous, polygonal, 10 to 15  $\mu$  in diameter, very much thickened with lignin and with a narrow lumen; xylem rays 3 to 5 seriate, short, fusiform, walls pitted.

**Stem** TS circular, cork interrupted by lenticels; cork cambium present; secondary cortex 6 to 8 seriate, peripheral 2 to 3 layers composed of isodiametric cells; inner layers with tangentially much elongated, thin walled, parenchymatous cells containing abundant prismatic calcium oxalate crystals, phloem contains sieve tubes, companion cells, fibres and parenchyma; phloem parenchyma contains prismatic calcium oxalate crystals, fibres in groups of 3 or 4, scattered; xylem contains vessels, fibres and parenchyma; vessels arranged in 40 to 60 radiating rows, each row containing 2 to 10 pitted vessel elements of different sizes; cross wall oblique; fibres numerous, polygonal, 10 to 15  $\mu$  in diameter and 225 to 280  $\mu$  in length with tapering ends, walls much thickened with lignin; simple pits present, and lumen very narrow; rays mostly uniseriate; rarely biseriate; pith composed of thin walled, loosely arranged, parenchymatous cells.

**Powder** Brown, shows the presence of tangentially elongated, stratified cork cells, prismatic calcium oxalate crystals, vessels with scalariform thickenings and bordered pits arranged in vertical rows, fibres measuring 225 to 280  $\mu$  long, occasionally with simple pits.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	8 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	3 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	8 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	13 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane:ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm, spots appear at  $R_f$  0.12, 0.35 and 0.59 (all blue); on exposure to *iodine vapour*, spots appear at  $R_f$  0.12, 0.29, 0.35 and 0.59 (yellow); on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup> spots appear at  $R_f$  0.12, 0.29, 0.35, and 0.59(brown).

**CONSTITUENTS** - Fixed oil.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kapha-vātahara, Keśya, Kuṣṭhaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Arūṃṣikā (dandruff), Dantaśūla (toothache), Gulma (abdominal lump), Kuṣṭha (Leprosy / diseases of skin), Plīha roga (splenic disease), Udararoga (diseases of abdomen), Vātarakta (Gout), Vidradhi (abscess), Visarpa (Erysepales)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## ŚLEṢMĀTAKA (Fruit)

Śleṣmātaka consists of dried, ripe fruits of *Cordia dichotoma* Forst. f. Syn. *C. obliqua* Willd., *C. myxa* Roxb. (Fam. Boraginaceae), a medium sized tree with short crooked trunk with drooping branches, distributed throughout warmer parts of India.

**SYNONYMS :** Bahuvāra ḥ, Śelu

### REGIONAL LANGUAGE NAMES

Assamese	:	Dilk
Bengali	:	Bahnaree, Bahuvar
English	:	Sebesten
Gujrati	:	Gundaavada, Gundaa
Hindi	:	Lasora, Lisodaa
Kannada	:	Challe kaayi
Malayalam	:	Naruvari, Naruviri
Marathi	:	Bhonkar
Punjabi	:	Lasuda
Tamil	:	Naruvili, Narivilee
Telugu	:	Nakkera

### DESCRIPTION

#### a) Macroscopic

Fruits conical with acute apex, upto 2 cm in length and 1.5 cm in diameter, occasionally with attached calyx and pedicel, greyish brown to dark brown, surface shrunken, hard to break; odour, specific; taste, indistinct.

## b) Microscopic

Epicarp shows single layer of thick walled and tangentially elongated cells covered externally with thick cuticle; most of the area just below the epicarp occupied by large patches of stone cells; mesocarp consists of thin walled and collapsed parenchyma cells, patches of fibres with a few stone cells, numerous secretory canals lined by 5 to 7 epithelial cells as well as small vascular bundles distributed in the central and lower region of mesocarp; small circular to oval starch grain and rosette of calcium oxalate crystals present in a few parenchyma cells; endocarp represented by 4 to 6 layers of thick walled polygonal stone cells with narrow lumen; testa thin walled and single layered; cotyledon consists of thick walled parenchyma cells containing simple, small, circular to oval starch grains, measuring 5 to 10  $\mu$ m in diameter with hilum as a point in the centre.

**Powder-** Powder shows fragments of fibres with tapering or pointed ends, parenchyma cells with rosette of calcium oxalate crystals and starch grains, polygonal stone cells with wide lumen and pitted walls, stone cells with highly thickened walls and narrow lumen, scalariform vessels, fragments of secretory canals and thick walled cells of epicarp, thick walled parenchyma cells of cotyledon with starch grains.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	9 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	30 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *toluene: ethyl acetate: acetic acid: methanol* (6:4:2:2) as mobile phase and when seen under UV 254 nm, shows spots at  $R_f$  0.20, 0.26, 0.33, 0.35, 0.52 (all blue), 0.58, 0.67, 0.83, 0.86, 0.39, 0.79 and 0.92 (all pink).

**CONSTITUENTS** -  $\beta$ -sitosterol, palmitic, stearic and oleic acids.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pittahara, Kaphahara, Grāhī

**IMPORTANT FORMULATIONS** - Gojihvādi Kvātha Cūrṇa

**THERAPEUTIC USES** - Jvara (fever), Kāsa (cough), Kṛmi (worm infestation), Pratiśyāya (coryza), Raktadoṣa (disorder of blood), Raktapitta (bleeding disorder), Śukradaurbalya (seminal stress), Śvāsa (Asthma), Trṣṇā (thirst), Upadaṃśa (soft chancre), Vātapittajanya Vikāra (disorders due to Vāta and Pitta doṣa)

**DOSE** - Pakva phala pānaka (syrup of ripened fruit): 10 to 20 ml

## ŚLEṢMĀTAKA (Stem Bark)

Śleṣmātaka consists of dried stem bark of *Cordia dichotoma* Forst. f. Syn. *C. obliqua* Willd., *C. myxa* Roxb. (Fam. Boraginaceae), a medium sized tree with short crooked trunk with drooping branches, distributed throughout warmer parts of India.

**SYNONYMS :** Bahuvāra, Śelu

### REGIONAL LANGUAGE NAMES

Assamese	:	Dilk
Bengali	:	Bahnaree, Bahuvar
English	:	Sebesten
Gujrati	:	Vadagunda
Hindi	:	Lasora, Lisodaa
Kannada	:	Chikkachalli, Doduchallu
Malayalam	:	Naruviri, Naruvari
Marathi	:	Bhonkar
Punjabi	:	Lasuda
Tamil	:	Narivilee, Naruvili
Telugu	:	Nakkera

### DESCRIPTION

#### a) Macroscopic

Bark in pieces of 5 to 10 cm long and 6 to 12 mm thick; dark greyish brown, surface rough with transverse and longitudinal cracks and fissures, inner surface deep greyish; fracture tough, fractured surface horny; taste and odour indistinct.

## b) Microscopic

Bark shows wide cork consisting of rectangular and tangentially elongated cells, rhytidoma present; phellogen indistinct; phelloderm composed of thin walled tangentially elongated cells; phloem wide consisting of sieve tubes, companion cells, phloem parenchyma and fibres, traversed by uni to biseriate medullary rays, fibres present in tangential bands alternating with bands of ceratenchyma extending from one medullary ray to another; fibres very long with narrow lumen and tapering, pointed or blunt ends.

**Powder-** Shows fragments of thin walled parenchyma cells, long thick walled fibres, groups of elongated cells of ceratenchyma and cork cells.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	17 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.6 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	9 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	4 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *chloroform: ethyl acetate: formic acid* (3:6:1) as mobile phase and when seen under UV 254 nm shows spots at  $R_f$  0.16, 0.28, 0.48, 0.59, 0.80 (all brown).

**CONSTITUENTS** - Gallic acid and  $\beta$ -sitosterol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṣāya, Kaṭu
<b>Guna</b>	:	Rūkṣa, Picchila
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Pittahara, Kaphahara, Keśya, Viṣṭambhi, Grāhī, Kṛmighna, Pācana, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmadoṣa (products of impaired digestion and metabolism), Bahuvraṇa (multiple injuries / ulcers), Dṛkjāta masūrikā (ocular manifestation of small pox), Kṛmi-śūla (colic due to worm infestation), Kuṣṭha (Leprosy / diseases of skin), Lūtāviṣa (spider bite), Masūrikā (small pox), Raktadoṣa (disorder of blood), Tvakroga (skin diseases), Visarpa (Erysepales), Visphoṭa (blister), Vraṇa (ulcer)

**DOSE** - Kvātha (decoction): 50 to 100 ml

## ŚLĪPADĀRIKANDA (Tuber)

Ślīpadārikanda consists of fresh or dry tuber of *Typhonium trilobatum* Schott. (Fam. Araceae), a perennial herb with a broadly ovate, open spathe and hastate leaves found in parts of peninsular India, and from Yamuna eastwards to north - eastern states.

### REGIONAL LANGUAGE NAMES

Bengali	:	Ghetkochu
Malayalam	:	Chenna
Tamil	:	Pitikarunai

### DESCRIPTION

#### a) Macroscopic

Rhizome fusiform, light brown outside, creamish inside, flaky and peeling off on the outer surface, bearing bud primordia and wiry, unbranched, thin adventitious rootlets; rhizomes or tubers usually available in transversely cut pieces 4 cm long and 2.5 to 6.5 cm in diameter; fracture, short; starchy; taste, slightly acrid.

#### b) Microscopic

A few layers of thin walled corky cells form the outermost tegumentary tissue; cambium lying below the bark irregular, discontinuous and usually 2 to 5 layered; below the cambium a few layers made of parenchymatous cells free from starch grains; cortex or ground tissue consisting of thin walled, parenchymatous, angular or polygonal cells rich in simple and aggregate starch grains; grains clear, without striations, hilum 2 to 3 stellate; simple grains mostly ovoid or sub-spherical, compound grains polyhedral or sub-spherical with 2 to 6 units; idioblasts containing raphide bundles and some cells with dark contents scattered in the cortex; a distinct endodermis not seen; vascular bundles scattered, running obliquely in the ground tissue and consisting of xylem comprising a few vessels with spiral and annular thickenings, and parenchyma; phloem comprises of sieve tubes and companion cells; some of the vascular bundles may be surrounded by rings of cork cells.

**Powder** Creamish, fine in texture, tasteless and starchy; microscopy shows abundant single and 2 to 6 membered compound starch grains, usually up to 45  $\mu$  in size and raphides up to 50  $\mu$  in length, loose or in bundles of up to 100  $\mu$  in length, and vessel fragments with spiral thickenings.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	3 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	9 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	21 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract of the drug on silica gel 'G' F<sub>254</sub> using *toluene: ethyl acetate: acetic acid* (6.5:3.1:0.4) as mobile phase and on spraying the plate with *anisaldehyde-sulphuric acid reagent* and heating the plate for 5 minutes at 105<sup>0</sup> shows spots at R<sub>f</sub> 0.10, 0.19 (light violet), 0.53 (violet), 0.57 (violet) and 0.68 (dark violet).

**CONSTITUENTS** -  $\beta$  sitosterol and unidentified sterols.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Tīkṣṇa, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Arśoghna, Śothahara, Lekhana, Viṣaghna, Dīpana, Pācana, Śūlapraśamana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Arbuda (tumor), Arśa (piles), Raktārśa (bleeding piles), Śoṭha (inflammation), Sarpadaṃśa (snake bite), Ślīpada (Filariasis), Udararoga (diseases of abdomen)

**DOSE** - Cūrṇa (powder) : 5 to 10 g daily dose after Śodhana

## SPHĪTAKĪṬĀRĪ (Rhizome)

Sphītakīṭārī consists of the dried rhizome with frond bases of *Dryopteris filix mas* (L.) Schott. Syn. *Aspidium filix-mas* L. (Fam. Dryopteridaceae), a fern distributed practically all over temperate regions; the drug is imported into India. Indian species are *D. schimperiane*, *D. marginata*, *D. odontoloma*, *D. barbiflora*, *D. blandtorchi* occurring in the Himalayas.

**SYNONYMS :** Salka parṇāṅga, Granthi-pādikā

### REGIONAL LANGUAGE NAMES

Bengali	:	Pankharaaj
English	:	Male fern
Hindi	:	Keeldaaru, Bisauraa
Tamil	:	Iruvi
Urdu	:	Sarakhsa

### DESCRIPTION

#### a) Macroscopic

Rhizome thick, cylindrical, dark brown to black in colour, 6 to 25 cm long and 2 to 4 cm in diameter and covered by the base of petioles; frond bases are hard, persistent, dark brown and curved; the petiole bases and the younger parts of the rhizome are completely covered by the brown, dense silky and shining, chaffy scales termed ramentae; odourless, taste at first sweetish, becoming bitter and extremely nauseous.

#### b) Microscopic

**Rhizome** -Epidermis single layered, unicellular and covered by thick cuticle, followed by hypodermis composed of sclerenchymatous cells with dark resinous contents; the ground tissue is made up of thick walled parenchyma cells packed with starch grains; about 6 to 9 meristeles embedded in the ground tissue in a circle; each meristele enclosed by a layer of

pericycle and endodermis, this is followed by moderately thick walled phloem; xylem occupies the centre of the meristele and consists of tracheids; intercellular spaces in the rhizome of Male fern shows the secreting glands; the marginal cells of the ramenta is prolonged at intervals into hair like processes, that are formed by two contiguous cells parallel to each other; glandular process absent; the cells of the ramentum are slightly thick walled, narrow and elongated longitudinally.

**Powder** -Brown, isolated tracheids with scalariform thickenings, oblique walls, parenchyma cells with starch grains measuring about 15 to 20  $\mu$  in size; stalked glands, ramental hairs, sclerenchymatous and marginal cells also seen.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	12 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	13 per cent,	Appendix 2.2.8
Fixed oil	Not less than	3 per cent,	Appendix 2.2.9

### **T.L.C.**

T.L.C. of dichloromethane extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (9:1) as mobile phase and on dipping the plate in *vanillin - sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.2 (dark grey), 0.36 (violet), 0.4 (dark grey), 0.42 (violet), 0.5 (orange), 0.68 and 0.82 (both yellow).

**CONSTITUENTS** - Filicin;  $\alpha$ -flavaspidic acid; albaspidin; filixic acid; hexadeca aspidinol; dropterin; filmarone;  $\beta$ -aspidin; 9-aliphatic alcohols and 3 sterols.

## **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Lekhana, Virecana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Jvara (fever), Sphita Kṛmi (tape worm), Vātarakta (Gout)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## SPṚKKĀ (Whole Plant)

Sprkkā consists of the dried entire plant of *Anisomeles malabarica* (L.) R. Br. ex Sims (Fam. Lamiaceae), a densely pubescent, aromatic, 1.2 to 2 m high perennial herb, commonly found in the Western Ghats from Maharashtra to Karnataka, Andhra Pradesh, Kerala and Tamil Nadu.

**SYNONYMS :** Sprk, Devī, Vadhū, Sugandhā

### REGIONAL LANGUAGE NAMES

Bengali	:	Sprk, Devī, Vadhū, Sugandhā
Gujrati	:	Karpooree, Madhuree
Hindi	:	Asabarag, Asarak
Kannada	:	Nalehullu, Hikke
Marathi	:	Karpoorvallee
Tamil	:	Irattai Peymarutti, Perundumbai

### DESCRIPTION

#### a) Macroscopic

**Root** - Tap root, branched, woody, hard, stout, cylindrical, somewhat twisted, laterally flattened, measuring 7 to 14 cm in diameter, variable in length, arising from the basal portion of the highly knotty crown, 8 to 20 cm in diameter; lateral branches about 10 to 12 cm in diameter; surface very rough, longitudinally wrinkled, fissured, bears long wiry, twisted lateral roots or scars left by them; at places exhibits 10 to 12 cm wide circular to oval, tumor like protuberances; taste bitter, odour faint and not characteristic.

**Stem** - The older stems arising from the upper surface of the cylindrical, crown stout, 3 to 4 cm in diameter, densely tomentose, exposing at places the inner hard whitish, longitudinally striated wood; young stems cylindrical, faintly ridged and furrowed, densely tomentose, soft,

axillary and oppositely branched, internodes 3 to 5 cm long and 0.8 to 1.5 cm in diameter, fracture outer fibrous, inner short, fractured surface exhibits central wide whitish porous wood occupying the major portion of the stem and outer ridged tomentose margin; odour, very faint; taste, slightly bitter and astringent.

**Leaf** - Simple, opposite, oblong to lanceolate, 7 to 8 cm in length, 2 to 2.5 cm in breadth, serrate to crenate, acute, reticulate, veins more prominent at lower side, arising from the base, both the surfaces are densely tomentose, base symmetrical; petiole densely pubescent, 1.5 to 4 cm in length and 2 to 4 mm in diameter, cylindrical and channelled on the upper side.

#### **b) Microscopic**

**Root** - TS circular, cork composed of 10 to 15 rows of tangentially elongated suberized cells, the outermost few layers being deep brown in colour and at places not continuous or often getting disintegrated; cortex narrow consisting of 4 to 5 rows of parenchymatous cells, traversed by isolated or small groups of spherical lignified thick walled stone cells; phloem comparatively wider, about 15 to 20 in rows, composed of phloem parenchyma, sieve tubes and companion cells; groups of stone cells of various sizes, shapes and thickness and oil canals often arranged in rows, especially in the inner region of the phloem; medullary rays multiseriate, brownish, funnel shaped, in continuation with that of xylem, cells somewhat tangentially elongated; xylem exhibits distinct growth rings and composed of vessels frequently containing yellowish brown tylosis, thin walled tracheids, fibres and pitted parenchyma often encircling vessels; starch grains simple, rarely compound, oval to spherical, with distinct hilum, present throughout the parenchymatous cells of the xylem.

**Stem** - TS somewhat quadrangular, epidermis single layer, covered with thick cuticle, cells rectangular to squarish in shape, filled with some yellowish brown contents; simple, covering, 2 to 3 celled, uniseriate trichomes of adjacent cells, characteristically thickened spirally, rarely branched, the basal cell often embedded with a few microsphenoidal crystals of calcium oxalate; glandular trichomes, short, bearing uni to bi cellular stalk and circular bulging oval, cup shaped or mushroom shaped head; cortex collenchymatous, 2 to 4 in rows

and 5 to 15 under the ridge; endodermis distinct; pericycle exhibits discontinuous ring of thin walled groups of lignified fibres; phloem very narrow, often getting obliterated; xylem consisting of radially arranged oval to spherical vessels, pitted parenchyma, thin walled fibres and uni to biseriate medullary rays containing acicular crystals of calcium oxalate; pith parenchymatous and contains acicular crystals of calcium oxalate.

### ***Leaf-***

***Petiole*** TS dorsiventrally flattened, with two prominent wing like projections on the lateral sides; shows epidermis consisting of tangentially elongated cells filled with brownish content and covered with thick cuticle; trichomes similar to those of leaf and stem; underneath the epidermis lies a band of collenchyma forming 3 to 10 rows; a boat shaped meristele shows radially arranged xylem vessels and narrow phloem almost encircling the xylem, the upper phloem tissue often exhibiting a few tangentially running cavities; meristele lying under the wing is very small, hardly consisting of 2 or 3 rows of narrow xylem vessels encircled by narrow phloem; pericyclic region traversed with a few fibres; on the adaxial sides lies 2 to 4 rows of thick walled irregular parenchymatous cells; acicular crystals of calcium oxalate present throughout parenchymatous tissue.

***Midrib*** TS shows highly pubescent upper and lower epidermis; cells filled with dark brownish contents, 12 to 15 rows of collenchymatous tissue beneath the upper epidermis and 2 to 6 rows above the lower epidermis; a discontinuous, radially arranged, deep arc of centrally located meristele consisting of xylem, narrow phloem, uni- to bi-seriate medullary rays and a band of pericycle, occasionally traversed with isolated or groups of lignified fibres.

***Lamina*** - TS shows epidermal cells, tubular to rectangular in shape, with thick striated cuticle, occasionally papillose; trichomes many, identical with that of stem but glandular trichomes are more in number; palisade tissues in a single row, discontinuous over the midrib, remaining mesophyll tissues consisting of 4 to 6 rows of spongy parenchyma containing acicular crystals of calcium oxalate; small vascular bundles encircled by parenchymatous sheath traversed throughout the mesophyll tissue; upper and lower epidermis

in surface view shows stomata, diacytic and anisocytic, more on lower side; stomatal index 8 to 10 on upper side and 22 to 25 on lower side, palisade ratio 4 to 6 and veinislet number 4 to 7.

**Powder** - Greenish brown, showing abundant trichomes of various sizes and shapes, thick walled, coiled, multicellular; glandular trichomes with uni to bi- cellular stalk and spherical glistening head; fragments of long, unicellular, simple trichomes; isolated or groups of fibrous sclereids and stone cells varying in size, thickness and shape, often exhibiting radiating, distinct connecting pits; starch grains simple and compound throughout and embedded in the parenchymatous cells; pitted, spiral and reticulate vessels of the vascular strands; epidermal cells of lamina in surface view with slightly sinuous walls, containing diacytic and anisocytic stomata and sessile glandular trichomes of 4 to 8 celled head.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	11 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of the alcoholic extract on silica gel 'G' plate of 0.2 mm thickness using *toluene: ethyl acetate* (6:4) as mobile phase and on spraying with *vanillin sulphuric acid reagent* and heating the plate for about 10 minutes at 105<sup>0</sup> shows spots at R<sub>f</sub> 0.14, 0.43, 0.71 and 0.82.

T.L.C. of the volatile oil on silica gel 'G' plate of 0.2 mm thickness using *toluene:ethyl acetate* (93:7) as mobile phase and on spraying with *vanillin sulphuric acid reagent* and heating the plate for about 10 minutes at 105<sup>0</sup> shows spots at R<sub>f</sub> 0.18, 0.25, 0.38, 0.62, 0.74 and 0.87.

**CONSTITUENTS** - Triterpenic acid, betulinic acid, two diterpenoids viz., ovatodiolide and anisomelic acid, aerial parts contain five 14 membered macrocyclic diterpenes namely anisomelode,  $\beta$ -sitosterol, malabaric acid, 2-acetoxymalabaric acid, anisometyl acetate and anisoelol; a terpenoid, anisomelin and a flavone 4, 5-dihydroxy-3,6,7-trimethoxyflavone.

**PROPERTIES AND ACTION**

**Rasa** : Tikta, Kaṭu, Kaṣāya  
**Guna** : Rūkṣa, Laghu, Tikṣṇa  
**Vīrya** : Uṣṇa  
**Vipāka** : Kaṭu  
**Karma** : Vātahara, Kaphahara, Varṇaprasādana, Anulomana, Lekhana, Viṣaghna  
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**IMPORTANT FORMULATIONS** - Sahacarādi Taila, Balā Taila, Balādhātryādi Taila

**THERAPEUTIC USES** - Aśmarī (calculus), Kaṇḍū (itching), Kaphavikāra (disorders due to vitiation of Kapha doṣa), Kāsa (cough), Koṭha (ringworm / Impetigo / Erythema), Mūtrakṛcchra (dysuria), Piḍakā (carbuncle), Prameha (metabolic disorder), Śvāsa (Asthma), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 3 to 5 g

## SRUVAVṚKṢA (Fruit)

Sruvavr̥kṣa consists of fruits of *Flacourtia indica* (Burm.f.) Merr. Syn. *F. ramontchii* Herit. (Fam. Flacourtiaceae), a thorny small tree up to 8 m high bearing small, greenish yellow flowers and small, red or dark brown, globose fruits. It is found in sub-mountain areas of Punjab and Himachal Pradesh, Bihar, Maharashtra, and southern peninsula.

**SYNONYMS** : Vikāṅkata, Gopakaṅṭa

### REGIONAL LANGUAGE NAMES

Bengali	:	Bincha, Bainchi-kul, Bainchaa
English	:	Governors plum, Madagaskara plum, Mauritius plum
Gujrati	:	Kankata, Kaankod
Hindi	:	Kataai, Bilangra, Kakaiyaa
Kannada	:	Lumanika, Dodda gejjalakai, Hunmunaki, Panumbus
Malayalam	:	Vavankataku, Vikamkath, Yaliya nzerinigal
Marathi	:	Kaker, Bhekal
Oriya	:	Kantheikoli, Vaincha, Unicha
Punjabi	:	Kanghu
Tamil	:	Sottaikala, Kat-ukala, Panampuvatti
Telugu	:	Putikatada, Putregu, Kanaveguchettu, Vikankata, Kandregu

### DESCRIPTION

#### a) Macroscopic

Fruit greyish green to reddish brown, rounded, lobed, 5 to 12 mm in diameter; containing up to 16 seeds in 2 rows; seeds small, creamish, sometimes a few aborted; taste sharp and sweet, flavour agreeable.

## b) Microscopic

**Fruit-** TS shows an outermost epidermal layer of epicarp comprising small, thin walled, rounded cells occasionally bearing smooth, small, almost straight, tapering, unicellular trichomes; bulk of the fruit tissue comprises of the many layered, mesocarp made up of thin walled parenchymatous cells interspersed abundantly with cavities filled with brown colouring matter or substance; endocarp lines the individual ovular loculi and comprises some layers of stone cells interspersed with long cells placed tangentially or obliquely to the cavity; cells of endocarp layer are relatively clear and transparent, some cells of this layer also contain prismatic crystals of calcium oxalate 15 to 25  $\mu$  in size.

**Seed-** The outer seed coat consists of a few layers of rounded cells; inner integument consists of a single layer of squarish cells containing brown pigment; endosperm comprises of thin walled, compactly arranged, rectangular, parenchymatous cells rich in starch.

**Powder** Dark brown, texture fine, taste slightly sour and odour flour like; microscopy shows unicellular trichomes upto 350  $\mu$  long, and stone cells upto 120  $\mu$  in size.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	20 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	21 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract of the drug on silica gel 'G'  $F_{254}$  plate using *butanol: ethyl acetate: acetic acid: water* (3:5:1:1) as mobile phase and on spraying the plate with NP/PEG reagent and when seen under UV 366 nm, spots appear at  $R_f$  0.28 (light yellow), 0.33 (white fluorescent), 0.57 (orange red) and 0.74 (UV green).

**CONSTITUENTS** - Flacourside, and on methyl 6-*O*-(*E*)-*p*-coumaroyl glucopyranoside and 6-*O*-(*E*)-*p*-coumaroyl glucopyranose

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura, Tikta
<b>Guna</b>	:	Tīkṣṇa, Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphahara, Mūtrala, Pācana, Pittahara, Rucya, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Kāmalā (Jaundice), Plīhavṛddhi (splenomegaly), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Śoṭha (inflammation), Yakṛt roga (liver disorder)

**DOSE** - Cūrṇa (powder): 5 to 10 g

## STHŪLAILĀ (Fruit)

Sthūlailā is the dried fruits of *Amomum subulatum* Roxb. (Fam. Zingiberaceae), a perennial rhizomatous herb upto a height of 1.5 to 2 m growing in West Bengal, Sikkim and Assam Hills.

**SYNONYMS :** Bṛhadelā, Bṛhat elā, Bhadrailā

### REGIONAL LANGUAGE NAMES

Bengali	:	Bara elachi, Baara aliachi, Bad elaach
English	:	The Greater Cardamom
Gujrati	:	Mothi elichi, Moto-elachi
Hindi	:	Baraa-elaachi, Badi ilaayachi
Kannada	:	Dodda yalakki
Malayalam	:	Valiya elam, Perelam, Peri-elav
Marathi	:	Mothe elaayachi, Moteveldode
Oriya	:	Badaa alaicha, Alaicha
Punjabi	:	Budi eleichi
Tamil	:	Periya elam
Telugu	:	Pedayelaki, Pedda elakulu
Urdu	:	Ilaayachi badi, Heel kalan

### DESCRIPTION

#### a) Macroscopic

Fruits are indehiscent capsules, dark brown with occasional pink tinge; ovate - elliptic, 1 to 3 cm long and 1 to 2 cm broad, slightly three angular and three loculed; each locule with a ragged membraneous septum; fruit rind coarsely striated; each fruit bears 20 to 70 seeds held in a viscid pulpy mass; seeds ovate - elliptic and angular, brownish black, 2 to

4 mm long and 2 to 3 mm broad in size; membranous aril present; aromatic and strongly pungent with a camphoraceous taste.

#### **b) Microscopic**

**Fruit-** Pericarp consists of a single layer of epidermis formed by tangentially elongated cells with brownish oil droplets; mesocarpic tissue consists of thin walled parenchymatous cells, both isodiametric and tangentially elongated, more compact towards the endocarpic region; many fibro-vascular bundles present in a row in the mesocarp.

**Seed-** Shows a somewhat triangular outline; outer layer of the testa is with a single row of thick walled, compact and radially elongated cells followed by perisperm tissue composed of 10 to 15 layers of radially elongated parenchyma cells packed with many simple, small, mostly globular starch grains and tiny rosettes of calcium oxalate crystals; endosperm cells parenchymatous, usually 8 to 10 layered.

**Powder-** Dark brown, microscopic observation shows a patch of elongated rectangular parenchyma; perisperm cells packed with starch grains; polyhedral starch grains and rosettes of calcium oxalate crystals of about 5  $\mu$  across; irregular, thick walled stone cells with very narrow lumen, size 20 to 105  $\mu$ ; brownish resin masses; narrow elongated fibres; spiral, reticulate and pitted vessels.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	18 per cent,	Appendix 2.2.8
Volatile oil	Not less than	1 per cent,	Appendix 2.2.12

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *hexane:ethyl acetate* (8:2) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.44, 0.52 (both pink), 0.6 (light pink), 0.67 (brown), 0.72 (pink) and 0.78 (light brown).

**CONSTITUENTS** - Volatile oil predominantly containing cineol with other constituents such as  $\alpha$ -pinene,  $\beta$ -pinene, sabinene, myrcene,  $\alpha$ -terpinene,  $\beta$ -terpinene, limonene, *p*-cymene, terpinenol,  $\alpha$ -terpineol,  $\delta$ -terpineol and nerolidol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Anulomana, Dīpana, Hṛdya, Kaphahara, Mūtrala, Pittasāraka, Śiraḥśodhaka, Vātahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Aruci (tastelessness), Bastivikāra (bladder disorders), Chardi (emesis), Dantaroga (disease of tooth), Hṛllāsa (nausea), Kaṇḍū (itching), Kaṇṭharoga (disease of throat), Kāsa (cough), Mukharoga (disease of mouth), Raktapitta (bleeding disorder), Raktavikāra (disorders of blood), Śīroroga (disease of head), Śūla (pain / colic), Śvāsa (Asthma), Tṛṣṇā (thirst), Tvakroga (skin diseases), Viṣavikāra (disorders due to poison), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## ŚUKANĀSĀ (Rhizome)

Śukanāsā consists of the rhizomes of *Corallocarpus epigaeus* Benth. ex Hook. f. Syn. *Bryonia epigaea* Rottler; *Rhyncocarpa epigaea* Naud and *Aechmandra epigaea* Arn. (Fam. Cucurbitaceae), a monoecious tendril climber, found in the scrub jungles of South India along hilly tracts.

**SYNONYMS :** Nāhīkanda, Kaṭunāhī, Nāhikā, Ākāśagaruḍa

### REGIONAL LANGUAGE NAMES

Gujrati	:	Kadvinai, Naahikand
Hindi	:	Mirchiakand, Kirakanda, Kadvi naahi, Naahi Kand
Kannada	:	Akasha garudagadde
Malayalam	:	Kollamkova kizhang
Marathi	:	Karunai, Kadavinai, Akashagarudi
Tamil	:	Karutankilanku
Telugu	:	Murudonda, Nagadonda

### DESCRIPTION

#### a) Macroscopic

Whole tubers napiform, upto 5 cm in diameter, cut pieces 1 to 2 cm in length and 1.5 to 3.5 cm in diameter, brownish yellow; skin very thin and closely intact; cut surface yellowish white; fracture, short, starchy; taste, bitter.

#### b) Microscopic

**Rhizome** - Cork made up of 8 to 10 rows of cells, of which the outermost 3 or 4 layers are tangentially elongated, thick walled cells and inner few layers radially arranged and thin walled; rest of the ground tissue of parenchyma cells contain simple starch grains measuring about 10 to 20  $\mu$  in diameter and compound starch grains with 2 to 4 components; xylem

composed of isolated strands embedded in the ground tissue, including a large solitary and wide vessels present in radial multiples of two or three, phloem scattered in the ground tissue particularly towards inside of the xylem strands.

**Powder** - Yellowish white, taste very bitter; tissue debris with thick walled cork cells in surface view, compound starch grains, simple starch grains, fibres and vessels observed.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4.5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	5 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8
Fixed oil	Not less than	1 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: methanol* (7:1) as mobile phase and when seen under UV 366 nm, spots appear at R<sub>f</sub> 0.14, 0.19 and 0.46 (all blue), 0.69 (fluorescent blue), 0.74, 0.80, 0.89 (all blue). Under UV 254 nm, spots appear at R<sub>f</sub> 0.11, 0.24, 0.31, 0.37 and 0.63 (all green), 0.69 (pale blue), 0.80 (green); on dipping the plate in *vanillin-sulphuric acid* and heating at 105° for 5 minutes, spots appear at R<sub>f</sub> 0.14, 0.2, 0.26 and 0.34 (all pale brown) 0.63 and 0.74 (both grey).

**CONSTITUENTS** - Bryonin; epigaeusyl ester; corallocarpuscularolide; corallocarpenoyl ester; dotriacont-22, 25-diol-10-one.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa

**Vipāka** : Kaṭu  
**Karma** : Śothahara, Vamana, Virecana, Viṣaghna

**IMPORTANT FORMULATIONS** - Kāśmaryādi ghr̥ta

**THERAPEUTIC USES** - Aruci (tastelessness), Atisāra (diarrhoea), Dāha (burning sensation), Hikkā (hiccup), Jīrṇa Āntraśoṭha (chronic intestinal pain), Jīrṇajvara (chronic fever), Jvara (fever), Kāsa (cough), Kṛmi roga (worm infestation), Pravāhikā (dysentery), Sarpa viṣa (snake poison), Śoṭha (inflammation), Śvāsa (Asthma), Vātakapha Jvara (fever due to Vāta and Kapha doṣa), Visphoṭaka (blisterous eruption), Vraṇa (ulcer), Yoniroga (disease of female genital tract)

**DOSE** - Cūrṇa (powder): 3 to 5 g

## ŚVETA VETASA (Leaf)

Śveta vetasa consists of dried leaves of *Salix alba* L. (Fam. Salicaceae), a large tree with olive green, purple or yellow branches cultivated in Western Himalayas. The plant is not found to grow wildly in India.

**SYNONYMS :** Śveta veda-muśka

### REGIONAL LANGUAGE NAMES

English	:	European willow, White willow
Hindi	:	Sveta veda muska
Kannada	:	Neerganjimara
Marathi	:	Pandra veda muska
Punjabi	:	Bis, Malchang, Bhushan, Madnu
Urdu	:	Bed Sada

### DESCRIPTION

#### a) Macroscopic

Leaves 6.3 to 10 cm long, lanceolate, broadest at a little above the middle, pinnately veined, apex acute and margin minutely serrated, silvery when young, glaucous beneath; petiole 7.5 to 12.5 mm long; odour and taste nil.

#### b) Microscopic

##### **Leaf:**

**Petiole** -TS irregular in outline with 'V' shaped groove on the upper side; stele centrally located and bicollateral; epidermis single layered covered by a thick cuticle and a few trichomes upto 108 ñ long, followed by 10 to 15 rows of collenchyma; collenchyma on the adaxial side of the petiole followed by 10 to 12 rows of parenchyma, parenchyma tissue

absent on the abaxial side of the petiole; vascular bundle consisting of xylem and phloem; idioblasts present throughout the ground tissue, filled with rosette crystals and a few prismatic crystals of calcium oxalate.

**Midrib** -TS passing through the midrib more convex on the abaxial side and almost flat on the adaxial side; upper epidermis single layered, lower epidermis two layered; cuticle present; a few epidermal cells filled with light pink pigment; a few unicellular long trichomes present; epidermis followed by 5 or 6 rows of collenchyma, 5 or 6 rows of parenchyma with a few cells filled with rosette crystals of calcium oxalate; midrib shows a centrally located bicollateral stele, surrounded by patches of pericyclic fibres; vascular bundle consists of a xylem and phloem; pericycle made up of fibres.

**Lamina** -Lamina isobilateral; trichomes 45 to 108  $\mu$  long; upper epidermis single layered whereas lower two layered, made up of barrel shaped cells; two layers of palisade cells present adjacent to both upper and lower epidermis; 2 or 3 layers of spongy cells in the central region; a few cells of the mesophyll are filled with rosette and prismatic crystals of calcium oxalate; vascular bundles of the veins are seen; average stomatal index 5 to 7 and 8 to 11 on upper and lower surface respectively; palisade ratio 6 to 11 on both surfaces.

**Powder** - Greyish green, taste and odour nil; exhibits upper epidermis made up of straight anticlinal walls and devoid of stomata; lower epidermis made up of straight anticlinal walls covered by paracytic stomata, cicatrices and trichomes, fragments of lamina in sectional view, trichomes two celled long with a small basal cell and a long apical cell with smooth walls; rosette and prismatic crystals of calcium oxalate.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	10.5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.6 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	11 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	66 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of alcoholic extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene:ethyl acetate:formic acid:methanol* (3:3:0.8:0.2) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* followed by heating at 105<sup>o</sup> for 5 min, shows spots at R<sub>f</sub> 0.13 (yellow), 0.36 (light violet), 0.47 (light brown), 0.52 (light yellow), 0.65 (greenish grey), 0.76 (blue) and 0.86 (purple).

**CONSTITUENTS** - Amentoflavone, apigenin, (+)-catechin, (+)-gallo catechin, isoquercetrin, rutin, narcissin, isorhamnetin-3-O-β-D-glucoside, salicin, fragilin, salicortin.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Grāhī, Jvaraghna, Kaphahara, Mūtrala, Rakṣoghna, Vedanāsthāpana, Vraṇa Śodhana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Śvitra (leucoderma / vitiligo), Atisāra (diarrhoea), Kāmalā (Jaundice), Karṇaroga (disease of ear), Pravāhikā (dysentery), Raktaṣṭhivana (haemoptysis), Raktapitta (bleeding disorder), Vātarakta (Gout)

**DOSE** - Cūrṇa (powder) : 3 to 6 g  
Kaṣāya (decoction) : 50 to 100 ml

## TAKKOLA (Fruit)

Takkola consists of fruits of *Illicium verum* Hook. f. (Fam. Magnoliaceae), an evergreen shrub or tree attaining a height of 8 to 15 m and diameter of 25 cm. The plant is a native of China and is sometimes cultivated in India. Most of the drug available in the market is imported.

### REGIONAL LANGUAGE NAMES

Assamese	:	Baadiyaane khataai
English	:	Star Anise of China
Hindi	:	Ansafal
Malayalam	:	Takkolpputtill
Marathi	:	Baadiyaan
Tamil	:	Anushappu, Anushuppu, Annashuppu
Telugu	:	Anasapuveru
Urdu	:	Baadiyaan khataai

### DESCRIPTION

#### a) Macroscopic

Fruits star shaped, consisting of 8 carpels (follicles) arranged in a whorl around a short central column attached to a pedicel; each follicle 12 to 17 mm long, up to 14 mm deep, up to 5 mm broad, boat shaped, bluntly beaked at the apex, woody and wrinkled, reddish brown outside, smooth glossy inside, opening by ventral suture at the upper margin, containing one seed. Pedicel up to 5 cm long, strongly curved at the distal end; seeds reddish brown, compressed-ovoid, smooth, shiny with brittle seed coat enclosing a soft, oily kernel; odour, pleasant, resembling that of anise; taste, agreeable, aromatic, sweet.

## b) Microscopic

TS of the follicle shows an outer most single layered epicarp of flattened, nearly rectangular cells; mesocarp consists of parenchymatous, many layered, spongy tissue composed of irregular cells with brownish walls and containing frequent cavities, patches of sclerenchyma, occasional vascular strands surrounded by sclerenchyma and prismatic crystals; endocarp composed of a layer of columnar, translucent or clear cells containing scattered, occasional prismatic crystals; seed shows testa with an outer epidermal layer made up of sclereids; inner layer of seed coat consists of thick walled, brown-pigmented cells; endosperm composed of thin walled parenchyma cells and contain food reserves.

**Powder** Dark brown, coarse, odour anise like; taste slightly tingling, powder microscopy shows groups of clear, thin walled, columnar cells 200 to 220  $\mu$  long from endocarp, and fragments of seed coat comprising sclereids of 100 to 130  $\mu$  in size in surface and side views; complies with the following colour tests:-

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	13 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	21 per cent,	Appendix 2.2.8
Volatile oil	Not less than	3 per cent,	Appendix 2.2.12

## T.L.C.

T.L.C. of alcoholic extract of the drug on silica gel 'G' 60 F<sub>254</sub> plate using *chloroform:methanol:acetic acid* (8:2:0.25) as mobile phase and on spraying the plate with *anisaldehyde-sulphuric acid reagent* and heating the plate for 15 minutes at 105<sup>0</sup>, spots appear at R<sub>f</sub> 0.12 (dark green), 0.27 (green), 0.33 (bluish grey), 0.40 and 0.50 (both grey).

**CONSTITUENTS** - Essential oils, flavonol glycosides, and veranisatins A, B & C.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṭu
<b>Guṇa</b>	:	Laghu, Snigdha, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Kaphahara, Dīpana, Pācana, Vātānulomana, Mūtrala, Vātaghna, Koṣṭhavāta - śamana, Vedanāhara

## IMPORTANT FORMULATIONS - Karpurādi Cūrṇa

**THERAPEUTIC USES** - Ādhmāna (flatulence with gurgling sound), Aruci (tastelessness), Gulma (abdominal lump), Mukhadurgandha (Halitosis), Sandhivāta (arthritis due to Vāta doṣa), Śūla (pain / colic)

**DOSE** - Cūrṇa (powder): 250 to 625 mg

## TINDUKA (Fruit)

Tinduka consists of unripe and ripe fruits of *Diospyros peregrina* Gurke Syn. *Diospyros embryopteris* L. (Fam. Ebenaceae), a medium sized tree having alternate leaves and ellipsoid or sub-globose, green or light brown fruits possessing prominent, persistent, woody calyx. The tree is distributed throughout India.

**SYNONYMS :** Viralā, Asitakāraskara, Kālaskandha, Sphūrjaka

### REGIONAL LANGUAGE NAMES

Assamese	:	Kendu
Bengali	:	Gab
English	:	Indian Gaub, Persimon
Gujrati	:	Timbaravo, Temru
Hindi	:	Tendu, Gaabh, Maakaatendu
Kannada	:	Holetupare, Kusharta
Malayalam	:	Panachi, Panachchi, Pananchi
Marathi	:	Temburni
Oriya	:	Kendu
Tamil	:	Kattatti, Kavikattai, Tumbi, Paanicikaa, Tumbika
Telugu	:	Tumiki, Gaara
Urdu	:	Tendu

### DESCRIPTION

#### a) Macroscopic

Fruit globose, ovoid or ellipsoid berry, 3.5 to 5 cm in width, with a much large and thickened, often woody calyx; cuticle thick and shiny; green when unripe, yellowish orange when ripe; nearly smooth or covered with a rusty mealiness; fleshy and possessing a viscid, glutinous pulp when fresh, hard when dried, 6 to 10 celled; both unripe and ripe fruits cut

longitudinally in to 3 to 4 pieces along with persistent calyx and dried for use; seed solitary in each cell, thin, flat, and oblong; testa hard, separable; endosperm prominent.

#### **b) Microscopic**

**Fruit** -TS shows a thick, stratified cuticle supported on a many-layered exocarp; outermost layer of small, rectangular or rounded cells forms the epidermis; hypodermal region of exocarp possesses abundant groups of stone cells mixed with parenchymatous patches; mesocarp constitutes many layers of parenchymatous cells possessing abundant, large cavities having reddish brown colouring matter; innermost layer of pericarp lined with the cuticle and constituting the endocarp.

**Seed** -Testa, thick, many layered and lined externally by cuticle; outermost layer of squarish or angular, thick cells forms the outer epidermis of testa; many layers of parenchymatous, sub epidermal zone contain abundant brown colouring matter; innermost layer of testa consists of thin walled, parenchymatous cells; endosperm prominent and cartilaginous with cells having very thick, wavy or straight walls.

**Powder** -Dull brick red, coarse and granular; taste and odour not distinct; microscopy shows abundant stone cells 60 to 120  $\mu$  in size and cells of cartilaginous endosperm.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	6 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	16 per cent,	Appendix 2.2.8

#### **T.L.C.**

T.L.C. of alcoholic extract of the drug on silica gel 'G' F<sub>254</sub> plate using *ethyl acetate*: *n-hexane* (7:3) as mobile phase and on spraying the plate with *anisaldehyde-sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at R<sub>f</sub> 0.41 (light blue) 0.49 (brownish zone) 0.61 (bluish) and 0.83 (dark blue).

**CONSTITUENTS** - Alkanes and triterpenoids. Seed contains hexacosane and  $\beta$ -sitosterol,  $\beta$ -sitosterol glucoside, gallic acid and betulinic acid. Fatty oil (32%), unsaponified matter and  $\beta$ -amyrin.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Guru, Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Pittahara, Kaphahara, Durjara, Puṣṭikara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āśmarī (Calculus), Aruci (tastelessness), Kapharoga (disease due to Kapha doṣa), Prameha (metabolic disorder), Raktadoṣa (disorder of blood), Atisāra (diarrhoea), Bhagna (fracture), Dāha (burning sensation), Kuṣṭha (Leprosy / diseases of skin), Śoṭha (inflammation), Medoroga (obesity), Pravāhikā (dysentery), Raktapitta (bleeding disorder), Udarda (urticaria), Vraṇa (ulcer)

**DOSE** - Pakva phala (ripe)- Cūrṇa (powder) : 5 to 10 g  
Apakva phala (unripe)- Cūrṇa (powder) : 4 to 8 g

## TRĀYAMĀṆĀ (Rhizome)

Trāyamāṇā consists of dried rhizomes of *Gentiana kurroo* Royle (Fam. Gentianaceae), a perennial herb with tufted and decumbent stem distributed sporadically in sub-alpine to alpine meadows between altitudes of 1500 to 3000 m.

**SYNONYMS :** Trāyantī, Girijā, Adrisānuja, Balabhadrā, Pālanikā, Trāyantikā

### REGIONAL LANGUAGE NAMES

English	:	Indian gentian
Gujrati	:	Traymana
Hindi	:	Trayman, Kadu
Kannada	:	Karadihanni
Malayalam	:	Trayamana
Punjabi	:	Kadu
Tamil	:	Kampanitirai
Telugu	:	Trayama

### DESCRIPTION

#### a) Macroscopic

Dried rhizome pieces cylindrical to quadrangular, upto 12 cm long, 0.8 cm thick, dark brown with yellowish-white patches of exfoliated bark and marked by closely arranged transverse annulations and a few scars of rootlets; fracture, short and brittle; odour, characteristically aromatic; taste, bitter.

#### b) Microscopic

TS shows thin cork of tangentially elongated cells, 2 or 3 layered cork cambium of polygonal cells; multilayered cortex of oval to round cells; phloem 2 to 3 layered; cambium present and xylem largely composed of vessels arranged in radial rows or single; broad

squarish pith region of large circular cells extend from corners into intervascular regions; cells of cortex and pith filled with resinous mass and broad acicular crystals of calcium oxalate.

**Powder-** Light brown, shows fragments of round to elongated polygonal or oval parenchymatous cells of cortex and pith containing globules of resinous mass and broad acicular crystals of calcium oxalate; reticulately thickened vessels; yellowish-brown cork cells filled with brown granular material; abundant brownish coloured mycorrhizal hyphae may occur in association with cortex cells.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	7 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	28 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	13 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract of the drug on precoated silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene* : *ethyl acetate* (90:10) as mobile phase and on spraying with *anisaldehyde-sulphuric acid reagent* followed by heating at 105<sup>0</sup> for 10 minutes, spots appear at R<sub>f</sub> 0.13 (light violet), 0.20 (violet), 0.28 (light violet), 0.34 (brick red), 0.40 (violet), 0.50 (magenta), 0.55 (pink), 0.63 (violet), 0.78 and 0.96 (both dark pink).

**CONSTITUENTS** - Bitter crystalline glycoside Picrorhizin (3 to 4%) cathartic acid.

Secoiridoids like picroside A and kutuoside.

### PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṣāya

**Guṇa** : Sara

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu  
**Karma** : Pittahara, Kaphahara, Viṣaghna

**IMPORTANT FORMULATIONS** - Trāyamāṇā ghr̥ta, Trāyamāṇā kvatha, Mahā paisācika ghr̥ta

**THERAPEUTIC USES** - Atisāra (diarrhoea), Bhrama (vertigo), Gulma (abdominal lump), Hṛdroga (heart diseases), Jvara (fever), Raktapitta (bleeding disorder), Raktavikāra (disorders of blood), Śūla (pain / colic), Sūtikāśūla (postpartum abdominal pain), Tr̥ṣṇā (thirst), Visarpa (Erysepales)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## TRIPAKṢĪ (Whole Plant)

Tripakṣī consists of the whole plant of *Coldenia procumbens* L. (Fam. Boraginaceae), a procumbent herb with trailing stems appressed to the ground and rooting all along; found wild in fallow fields, dried up lakes and roadsides in warmer parts of India.

**SYNONYMS :** Tripunḱhī

### REGIONAL LANGUAGE NAMES

English	:	Trailing coldenia
Gujrati	:	Basriookharad
Hindi	:	Tripunkhi
Kannada	:	Tripakshi
Malayalam	:	Cherupadi
Marathi	:	Tripakshi, Tripunkhi
Oriya	:	Gondri lota
Tamil	:	Ceruppatai
Telugu	:	Hamsapadu, Chepputhattekku

### DESCRIPTION

#### a) Macroscopic

**Root** -Taproot well developed, creamy white, length variable, thickness upto 1.5 cm, rootlets present, no characteristic odour and taste.

**Stem** -Stem procumbent, numerous branches radiating from the root reaching upto 40 cm long, shaggy, with appressed silky white hairs, especially on younger branches, bitter, no odour.

**Leaf** -Leaves ashy green on upper surface, lower surface greenish, crisped, shortly petiolate, obovate to oblong, crenate, pubescent, no odour and taste.

#### **b) Microscopic**

**Root** -Cork and outer cortex crushed, scattered sclerenchymatous patches present in the inner cortex; phloem present; cambium distinct; xylem consists of scattered, solitary circular vessels; xylem parenchyma lignified; uniseriate ray radiating from the centre.

**Stem** -Epidermis single layer of tabular cells, with an occasional much larger cell; thick walled unicellular trichomes, 200 to 400  $\mu$  in length; cortex consists of about two layers of hypodermal chlorenchyma followed by about four layers of collenchyma and inner layers of circular parenchyma; pericycle present with small patches of lignified fibres; stele consists of scattered xylem vessels, with layers of phloem cells at the periphery; occasional phloem fibres seen; medullary rays uniseriate; pith large and parenchymatous with intercellular spaces and shows starch grains and druses.

**Leaf** -

**Petiole** -Almost circular in outline; epidermal cells single layered with trichomes and a few empty idioblasts; one or 2 rows of chlorenchyma follows epidermis; ground tissue parenchymatous.

**Midrib** -Shows a slight convex curvature on the adaxial face and a deeper curvature on the abaxial face; epidermis single layered with unicellular trichomes upto 400  $\mu$  in length; the sub epidermal layers composed of 1 or 2 rows of collenchyma; collateral crescent shaped median vascular strands with two smaller bundles present on the adaxial side; ground tissue parenchymatous; druses present.

**Lamina** -Dorsiventral; epidermis single layer with a few empty idioblasts; stomata anomocytic; adaxial and abaxial epidermal cells polygonal with straight walls in surface view; palisade two layered, second layer with shorter cells; stomatal number 48 to 52 /  $\text{mm}^2$

for abaxial surface; 40 to 46 / mm<sup>2</sup> on adaxial surface; stomatal index 2 or 3 on both adaxial and abaxial epidermis; palisade ratio 9 to 11; vein islet number 10 to 12; veinlet termination number 15 to 18.

**Powder** -Ashy green, numerous thick walled unicellular trichomes, fragments of leaf with anomocytic stomata, fibres, occasional druses observed vessels scalariform.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1 per cent,	Appendix 2.2.2
Total ash	Not more than	13 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	17 per cent,	Appendix 2.2.8
Fixed oil	Not less than	3 per cent,	Appendix 2.2.9

### T.L.C.

T.L.C of chloroform extract on aluminium plate precoated with silica gel 'G' 60 F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate (6:1)* and 6 drops of formic acid, as mobile phase and when seen under UV 366 nm, spots appear at R<sub>f</sub> 0.10, 0.16, (both white), 0.38 (pink), 0.50 (magenta), 0.56 (white), 0.60 (pink), 0.67 (magenta) 0.73, (deep violet) and 0.83 (white). On exposure to *iodine vapour*, spots appear at R<sub>f</sub> 0.16, 0.31 (both yellowish brown), 0.38 (greenish yellow), 0.50, 0.56 (both yellowish brown), 0.60 (greenish yellow) 0.67 and 0.70 (both yellowish brown). On dipping the plate in *vanillin-sulphuric acid reagent* and heating at 105<sup>o</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.13 (violet), 0.20 (yellow), 0.25 (violet), 0.27, 0.40 (both yellow), 0.44 (green), 0.50, 0.53 (both violet), 0.63 (yellow), 0.67 (green) and 0.70 (violet).

**CONSTITUENTS** - Steroid glycosides.

### PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṣāya

<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kaphaghna, Pācana, Śothaghna, Vātahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Vidradhi (abscess)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## TUVARAKA (Seed)

Tuvaraka consists of the dried seeds of *Hydnocarpus pentandra* (Buch.-Ham.) Oken Syn. *H. laurifolia* (Dennst.) Sleumer., *H. wightiana* Blume (Fam. Flacourtiaceae), a deciduous evergreen tree upto 15 m or more, endemic to tropical forests of Western Ghats, upto 600 m.

**SYNONYMS :** Katukapittha

### REGIONAL LANGUAGE NAMES

Bengali	:	Chaulmugraa
English	:	Chaulmugra
Hindi	:	Chaalmograa
Kannada	:	Garudphala, Toratti, Suranti
Malayalam	:	Kodi, Vrikshamroti, Marotti
Marathi	:	Kadukavatha
Tamil	:	Nirati Muthu
Telugu	:	Nirudu, Niridi
Urdu	:	Chaalmagraa

### DESCRIPTION

#### a) Macroscopic

Seeds obtusely angular, elongate - obovate, dark brown, 8 to 15 mm in width and 12 to 28 mm in length; testa longitudinally ridged and stony; cotyledons two, thin, papery; endosperm, abundant and oily; odour, indistinct; taste, acidic.

#### b) Microscopic

TS through micropylar region of the seed shows seed coat, endosperm and embryo; the seed coat has outer testa made up of three types of cells: (i) an outer parenchymatous epidermis with vascular supply, with a few sclereids present around xylem; ii) a middle

sclerotic tissue of cells with four distinct zones, a few outer layers of isodiametric sclerotic cells upto 30  $\mu$  diameter, with thick walls and simple pits, followed by radially elongated thick walled cell; a middle uniseriate, ribbon shaped thick walled sclereids elongated up to 900  $\mu$ ; a few layers of tangentially elongated sclereids; (iii) an inner multiseriate epidermal layer with thin walled isodiametric, compactly arranged cells; tegmen is undifferentiated and is almost crushed by the endosperm; endosperm consists of compactly arranged isodiametric thinwalled parenchymatous cells, filled with oil globules and abundant rosettes of calcium oxalate prisms of 15 to 20  $\mu$ ; cotyledons two, possess single layer of epidermal cells with brick shaped cells; mesophyll undifferentiated.

**Powder-** Coarse, oily, brownish; shows thin walled polygonal cells of epidermis, polygonal thin walled cells of endosperm with rosettes of calcium oxalate crystals of 25 to 30  $\mu$ ; isodiametric sclereids with simple pits forming unbranched radiating canals measuring from 20 to 28  $\mu$  in diameter, laterally compressed sclereids measuring 300 to 900  $\mu$  long and 20 to 30  $\mu$  wide, fibrous tissue and xylem elements with annular and spiral thickenings.

### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	35 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	12 per cent,	Appendix 2.2.8

### **T.L.C.**

T.L.C. of alcoholic extract on silica gel 'G' plate using *n-hexane: ethyl acetate* (9:1) as mobile phase and when seen under UV 366 nm, spots appear at  $R_f$  0.15 (blue); 0.48 (green) and 0.83 (blue); on exposure to *iodine vapour*, spots appear at  $R_f$  values, 0.15, 0.25, 0.36, 0.48, 0.83 and 0.92 (all yellow), and on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at  $R_f$  0.15, 0.25, 0.48 and 0.83.

**CONSTITUENTS** - Apigenin, hydnocarpin, isohydnocarpine methoxyhydnocarpin and fixed oils.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Tikta, Madhura, Kaṣāya
<b>Guṇa</b>	:	Snigdha, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Vātahara, Kaphahara, Rasāyana, Ubhayatobhāghara

**IMPORTANT FORMULATIONS** - Tuvaraka Taila

**THERAPEUTIC USES** - Ānāha (distension of abdomen due to obstruction to passage of urine and stools), Arśa (piles), Gṛdhrasī (Sciatica), Gaṇḍamālā (cervical lymphadenitis), Gulma (abdominal lump), Jvara (fever), Kaṇḍū (itching), Kaphavātajā roga (disorders due to Kapha and Vāta doṣa), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Śoṭha (inflammation), Prameha (metabolic disorder), Raktavikāra (disorders of blood), Tvakroga (skin diseases), Udara (diseases of abdomen), Udāvarta (partial intestinal obstruction), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## ŪṢANDĪ (Whole Plant)

Ūṣandī consists of the whole plant of *Glinus lotoides* L. Syn. *Mollugo hirta* Thub., *M. lotoides* Kuntz. (Fam. Aizoaceae), a spreading annual herb with white hairy aerial parts, distributed in warmer parts of India in plains and also on the hills upto 800 m.

**SYNONYMS :** Bhisata, Okharadi

### REGIONAL LANGUAGE NAMES

Bengali	:	Duserasag
Gujrati	:	Aakaraadya
Hindi	:	Gandibudi
Kannada	:	Chandra kaasi soppu
Marathi	:	Kothuk, Bhisata
Oriya	:	Gandhibuti
Punjabi	:	Gandibuti
Tamil	:	Ciruceruppatai
Telugu	:	Chandrasi koorra

### DESCRIPTION

#### a) Macroscopic

**Root** -Tap roots well developed, stout, fleshy, long, cream in colour, odour and taste not characteristic.

**Stem** -Spreading, much branched, villous, bearing pinkish white flowers in axillary fascicles, odour nil and taste not characteristic.

**Leaf** -Leaves opposite, more than two at nodes, one to two cm in width and 0.5 to 1.5 cm in length and densely villous on both sides, broadly obovate or sub orbiculate, very obtuse

at the apex, cuneate at the base, petioles 6 to 10 mm long, slender, hairy, vein inconspicuous, odour nil and taste not characteristic.

## **b) Microscopic**

**Root** -TS shows circular outline; epidermis single layer of thick walled cells; four to five layers of thin walled parenchymatous cortex; followed by stele showing anomalous secondary growth; consisting of successive rings of alternate xylem and phloem; xylem consists of solitary wide circular thick walled vessels, in between the successive rings, thin walled parenchyma present; starch grains present; pith absent.

**Stem** -Cuticle present, epidermis single layered barrel shaped cells; a few cells show papillary growth, cortex consists of 4 to 5 layers of loosely packed parenchyma, some cells contain druses; two to three layers of stone cells alternating with sclerenchymatous fibers forms the pericycle; stele shows phloem and many solitary circular vessels embedded in thick walled xylem parenchyma; pith large, parenchymatous; starch grains present; a few cells contain druses.

### **Leaf-**

**Petiole** -TS circular in outline; epidermal cells thin walled with cuticle; epidermal outgrowths of stellate hair mostly dichotomously branched, with four celled stalk; cortical region parenchymatous with intercellular spaces, a few cells contain druses; vascular strand single, deeply arc shaped with many radial files of 2 to 5 xylem elements; phloem present on the abaxial side of the xylem strands; a few layer of ground tissue with smaller cells surround the vascular arc.

**Midrib** -TS shows abaxial side slightly curved; epidermal cells single layer, barrel shaped; cuticle present; palisade parenchyma continuous with lamina, two layered followed by 3 to 5 layers loosely arranged spongy parenchyma, some cells contain druses; single vascular

strand arc shaped; xylem elements in radial groups; phloem present on the abaxial side of the xylem strands.

**Lamina** - Dorsiventral; epidermis single layered; cuticle present; two layers of palisade parenchyma followed by loosely arranged spongy parenchyma, some cells contain druses; lower epidermis shows stellate hair dichotomously branched with 3 celled stalk; in surface view abaxial epidermal cell walls sinuous and adaxial slightly wavy; stomata anomocytic type; stomatal number 23 to 25 / mm<sup>2</sup> for abaxial epidermis; 18 to 20 / mm<sup>2</sup> for adaxial epidermis; stomatal index 43 to 45 for abaxial epidermis and 25 to 29 for adaxial epidermis; palisade ratio 2 to 4; vein islet number 4 to 5.

**Powder** -Greyish green, no characteristic odour and taste, stellate hair druses, fibres, vessels, starch grains measuring upto 5 μ in diameter and elongated pitted stone cells length upto 150 μ narrow lumen.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	8 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	23 per cent,	Appendix 2.2.8
Fixed oil	Not less than	3 per cent,	Appendix 2.2.9

#### **T.L.C.**

T.L.C. of chloroform extract on aluminium plate precoated with silica gel 'G' F<sub>254</sub> of 0.2 mm thickness using *toluene: ethyl acetate* (9:1) as mobile phase and when seen under UV 254 nm, spots appear at R<sub>f</sub> 0.10, 0.17, 0.24, 0.29, 0.46, 0.54, 0.61 and 0.71 (all green). Under UV 366 nm, spots appear at R<sub>f</sub> 20 (pink) 0.32 (blue), 0.37 (pink), 0.41 (dark pink), 0.49 (blue), 0.54 (pink) and 0.59 (dark pink). On exposure to *iodine vapour*, spots appear at R<sub>f</sub> 0.24, 0.65,

0.69 and 0.98 (all brown). On dipping the plate in *vanillin-sulphuric acid reagent* and on heating at 105° for 5 minutes, spots appear at R<sub>f</sub> 0.11 (grey), 0.18 (green), 0.29, 0.35 (both grey), 0.39 (green), 0.45, 0.53 (both grey), 0.59 (green), 0.74, 0.80 and 0.98 (all grey).

**CONSTITUENTS** - Mollugogenol A, B, C, D, E, F and G; mollugocin A and B; β- and γ-sitosterol glucosides; oleanolic acid; Flavonoids like apigenin-8-C-glucoside; apigenin-7-rhamnoglucoside; pelargonidin-3-sophorsido-7-glucoside; esculin; sulfuretin; vicenin 2; vitexin.

### PROPERTIES AND ACTION

**Rasa** : Kaṣāya, Tikta  
**Guṇa** : Laghu, Rūkṣa  
**Vīrya** : Śīta  
**Vipāka** : Kaṭu  
**Karma** : Jvaraghna, Kapha-pittahara, Pauṣṭika, Śothahara, Stambhana, Udardapraśamana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Atisāra (diarrhoea), Raktapitta (bleeding disorder), Udararoga (diseases of abdomen), Vidradhi (abscess), Vraṇa (ulcer)

**DOSE** - Cūrṇa (powder) : 3 to 6 g

## VAJRĀNNA (Leaf Base)

Vajrānna consists of the dried sheathy leaf bases of *Pennisetum typhoides* (Burm.) Stapf & C.E. Hubb, syn. *P. typhoideum* Rich., *P. spicatum* Roem and Schult [Fam. Poaceae (Graminae)], cultivated in the arid and semi-arid regions of central and peninsular India for its fruit used as cereal.

### REGIONAL LANGUAGE NAMES

Bengali	:	Bajar, Lahra
English	:	Spiked millet, Pearl millet, Bullrush millet
Gujrati	:	Bajni
Hindi	:	Bajra
Kannada	:	Sajjai
Malayalam	:	Mattari
Marathi	:	Bajri, Bjr
Oriya	:	Gantia, Bajri
Punjabi	:	Bajra
Tamil	:	Kambu, Kampu
Telugu	:	Gantelu, Sajjalu, Sajja
Urdu	:	Bajra

### DESCRIPTION

#### a) Macroscopic

Leaf bases sheathy, recurved, bearing ligules, shining, straw coloured, with smooth adaxial surface and finely lined cream coloured abaxial surface; 1.5 to 2 cm in width and 14 to 16 cm in length; venation parallel, lamina absent, odour and taste indistinct.

## **b) Microscopic**

TS of leaf base shows adaxial and abaxial epidermis, mesophyll and vascular bundles; epidermal cells of adaxial surface are rectangular elongated, compactly arranged; epidermal cells of abaxial surface tabular, some of which are differentiated into bulliform cells but ruptured due to drying of the leaf; mesophyll undifferentiated, composed of spongy tissue, cells isodiametric, thin walled, filled with chloroplasts and aggregates of prismatic calcium oxalate crystals; some of the mesophyll cells aggregated around vascular bundles to form a bundle sheath filled with starch grains measuring about 10  $\mu$  in diameter; vascular bundles linearly arranged in the mesophyll, collateral, closed, xylem towards adaxial surface, phloem towards abaxial surface; xylem contains 3 to 5 vessels, arranged in 'Y' form, 30 to 40  $\mu$  in diameter, with annular and spiral thickenings, along with xylem parenchyma and xylem fibres; phloem patch contains sieve tubes, phloem parenchyma and phloem fibres; each vascular bundle is associated with a sclerenchymatous bundle cap towards abaxial surface; sclereids thick walled, compactly arranged, and polygonal; in surface view the intercostal epidermal cells of adaxial surface are axially elongated, rectangular comparatively thin and nearly straight walled, length 100 to 350  $\mu$  and width 30 to 55  $\mu$ ; costal cells linear, thin and straight walled, 250 to 425  $\mu$  long 12 to 22  $\mu$  broad; intercostal cells of abaxial surface are of two types; rectangular, elongate 80 to 125  $\mu$  long 20 to 30  $\mu$  broad and squarish, smaller silica cells, 30 to 40  $\mu$  long and 20 to 30  $\mu$  broad; walls of both the type of cells are deeply sinuate; stomata in both the epidermal layers are paracytic type, with two dumb bell shaped guard cells, 14 to 25  $\mu$  long 4 to 8  $\mu$  broad, inner walls thickened with lignin, subsidiary cells two, bean shaped 21 to 30  $\mu$  long and 6.5 to 9.5  $\mu$  broad, hyaline, situated parallel to the long axis of guard cells; stomata in both the epidermal layers are arranged in vertical rows; but scattered over intercostal cells in adaxial surface; characteristically restricted to two vertical rows on either side of every vein region on abaxial surface; stomatal index of adaxial surface is 8 or 9 and that of abaxial surface is 10 or 11.

**Powder** -Greyish brown in colour, fine in texture, consisting of epidermal cells of adaxial and abaxial surfaces; cells of adaxial epidermis elongated, walls straight; cells of abaxial epidermis two types - rectangular, with sinuate walls and smaller silica cells; stomata present; sclereids from bundle caps, which are thick walled, isodiametric, 8 to 18  $\mu$  in

diameter; vessels with annular and spiral thickenings; fibres, and aggregates of prismatic calcium oxalate crystals upto 15  $\mu$  in diameter.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	15 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	12 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	15 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of alcoholic extract on precoated silica gel 'G' plate using *n-hexane:ethyl acetate* (8:2) as mobile phase and when seen under UV 366 nm, spots appear at  $R_f$  0.10, 0.44, 0.50, 0.61, 0.82 and 0.86; on spraying with 5% *methanolic sulphuric acid reagent* and heating the plate for 10 minutes at 105<sup>0</sup>, spots appear at  $R_f$  0.10, 0.40, 0.44, 0.50, 0.61, 0.82, 0.86 and 0.93.

**CONSTITUENTS** - Flavonoid, alkaloids, tannins, phenols and saponin.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Guru
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Amla
<b>Karma</b>	:	Balya, Durjara, Hṛdya, Kapha-vātahara, Pittahara, Puṁstvahara, Vātakara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Prameha (metabolic disorder), Śaitya (coldness), Santarpanājanya roga (disorders due to obesity), Sthaulya (obesity)

**DOSE** - Svarasa (juice): 10 to 20 ml

## VĀLUKĀ-ŚĀKA (Leaf)

Vālukā-Śāka is the dried leaves of *Gisekia pharnaceoides* L. Syn. *G. molluginoides* Wt. (Fam. Aizoaceae) which is a spreading herb with diffused branches of about 20 to 35 cm in length, distributed in coastal areas and arid zones of India.

**SYNONYMS :** Vālukā

### REGIONAL LANGUAGE NAMES

Bengali	:	Valuka
Hindi	:	Balukaasaaga
Malayalam	:	Panckirai
Marathi	:	Vaaluchi-bhaaji
Tamil	:	Manalkirai
Telugu	:	Eskadantikura

### DESCRIPTION

#### a) Macroscopic

Leaves simple, opposite, fleshy and brittle; bulk colour reddish brown to greenish yellow; petiole 1.5 to 3 mm long, slightly grooved above; lamina 7 to 13 mm long and 3 to 7 mm broad, elliptic, oblong to oblanceolate in shape, glabrous; tip obtuse and apiculate, base cuneate, narrow and unequal; margin entire; slightly recurved, veins obscure; slightly bitter and no characteristic odour.

#### b) Microscopic

Dorsiventral in nature; TS shows recurved margin with narrow deep furrowed midrib; upper epidermis single layer of large cells with cuticle; followed by one or two layers of palisade; vascular bundle horse shoe shaped, with 12 to 16 xylem vessels in a row in the centre; phloem just below the xylem; parenchymatous cells present above the xylem; and below the vascular bundle there is a patch of polygonal parenchyma cells extending to the

lower epidermis; small, oval starch grains present in most of the parenchymatous cells; many acicular calcium oxalate crystals of length 34 to 44  $\mu$  scattered throughout and also as raphides in lower spongy parenchyma; stomata anomocytic.

**Powder-** Powder grey with a brownish tinge, microscopic observation shows compact polygonal epidermal parenchyma with anomocytic stomata; oval or round starch grains, 20 to 25  $\mu$  across, with a linear hilum; needle shaped calcium oxalate crystals, 38 to 58  $\mu$  long, pitted and spiral vessels.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	12 per cent,	Appendix 2.2.3
Sulphated ash	Not more than	20 per cent,	Appendix 2.2.6
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	7 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	30 per cent,	Appendix 2.2.8

### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *n-hexane:chloroform:methanol* (4:5:1) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.10, 0.20, 0.37, 0.60, 0.68, 0.77 (all light pink), 0.83 (pink) 0.92 (light pink) and 0.98 (dark pink).

**CONSTITUENTS** - Oxalic, tartaric, citric and succinic acids besides triacontane, myristone, tetracosanol and dotriacontane.

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu

**Karma** : Anulomana, Kṛmighna, Kuṣṭhaghna, Durgandhanāśana

**IMPORTANT FORMULATIONS** - Lavaṅgādyā cūrṇa

**THERAPEUTIC USES** - Kaṇḍū (itching), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Raktapitta (bleeding disorder)

**DOSE** - Cūrṇa (powder): 3 to 6 g

## VANYA-AŚVAGOLA (Fresh Leaf)

Vanya-aśvagola consists of fresh leaves of *Plantago lanceolata* L. (Fam. Plantaginaceae), a small herb found in Western Himalayas. It is also cultivated through out the greater part of India.

**SYNONYMS** : Vanya-īṣadgola, Meṣa-jihvā

### REGIONAL LANGUAGE NAMES

Bengali	:	Bartung
English	:	Ribwort
Hindi	:	Baltanga, Jangali isabgola
Kannada	:	Siriportlagida
Marathi	:	Baltang
Punjabi	:	Kashur-gul
Telugu	:	Adavi ishapugorulu
Urdu	:	Bartang

### DESCRIPTION

#### a) Macroscopic

A perennial plant with a rosette of lanceolate ribbed leaves which grow from the root-stalk, petioles margined; leaves green, 7.5 to 20 by 2 to 2.5 cm, multicostate, convergent venation, 3 to 5 ribbed, margin entire, lamina tapering downwards in a short broad and curved stalk; taste and odour characteristic.

### IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	24.5 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1.7 per cent,	Appendix 2.2.4

Alcohol-soluble extractive	Not less than	12 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	35 per cent,	Appendix 2.2.8

#### T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *toluene: ethyl acetate:formic acid: methanol* (3:3:0.8:0.2) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105° for 5 minutes, spots appear at R<sub>f</sub> 0.11 (green), 0.17 (orange), 0.37, 0.46 (both violet), 0.53 (light purple), 0.59 (purple), 0.69 (pink), 0.78 (violet), 0.91 and 0.98 (both light purple).

**CONSTITUENTS** - Chlorogenic acid, chrysophanic acid, emodin, luteolin, plantaginin, scutellarin, aesculetin.

#### PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṣāya, Madhura
<b>Guna</b>	:	Snigdha, Guru
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Mūtrala, Rakta-stambhana, Rasāyana, Śōthahara, Sraṃsana, Vedanāśāmaka

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Karṇaśūla (otalgia), Aṣṛagḍara (menorrhagia or metrorrhagia or both), Dantaśūla (toothache), Kāsa (cough), Raktasrāva (bleeding disorder), Śōtha (inflammation), Śvāsa (Asthma), Vraṇa (ulcer)

**DOSE** - Patra Svarasa (Leaf juice): 5 to 10 ml

## VETRA (Rhizome)

Vetra is the dried rhizomes of *Calamus rotang* L. (Fam. Arecaceae) a thorny climbing shrub occurring in central and southern India. It is restricted to the plains along the backwaters and coasts.

**SYNONYMS :** Vetraka, Romaśara, Tejana

### REGIONAL LANGUAGE NAMES

Bengali	:	Chaachi bet
English	:	Cane, Common rattan
Gujrati	:	Netar
Hindi	:	Beta, Vet, Bent
Kannada	:	Betasu
Malayalam	:	Chural
Marathi	:	Veta, Thor veta
Oriya	:	Beta
Tamil	:	Pirampu
Telugu	:	Sanna Bettamu, Pemu

### DESCRIPTION

#### a) Macroscopic

Rhizome horizontal and branched; woody, stiff and rough in texture; light grey to brown in bulk; individual pieces tortuous in shape, size ranging from 1 to 5 cm long and 1 to 4 cm in cross section; cut surface shows an inner creamy ring and an outer brownish narrow ring; rhizome marked with wavy annulations at the nodes; internodal length ranges from 3 to 12 mm; with roots arising from the internode; fracture, very tough, fibrous; no characteristic odour bitter in taste.

## b) Microscopic

TS of rhizome circular in outline; epidermis single layered; cortical cells thin walled, parenchyma polygonal towards the epidermis and gradually become circular, with intercellular spaces; cortex shows many resin canals which are red in colour; scattered circular patches of sclerenchymatous cells, about 200  $\mu$  in diameter present, followed by an endodermis of a single layer of elongated cells; vascular bundles many, scattered, each circular in outline and has a sclerenchymatous cap; phloem consists of phloem parenchyma, sieve tubes and companion cells; xylem with a large vessel of 62 to 88  $\mu$  diameter and with 1 to 3 smaller vessels; starch grains oval or circular in shape and present in many cells in cortex and stele.

**Powder** -Cream to brown, bitter to taste and with no characteristic odour; microscopic observation shows starch grains of about 5  $\mu$  across and round to oval in shape; stone cells of about 35  $\mu$  width and triangular to oval in shape with a narrow lumen; reddish resinous masses; slender and wiry fibres of approximately 10  $\mu$  width; pitted and spiral vessels and wood parenchyma.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	3 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	10 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	9 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *n-hexane: chloroform* (3:7) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at 0.28 (yellow), 0.33 (pink), 0.45 (light pink), 0.51 (yellow), 0.67 (light pink), 0.72 (yellow) and 0.88 (pale yellow).

**CONSTITUENTS** - Saponins, alkaloids and flavonoids.

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guna</b>	:	Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Chedana, Dīpana, Kaphahara, Mūtrala, Pittahara, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Arśa (piles), Aruci (tastelessness), Aśmarī (calculus), Dāha (burning sensation), Jvara (fever), Kāsa (cough), Kuṣṭha (Leprosy / diseases of skin), Mūtrakṛcchra (dysuria), Prameha (metabolic disorder), Pravāhikā (dysentery), Raktapitta (bleeding disorder), Śōtha (inflammation), Tṛṣṇā (thirst), Tvakroga (skin diseases), Visarpa (Erysepales), Yoniroga (disease of female genital tract)

**DOSE** - Kvātha (decoction) : 50 to 100 ml

Cūrṇa (powder) : 5 to 10 g

## VIṢĀṆIKĀ (Whole Plant)

Viṣāṇikā is the whole plant of *Pergularia daemia* (Forsk) Chiov. Syn. *Daemia extensa* (Jacq.) R.Br. (Fam. Asclepiadaceae), a laticiferous twiner found in the plains throughout the hotter parts of India.

**SYNONYMS** : Uttamaraṇī, Yugmaphala

### REGIONAL LANGUAGE NAMES

Bengali	:	Chhagal bete
Gujrati	:	Amaradudheli, Nagaladudhi
Hindi	:	Utaran
Kannada	:	Juttuveballi
Malayalam	:	Veliparuthi
Marathi	:	Mendhadhdhi, Utarana
Oriya	:	Utruli, Juktiruhi
Punjabi	:	Karial, Siali
Tamil	:	Uttamani, Velipparuthi
Telugu	:	Gittapakau, Dustapuchettu, Dustuputige

### DESCRIPTION

#### a) Macroscopic

**Root** - Straight or branched, 3 to 7 mm in thickness; pale brown externally and cream coloured in cut surface; fracture short in bark, fibrous and splintery in wood, surface rough; mature roots fibrous; odour hay like and taste bitter.

**Stem** - Pubescent, pale green to green; 1 to 3 mm diameter and the internodal length 5 to 15 cm; fracture fibrous; pith hollow.

**Leaf**- Simple, opposite, pubescent, greenish, rarely brownish; petiole 3 to 6 cm, hairy; lamina 5 to 10 cm long and 4 to 9 cm broad, cordate and ovate to broadly ovate, tip acute to acuminate; brittle when dry; margin entire, veins 3 or 4 pairs, alternate, prominent below, about 3 nerves arise from the base.

**Flower** - Inflorescence umbellate raceme, axillary, peduncle up to 12 cm; pedicels about 2.5 cm, calyx greenish with purple tinge; corolla greenish to cream with purple tinge, pollinia pendulous, yellowish, about 1mm; corona double; ovary bicarpellary; ovules numerous.

**Fruit**- Follicle, slightly curved, usually in pairs, green; having thick, soft, short, spines throughout; broader at the base and tapering towards the apex, 3 to 7 cm long and 0.5 to 1.5 cm in width.

**Seed** - Ovate with blunt apex and wavy margin, pale to dark brown in colour, 4 to 6 mm in length, comose with tuft of long, white, silky hairs at apex; surface minutely pubescent.

## **b) Microscopic**

**Root:** TS shows cork composed of elongated, lignified cells of about 20 rows; cortical cells elongated or polygonal; latex cells present in the cortex, cluster of calcium oxalate crystals present in the cortical cells; starch grains also present in most of the cortex and xylem parenchyma; cambium distinct; xylem parenchyma, vessels and tracheids thick walled and lignified; medullary rays uniseriate.

**Stem** TS circular in outline; epidermis covered by a thin cuticle; trichomes unicellular 30 to 90  $\mu\text{m}$  in length or multicellular-uniseriate 125 to 400  $\mu\text{m}$ , occasionally with collapsed cell; a single layer of collenchyma followed by cortex of 5 to 12 layers of round to polyhedral cells with interspaces; endodermis present; sclerenchymatous patches of fibres forming a discontinuous pericycle; phloem with companion cells and sieve tubes; xylem forms a continuous ring composed of xylem vessels with much larger ones towards periphery and tracheids with smaller vessels and xylem parenchyma in the rest of the area; broken ring of phloem patches present internal to the xylem and in the periphery of the pith; cells of pith

circular to polygonal with intercellular spaces; many laticifers and cluster crystals of calcium oxalate present in the cortex and pith.

### ***Leaf***

***Petiole*** - TS circular in outline with a groove on the adaxial side; epidermis with a thick cuticle; unicellular and multicellular uniseriate trichomes present, followed by 2 or 3 layers of collenchyma, and a cortical region of 5 to 12 layers of parenchyma; stele crescent shaped with about 20 vertical rows of xylem and phloem patches on either side of the xylem; smaller vascular strand with a few xylem vessels present laterally placed on either side of the groove.

***Midrib*** - TS along the midrib shows slightly convex above and prominent below; epidermis followed by 2 to 4 layers of collenchyma on either side of the midrib; cortical parenchyma cells circular to polygonal with intercellular spaces; vascular bundle crescent shaped with xylem in the middle and phloem on either side.

***Lamina*** - Upper epidermis covered by a thin cuticle followed by a single layer of palisade cells; spongy mesophyll of irregular polyhedral cells present; lower epidermal cells smaller than the upper; stomata present only on the lower side, anomocytic; unicellular and multicellular- uniseriate trichomes present; laticifers present throughout.

***Powder*** -Light brown, slightly bitter, no characteristic odour; microscopic examination shows globular to ovate starch grains with central hilum, 10 to 20  $\mu$  in size; rosette crystals 10 to 30  $\mu$  across and clustered crystals of calcium oxalate; unicellular trichomes of 30 to 90  $\mu$  length; multicellular uniseriate trichomes of 130 to 400  $\mu$  length; several with collapsed cells; long wiry fibres; elongated stone cells of 70 to 200  $\mu$  length; tissue with linear rows of sclerenchymatous cells; vascular elements; spiral, annular, scalariform, reticulate, simple pitted and border pitted vessels; tracheids and epidermal tissue with anomocytic stomata.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	11 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	1 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	14 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2mm thickness using *n-hexane: chloroform* (3:7) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.19 (pink), 0.27, 0.31 (both light pink), 0.39 (violet), 0.42 (light pink), 0.72 (deep violet), 0.79 (pink) and 0.83 (light pink).

**CONSTITUENTS** - Several cardenolides such as calotropin, calactin, calotropagenin, uzarigenin, coroglaucigenin and triterpenoids,  $\beta$ - amyryn and lupeol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Kaṣāya
<b>Guṇa</b>	:	Laghu, Rūkṣa, Viśada
<b>Vīrya</b>	:	Anuṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Kapha niḥsāraka, Dīpana, Virecana, Kuṣṭhaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Mahākuṣṭha (group of major skin diseases), Agnimāndya (digestive impairment), Vibandha (constipation), Yonidoṣa (disorder of female genital tract), Śvāsa (Asthma), Śoṭha (inflammation), Mūtrakṛcchra (dysuria)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## VRNTĀMLAPHALA (Fruit Rind)

Vṛntāmlaphala consists of the fruit rind of *Garcinia pedunculata* Roxb. (Fam. Guttiferae), a tall stately tree 60 m high with fluted trunk and rather short spreading branches, with fruits of about 10 to 12 cm in length and about 8 cm in width found sporadically in upper Assam up to an altitude of 1000 m and in Manipur; occasionally cultivated; fresh mature fruits are cut and rind dried before use.

**SYNONYMS :** Vṛntāmlaphala

### REGIONAL LANGUAGE NAMES

Assamese	:	Borthekera
Bengali	:	Tikul, Tikur, Thaikal
Hindi	:	Amalbeda
Kannada	:	Chaarigehuli
Tamil	:	Pulivanchi
Telugu	:	Pullaprabali
Urdu	:	Amalbeda

### DESCRIPTION

#### a) Macroscopic

Freshly dried drug occurs as curved and flat pieces of rind of about 7 cm in length and about 0.2 cm in thickness, leathery, pliable, non fibrous, blackish brown in colour; some of the pieces bear pedicels and the remnants of the persistent calyx having four lobes; no characteristic odour, taste sour;

#### b) Microscopic

**Pedicel** -TS shows wavy outline; epidermis single layered; thick cuticle present; cortex parenchymatous with thick walled cells showing intercellular spaces; prismatic and

rosette crystals of calcium oxalate and brown contents present throughout cortex; secretory canals present all over the region; pericycle discontinuous with patches of collenchyma; stele shows wavy outline with a continuous band of phloem and xylem interrupted by medullary rays; pith large, parenchymatous showing several isolated anomalous amphicribal vascular bundles at the periphery.

**Fruit** -TS of fruit rind shows single layered epidermis; cuticle present; unicellular trichome occasionally present; mesocarp parenchymatous; prismatic and rosette crystals of calcium oxalate and brown contents present in cells of several layers of mesocarp, just below the epidermis; secretory cells present all over the region; middle and inner mesocarp shows amphicribal vascular bundles with a clear endodermis.

**Powder** -Parenchyma cells of epidermal tissue of pedicel in surface view showing paracytic stomata, spiral and scalariform vessels from rind, trichomes, rosette crystals of calcium oxalate, non septate fibres up to 400  $\mu$  in length from pedicel.

#### **IDENTITY, PURITY AND STRENGTH**

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	3 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	2 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	39 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	42 per cent,	Appendix 2.2.8
Fixed oil	Not less than	1 per cent,	Appendix 2.2.9

#### **T.L.C.**

T.L.C. of dichloromethane extract on aluminium plates precoated with silica gel 'G'60  $F_{254}$  of 0.2 mm thickness using *toluene: ethyl acetate* (5:1.5) as mobile phase and when seen under UV 366 nm, spots appear at  $R_f$  0.55, 0.93 and 0.96 (all blue). Under UV 254 nm, spot appears at  $R_f$  0.3 (green). On exposure to *iodine vapour*, spots appear at  $R_f$  0.61 and 0.65

(both yellow). On dipping in *vanillin-sulphuric acid* and on heating for 5 minutes at 105<sup>0</sup>, spots appear at R<sub>f</sub> 0.25 (blue), 0.44 (greenish blue), 0.84 (dark blue) and 0.95 (greenish blue).

**CONSTITUENTS** - Pedunculol; garcinol; cambogin.

### **PROPERTIES AND ACTION**

<b>Rasa</b>	:	Amla, Kaṣāya
<b>Guṇa</b>	:	Rūkṣa, Tīkṣṇa, Snigdha, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Amla
<b>Karma</b>	:	Anulomaka, Bhedana, Dīpana, Kaphahara, Mūtrala, Pācana, Vātahara

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ānāha (distension of abdomen due to obstruction to passage of urine and stools), Ajīrṇa (indigestion), Aśmarī (calculus), Arśa (piles), Aruci (tastelessness), Gulma (abdominal lump), Hṛdroga (heart diseases), Hikkā (hiccup), Kṛmi (worm infestation), Kāsa (cough), Plīha roga (splenic disease), Śūla (pain / colic), Śvāsa (Asthma), Udāvarta (partial intestinal obstruction), Vibandha (constipation)

**DOSE** - Svarasa (juice): 5 to 10 ml

## VRŚCIKAKANDA (Rhizome)

Vrścikakanda consists of dried rhizomes of *Doronicum hookeri* C. B. Clarke (Fam. Asteraceae), a robust herb growing in the Sikkim and Himalaya region between 3500 to 4200 m.

### REGIONAL LANGUAGE NAMES

Punjabi : Daarunaj-akrabi

Urdu : Darunaj Aqrabi

### DESCRIPTION

#### a) Macroscopic

Brown irregular pieces 3 to 5 cm long and 0.2 to 0.8 cm in width; scale leaf scars present; fracture smooth, taste starchy, astringent, odour present but not specific.

#### b) Microscopic

TS shows 3 or 4 layers of cork containing thin walled cells; cortex parenchymatous; vascular bundles numerous, arranged in a ring in the outer region of the cortex, each surrounded by a bundle sheath of sclerenchymatous fibres; phloem present towards the periphery and xylem towards the pith region, almost all the cells of cortex and pith are compactly filled with simple starch grains of various size ranging from about 10 to 60  $\mu$ ; some cells of the cortex are filled with yellowish brown colouring matter.

**Powder** -Light yellowish brown, shows simple and compound starch grains of various sizes, upto 60  $\mu$  and spherical, sub-spherical to ovoid in shape with a radiate hilum and very faint striations that are visible only in large starch grains; individual or groups of parenchymatous cells filled with starch grains; fibres sclerenchymatous, non-septate, lignified with tapering ends, broad lumened, ranging from 76 to 125  $\mu$  in length; xylem vessels with spiral and reticulate thickenings; taste slightly astringent; odour present but not specific.

## IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent,	Appendix 2.2.2
Total ash	Not more than	4 per cent,	Appendix 2.2.3
Acid-insoluble ash	Not more than	0.7 per cent,	Appendix 2.2.4
Alcohol-soluble extractive	Not less than	6.6 per cent,	Appendix 2.2.7
Water-soluble extractive	Not less than	20 per cent,	Appendix 2.2.8

## T.L.C.

T.L.C. of the methanolic extract on precoated silica gel 'G' plate of 0.2 mm thickness using *toluene:ethyl acetate* (5:4) as mobile phase and on spraying with *anisaldehyde sulphuric acid reagent* and heating at 105<sup>0</sup> for 5 minutes, spots appear at R<sub>f</sub> 0.15 (light blue), 0.30 and 0.40 (both blue), 0.52 (pink), 0.61, 0.68 and 0.77 (all blue).

**CONSTITUENTS** - Essential oil.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta
<b>Guṇa</b>	:	Rūkṣa, Laghu, Sugandhi
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Anulomana, Kaphahara, Viṣaghna, Hṛdbalya, Jvaraghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ānāha (distension of abdomen due to obstruction to passage of urine and stools), Ardita (facial palsy), Daṃśaviṣa (poisoning due to bites), Garbhāśayaśūla (uterine pain), Hṛdroga (heart diseases), Pakṣavadha (paralysis / hemiplegia), Udaraśūla (pain in the abdomen), Vātaroga (disease due to Vāta doṣa), Vātika Unmāda (mania / psychosis), Granthikajvara (Bubonic plague)

**DOSE** - Cūrṇa (powder): 1 to 3 g

## **DĀRUSITĀ TAILA (Cinnamomum Oil)**

Dārusitā Taila is distilled from the dried inner bark of the shoots of coppiced tree of *Cinnamomum zeylanicum* Blume (Fam.Lauraceae).

**SYNONYMS** : Tanutvak taila, Tvak taila

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Dalcina taila
Bengali	:	Daaruchini taila
English	:	Cinnamon oil
Gujrati	:	Taja taila
Hindi	:	Daalchini taila
Kannada	:	Lavanga palte enne
Malayalam	:	Karuva patte enna
Marathi	:	Daalchini taila
Oriya	:	Daalchini taila
Punjabi	:	Daalchini taila
Tamil	:	Karuvāpaṭṭai Eṇṇai
Telugu	:	Dalachini nune
Urdu	:	Rogan- dalachini

### **DESCRIPTION**

#### **a) Macroscopic**

A yellow liquid when freshly distilled, gradually becoming reddish-brown with age; odour and taste, characteristic of Cinnamon, taste sweetish and aromatic.

### **IDENTITY, PURITY AND STRENGTH**

**Optical rotation**

$0^{\circ}$  to  $-2^{\circ}$

Appendix 3.3

<b>Refractive index</b>	1.573 to 1.600	Appendix 3.1.1
<b>Weight per ml</b>	1.000 to 1.040g	Appendix 3.1.2
<b>Assay</b>	Contains not less than 55.0 per cent, w/w and not more than 70.0 per cent, w/w of cinnamaldehyde, C <sub>9</sub> H <sub>8</sub> O.	
<b>Microbial limits</b>	Complies with API	Appendix 2.4
<b>Pesticide residue</b>	Complies with API	Appendix 2.5

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṭu
<b>Guna</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Ārtavapravartaka, Balya, Dantya, Dīpana, Kaṇṭhya, Mukhadurgandhanāśana, Pācana, Pittahara, Pratiduṣaka, Sugandhi, Śukrajanana, Uttejaka, Vātahara, Vātanulomaka, Vraṇaśodhaka, Vrāṇaropaka

### IMPORTANT FORMULATIONS - Used as single drug

**THERAPEUTIC USES** - Ādhmāna (flatulence with gurgling sound), Āmadoṣa (products of impaired digestion and metabolism), Āmāśaya śūla (peptic ulcer), Āntrika pratidūṣaka (enteritis), Arśa (piles), Chardi (emesis), Dantaśūla (toothache), Dhvajabhāṅga (failure of penile erection), Kṛmi (worm infestation), Kṣayaja vraṇa (tubercular wound), Mukhaśoṣa (dryness of mouth), Nāḍīśūla (acute pain of nervine origin), Pīnasa (chronic rhinitis / sinusitis), Pratiśyāya (coryza), Rājayakṣmā (Tuberculosis), Raktavikāra (disorders of blood), Śūla (pain / colic), Trṣṇā (thirst), Vṛścika daṃśa (scorpion bite)

**DOSE** - 1 to 3 drops

## GANDHAPŪRA PATRA TAILA

Gandhapūra Patra Taila is the oil obtained by the steeping and fermentation of fresh leaves of *Gaultheria fragrantissima* Wall. (Fam. Ericaceae).

**SYNONYMS :** Gandhapūrṇa taila, Carmapatra taila

### REGIONAL LANGUAGE NAMES

Bengali	:	Gandapuro
English	:	Oil of wintergreen, Indian-Wintergreen
Gujrati	:	Gandhapuro
Hindi	:	Gandpuro, Gandhapuraa kaa tel, Machino
Kannada	:	Gandhapura
Malayalam	:	Gandhapura
Marathi	:	Gandhapura
Oriya	:	Gandhapura
Punjabi	:	Gandhapura tailam
Tamil	:	Gandhapura
Telugu	:	Oleum Gaultheriale
Urdu	:	Gandapuro

### DESCRIPTION

#### a) Macroscopic

Gandpura patra taila is colourless or nearly colourless oil; with strong characteristic odour, and pungent taste. It is soluble in 6 parts of alcohol (70 per cent).

### IDENTITY, PURITY AND STRENGTH

**Identification** Take 2 ml of oil, add a drop of *ferric chloride solution*; a violet colour is produced.

<b>Specific gravity</b>	At 15.5 <sup>0</sup> , 1.180 to 1.187	Appendix 3.1.2
<b>Optical rotation</b>	At 25 <sup>0</sup> , 0 <sup>0</sup> to -1 <sup>0</sup>	Appendix 3.3
<b>Refractive index</b>	At 20 <sup>0</sup> , 1.537 to 1.539	Appendix 3.1.1
<b>Assay-</b>	Determination of esters (methyl salicylate C <sub>8</sub> H <sub>8</sub> O <sub>3</sub> ) - Not less than 98 per cent	
		Appendix 2.2.25

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Tikta, Kaṭu
<b>Guṇa</b>	:	Tīkṣṇa, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Pūtiḥara, Saṅgrāhī, Svedala, Uttejaka, Vātahara, Vātānulomaka, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Āmavāta (Rheumatism), Aṅkuśa kṛmi (hookworm infestation), Atisāra (diarrhoea), Dantaśūla (toothache), Gṛdhrasī (Sciatica), Jvara (fever), Nāḍīśūla (acute pain of nerve origin), Udarakṛmi (intestinal worms), Vātarakta (Gout)

**DOSE** - 0.1 to 0.5 ml

## **GOGHṚTA (Clarified Cow Butter)**

Goghṛta consists of clarified butter derived from cow's milk to which no colouring matter or preservative is added and contains not less than 76.0 per cent of milk fat by weight.

**SYNONYMS** : Ājya, Haviṣya, Sarpi, Ghṛta

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Ghee
Bengali	:	Gava Ghee, Gava Ghrit
English	:	Clarified butter
Gujrati	:	Ghee
Hindi	:	Gaya Ghee
Kannada	:	Tuppa
Malayalam	:	Pasu Ney, Pasu Nei
Marathi	:	Toop
Oriya	:	Gai Ghia
Punjabi	:	Ghee
Tamil	:	Nei
Telugu	:	Neyyi, Nei
Urdu	:	Gaya ka ghee

### **DESCRIPTION**

#### **a) Macroscopic**

Goghṛta is an oily liquid or a semi solid with granular texture; at room temperature, colour white to light yellow, odour rich and characteristic, taste pleasant. It is required to be free from animal fats, wax, mineral oil, vegetable oils and fats.

## IDENTITY, PURITY AND STRENGTH

<b>Specific gravity</b>	At 25 <sup>0</sup> ,	1.01995	Appendix 3.1.2
<b>Reichert Meissel Value</b>		24-28	Appendix 3.14
<b>Moisture</b>	Not more than 0.5 per cent,		Appendix 2.2.10
<b>Saponification Value</b>	Not more than 225		Appendix 3.7
<b>Iodine Value</b>	Not more than 35		Appendix 3.8
<b>Unsaponifiable matter</b>	Not more than 1.5 per cent,		Appendix 3.11
<b>Carotene</b>	Not less than		2000 IU
<b>Microbial limits</b>	Complies with API		Appendix 2.4
<b>Heavy Metals</b>	Complies with API		Appendix 2.3

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guna</b>	:	Guru, Snigdha, Mṛdu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Agnidīpana, Anabhiṣyandi, Āyusya, Balya, Cakṣuṣya, Dīpana, Hṛdya, Kāntiprada, Medhya, Ojovardhaka, Rasāyana, Rucya, Śleṣmavardhana, Snehana, Śukravardhaka, Tejobalakara, Tvacya, Vātapittaprasāmana, Vayaḥsthāpna, Viṣahara, Vṛṣya

**IMPORTANT FORMULATIONS** - Brāhmī ghr̥ta, Triphalā ghr̥ta, Aśoka ghr̥ta, Elādi ghr̥ta, Cāngerī ghr̥ta, Amṛtā ghr̥ta

**THERAPEUTIC USES** - Agnidagdha (fire burns), Amlapitta (hyperacidity), Apasmāra (Epilepsy), Aruci (tastelessness), Grahaṇī (colitis / ulcerative colitis), Jīrṇajvara (chronic fever), Karṇaśūla (otalgia), Kṣataḥṣṭīṇa (debility due to chest injury), Mada (intoxication), Mūrcchā (syncope), Śiraḥśūla (headache), Smṛtināśa (loss of memory), Śoṣa (emaciation), Unmāda (mania / psychosis), Viṣamajvara (intermittent fever), Visarpa (Erysepales), Viṣavikāra (disorders due to poison), Yoniśūla (pain in female genital tract)

**DOSE** - 5 to 20 ml

## GUḌA (Jaggery)

Guḍa is the product obtained by concentrating juice expressed from the stems of *Saccharum officinarum* L. (Fam. Poaceae) with or without prior purification of the juice, followed by cooling.

### REGIONAL LANGUAGE NAMES

Bengali	:	Guda
English	:	Jaggery
Hindi	:	Guda
Kannada	:	Bella
Malayalam	:	Sarkara
Marathi	:	Guda
Punjabi	:	Guda
Tamil	:	Vellam
Telugu	:	Bellam
Urdu	:	Guda

### DESCRIPTION

#### a) Macroscopic

It is light yellow to reddish brown solid, blocks or spherical solid forms or in the form of coarse granules with pleasant and characteristic odour. It does not show the presence of insects, vegetable debris or fibres when examined with naked eyes in daylight.

### IDENTITY, PURITY AND STRENGTH

<b>Loss on Drying</b>	Not more than 10 per cent,	Appendix 2.2.10
	(other than that of the liquid or semi-liquid variety)	
<b>Total ash</b>	Not more than 6 per cent,	Appendix 2.2.3
<b>Acid-insoluble ash</b>	Not more than 0.5 per cent,	Appendix 2.2.4

<b>Water-insoluble matter</b>	Not more than 2 per cent,	Appendix 2.2.11
<b>Total sugars</b>	Not less than 90 per cent,	Appendix 5.1.3.2
<b>Sucrose</b>	Not less than 60 per cent,	Appendix 5.1.7
<b>Sulphur dioxide concentration</b>	Not more than 70 ppm,	Appendix 5.1.6
<b>Heavy metals</b>	Complies with API	Appendix 2.3
<b>Microbial limits</b>	Complies with API	Appendix 2.4
<b>Pesticide residue</b>	Complies with API	Appendix 2.5

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guna</b>	:	Snigdha, Īṣatksāriya
<b>Vīrya</b>	:	Nātiśīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Svādukara, Rakta śodhaka, Nātipittajit, Kaphavṛddhikara, Vātaghna, Kṛmivṛddhikara, Balya, Vṛṣya, Medovṛddhikara

**IMPORTANT FORMULATIONS** - ārivādyāsava, Kumāryāsava, Madhukāsava

**THERAPEUTIC USES** - Vātaroga (disease due to Vāta doṣa), Daurbalya (weakness), Dhātukṣaya (tissue wasting)

**DOSE** - 5 to 30 g

## **JALA (Potable Water)**

Jala is a clear, colourless, odourless liquid, obtained from natural sources such as rain, river and lakes and rendered fit for human consumption; it complies with the standards described below, except where any special requirement is indicated for the Jala to be used.

**SYNONYMS** : Pānīya, Nīra, Udaka, Salila, Toya, Ambu, Daka, Ambha, Meghapuṣpa, Salira, Āpa, Vāri, Paya, Kīlāla, Puṣkara, Pātha, Vāruṇa, Varṣāmbu, Jīvana, Amṛta, Ghanarasa

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Pani
Bengali	:	Jal
English	:	Water
Gujrati	:	Paani
Hindi	:	Jala, Paani
Kannada	:	Neeru
Malayalam	:	Vellam
Marathi	:	Paani
Oriya	:	Paani
Punjabi	:	Paani
Tamil	:	Tannir
Telugu	:	Neeru, Neellu
Urdu	:	Pani

### **IDENTITY, PURITY AND STRENGTH**

<b>Colour (Hazen Units)</b>	Not more than 5
<b>Odour</b>	None
<b>Taste</b>	Agreeable and refreshing
<b>Turbidity (NTU)</b>	Not more than 5

<b>pH</b>	6.5-8.5	Appendix, 3.1.3
<b>Alkalinity (mg/l)</b>	Not more than	200
<b>Total hardness (as CaCO<sub>3</sub>) (mg/l)</b>	Not more than	300
<b>Iron (as Fe) (mg/l)</b>	Not more than	0.3 Appendix 5.2.5
<b>Chlorides (as Cl) (mg/l)</b>	Not more than	250 Appendix 5.2.12
<b>Residual, free Chlorine (mg/l)</b>	Not more than	0.2
<b>Dissolved Solids (mg/l)</b>	Not more than	500
<b>Calcium (as Ca) (mg/l)</b>	Not more than	75 Appendix 5.2.12
<b>Copper (as Cu) (mg/l)</b>	Not more than	0.05 Appendix 5.2.4
<b>Manganese (as Mn) (mg/l)</b>	Not more than	0.1
<b>Sulphate (as SO<sub>4</sub>) (mg/l)</b>	Not more than	200 Appendix 5.2.12
<b>Nitrate (as NO<sub>3</sub>) (mg/l)</b>	Not more than	45
<b>Fluoride (as F) (mg/l)</b>	Not more than	1
<b>Phenolic Compounds</b>		
<b>(as C<sub>6</sub>H<sub>5</sub>OH) (mg/l)</b>	Not more than	0.001 Appendix 5.1.1
<b>Heavy Metals</b>	Complies with API	Appendix 2.3
<b>Arsenic</b>	Complies with API	Appendix 2.3.1
<b>Microbial Limits</b>		
Coliform Organisms	Absent	Appendix 2.4
<i>E.coli</i>	Absent	
<b>Pesticides (mg/l)</b>	Absent	Appendix 2.5

## PROPERTIES AND ACTION

**Rasa** : Madhura

**Guna** : Laghu

**Vīrya** : Śīta

**Vipāka** : Madhura

**Karma** : Āhalādana, Ālasyahara, Balya, Buddhiprada, Dīpana, Hṛdya, Hṛtbalakara, Kaphahara, Klamahara, Medohara, Nidrāhara, Pācana, Pathya, Pittaśāmaka, Rucya, Santarpaṇa, Saumya, Śramahara, Tarpaṇa, Vātahara, Viśahara, Vṛṣya

**IMPORTANT FORMULATIONS** - Kvātha, Hima, Phāṅṅa, Āsava, Ariṣṭa

**THERAPEUTIC USES** - Ajīrṅa (indigestion), Bhrānti (mental confusion), Chardi (emesis), Dāha (burning sensation), Krodha (anger), Moha (delusion), Mukhaśoṣa (dryness of mouth), Mūrcchā (syncope), Śoṣa (emaciation), Tandrā (drowsiness), Tṛṣṅā (thirst), Vibandha (constipation), Viṣavikāra (disorders due to poison)

**DOSE** - Q.S.

## **KARPŪRA (Natural Camphor)**

Karpūra (Natural Camphor) is obtained from the leaves, chipped wood and roots of *Cinnamomum camphora* (L.) Nees & Eberm. (Fam. Lauraceae) and whole plant of *Ocimum kilimandscharicum* Guerke (Fam. Lamiaceae) by hydrodistillation process.

**SYNONYMS** : Ghanasāra, Candra, Himāhva, Himabāluka, Śitaśiva

### **REGIONAL LANGUAGE NAMES**

Assamese	:	Karpura
Bengali	:	Karpur
English	:	Camphor
Gujrati	:	Kapur
Hindi	:	Kapur
Kannada	:	Karpura
Malayalam	:	Karpuram, Chutakkapuram
Marathi	:	Kaapur
Oriya	:	Karpur
Punjabi	:	Kapura
Tamil	:	Karpuram
Telugu	:	Karpram, Karpuraamu
Urdu	:	Riyaahi Kapphur, Kaaphoraa

### **DESCRIPTION**

#### **a) Macroscopic**

Colourless or white crystals, granules or crystalline masses; odour penetrating and characteristic; taste pungent, aromatic, and followed by a sensation of cold. Readily pulverisable in the presence of a little alcohol (95 per cent), chloroform, or solvent ether.

## IDENTITY, PURITY AND STRENGTH

**Identification** Volatilises at ordinary temperature and readily burns with a smoky flame

**Melting Range** 174<sup>0</sup> to 179<sup>0</sup> Appendix 3.2.1

**Specific Optical Rotation** + 41<sup>0</sup> + 43<sup>0</sup> Appendix 3.3.B

(Synthetic Camphor is the optically inactive, racemic form),

**Non-volatile Matter** Not more than 0.05 per cent

**Pesticide residue** Complies with API Appendix 2.5

## ASSAY

Karpūra contains not less than 96.0 per cent of Camphor (C<sub>10</sub> H<sub>16</sub>O), when analysed as below:

Weigh accurately about 0.2 g and dissolve in 25 ml of aldehyde-free alcohol in a 300 ml flask. Slowly add while stirring 75 ml of dinitrophenylhydrazine solution and heat on a water bath for four hours under reflux. Remove alcohol by distillation, allow to cool, dilute to 200 ml with a 2 per cent v/v solution of sulphuric acid. Set aside for twentyfour hours, filter in tared Gooch crucible, and wash the precipitate with successive quantities of 10 ml of cold water until the washings are neutral to litmus paper. Dry to constant weight at 80<sup>0</sup> and weigh.

Each g of precipitate is equivalent to 0.458 g of C<sub>10</sub> H<sub>16</sub>O.

## PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṭu, Madhura

**Guṇa** : Laghu, Tīkṣṇa, Snigdha

**Vīrya** : Śīta

**Vipāka** : Kaṭu

**Karma** : Cakṣuṣya, Durgandhanāśaka, Hr̥dya, Lekhana, Madakāraka, Medhya, Pācana, Tridoṣahara, Vedanāsthāpana, Vṛṣya

**IMPORTANT FORMULATIONS** - Karpūra rasa, Karpūrāsava, Arka Kapūra, Khadirādivatī, Mrdvīkārīṣṭa

**THERAPEUTIC USES** - Ādhmāna (flatulence with gurgling sound), Agnimāndya (digestive impairment), Āmavāta (Rheumatism), Aruci (tastelessness), Atisāra (diarrhoea), Dāha (burning sensation), Dantapūya (Pyorrhoea), Dantaśūla (toothache), Jīrnapratiśyāya (chronic sinusitis), Kaṇḍū (itching), Kanṭharoga (disease of throat), Kāsa (cough), Klaibya (male impotence), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Medoroga (obesity), Pārśvaśūla (intercostal neuralgia and pleurodynia), Sandhiśūla (joint pain), Śvāsa (Asthma), Trṣṇā (thirst), Tvakroga (skin diseases), Vicārikā (eczema), Viṣavikāra (disorders due to poison), Viśūcikā (Gastro-enteritis with piercing pain), Vṛkkaroga (renal disorder)

**DOSE** - 125 to 375 mg

## LAVAᅅGA TAILA (Clove Oil)

Lavaᅅga Taila is the volatile oil obtained by expression or steam distillation from dried, unopened flower buds of *Syzygium aromaticum* Merril & Perry Syn. *Eugenia caryophyllus* (Spreng) Sprague (Fam. Myrtaceae).

**SYNONYMS** : Śriprasūna, Devakusuma

### REGIONAL LANGUAGE NAMES

Assamese	:	Lavang, Lan, Long
Bengali	:	Lavang
English	:	Clove
Gujrati	:	Lavang, Laving
Hindi	:	Lavanga, Laung
Kannada	:	Lavanga enne
Kashmiri	:	Rung
Malayalam	:	Karampu, Karayampoovu, Grampu
Marathi	:	Lavang
Oriya	:	Labanga
Punjabi	:	Laung, Long
Tamil	:	Kirambu Tailam
Telugu	:	Lavangalu
Urdu	:	Qarnful, Laung

### DESCRIPTION

#### a) Macroscopic

A colourless or pale yellow aromatic liquid when freshly obtained, becoming darker and thicker by ageing or on exposure to air; odour and taste characteristic.

## IDENTITY, PURITY AND STRENGTH

<b>Specific gravity</b>	1.047-1.060	Appendix 3.1.2
<b>Optical rotation</b>	0 <sup>0</sup> to -1.5 <sup>0</sup>	Appendix 3.3.A
<b>Refractive index</b>	1.528 to 1.537	Appendix 3.1.1
<b>Weight per ml</b>	1.041 to 1.054 g	Appendix 3.1.2
<b>Microbial limits</b>	Complies with API	Appendix 2.4
<b>Pesticide residue</b>	Complies with API	Appendix 2.5

## ASSAY

It contains not less than 85per cent, w/v of phenolic substances, chiefly eugenol, C<sub>10</sub>H<sub>12</sub>O<sub>2</sub> when analysed as follows:

Pipette 10 ml of clove oil in a Cassia flask, the neck of which is graduated from 0 to 6 ml at intervals of 0.1 ml. Add 75 ml of potassium hydroxide solution. Shake the mixture for five min. and heat for ten min. in boiling water, shaking the flask at least three times during heating. Cool to room temperature and when liquids have completely separated, add sufficient *potassium hydroxide* solution to raise the lower level of the oily layer with in the graduated portion of the flask. Keep aside for 18 hours and read the volume of oily layer. Not more than 1.5 ml of oil separates indicating the presence of not less than 85 per cent of w/v of total eugenol.

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guna</b>	:	Snigdha, Laghu
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Agnikṛt, Kaphaghna, Mukhaśodhaka, Durgandhanāśana, Vaktrakledanāśana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Tr̥ṣṇā (thirst), Garbhiṅīchardi (morning sickness), Dantaveṣṭaroga (gingivitis), Kaphajanya pīḍā (pain due to Kapha doṣa)

**DOSE** - 2 to 6 drops

## MADHU (Honey)

Madhu is a naturally occurring sweet fluid produced by the honeybees by enzymatic transformation of floral nectar ingested by them and deposited in the cells of hives or combs. The Indian species of honeybees belong to the genus *Apis* of which the common ones are *A. indica*, *A. dorsata* and *A. florea* (Fam. Apidae). In commerce, Madhu may be collected from naturally occurring hives in groves and forests, by pressing and squeezing in the traditional method or may be extracted by centrifugation of the combs containing honey in artificially maintained apiaries. Both have to be filtered before storage or use.

**SYNONYMS :** Puṣpāsava, Puṣparasa, Kṣaudra, Mādhvīka

### REGIONAL LANGUAGE NAMES

Assamese	:	Mahu
Bengali	:	Madhu, Mau
English	:	Honey
Gujrati	:	Madh
Hindi	:	Madhu, Sahad
Kannada	:	Jentuppa
Malayalam	:	Then
Marathi	:	Madh
Oriya	:	Mahu
Punjabi	:	Sahad
Tamil	:	Then
Telugu	:	Tene
Urdu	:	Sahad

## DESCRIPTION

### a) Macroscopic

A thick, syrupy, translucent yellow to yellowish brown fluid; taste sweet with a pleasant odour and flavour. When poured on to a tray as a thin layer, no impurities like mould, dirt, beeswax, insect fragments, plant debris or any other objectionable foreign matter should be visible to the naked eye in daylight.

## IDENTITY, PURITY AND STRENGTH

<b>Wt. per ml at 250<sup>0</sup></b>	Not less than	1.35		Appendix 3.1.2
<b>Moisture content (LOD)</b>	Not more than	25	per cent by wt.	Appendix 2.2.10
<b>Reducing sugars</b>	Not more than	65	per cent by wt.	Appendix 5.1.3.1
<b>Sucrose</b>	Not more than	5	per cent by wt.	Appendix 5.1.7
<b>Fructose-Glucose ratio</b>	Not less than	1	per cent by wt.	Appendix 5.1.7
<b>Ash</b>	Not more than	0.5	per cent by wt.	Appendix 2.2.3
<b>Acidity</b>				
<b>(expressed as Formic acid)</b>	Not more than	0.2	per cent by wt.	Appendix 2.2.22
<b>Fiehe's Test</b>	Negative			Appendix 5.1.4
<b>Aniline Chloride Test</b>	Negative			Appendix 5.1.5
<b>Heavy metals</b>	Complies with API			Appendix 2.3
<b>Microbial limits</b>	Complies with API			Appendix 2.4
<b>Pesticide residue</b>	Complies with API			Appendix 2.5

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura, Kaṣāya
<b>Guṇa</b>	:	Laghu (Suśruta), Guru (Caraka), Rūkṣa, Picchila, Yogāvahī
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Agnidīpana, Cakṣuṣya, Pittapraśamana, Prasādana, Ropaṇa, Sandhāna, Śleṣmapraśamana, Śodhana, Tridoṣapraśamana, Vātapittaghna, Viṣaghna

**IMPORTANT FORMULATIONS** - Madhūkāsava, Cyavanaprāśa, Kuṭajāvāleha

**THERAPEUTIC USES** - Arśa (piles), Atisāra (diarrhoea), Chardi (emesis), Dāha (burning sensation), Hikkā (hiccup), Kāsa (cough), Kṛmi (worm infestation), Kṣata (wound), Kṣaya (pthisis), Kuṣṭha (Leprosy / diseases of skin), Medoroga (obesity), Prameha (metabolic disorder), Raktapitta (bleeding disorder), Raktavikāra (disorders of blood), Śvāsa (Asthma), Tṛṣṇā (thirst), Viṣavikāra (disorders due to poison)

**DOSE** - DOSE- 1 to 10 ml  
**STORAGE** -Should be stored preferably at 200 to 250 away from heat; should not be refrigerated.

## PEPPERMINT- SATVA (Menthol)

Peppermint - Satva is the natural laevo-rotatory menthol obtained from various species of *Mentha* (Fam. Lamiaceae).

**Other Common Name:** Peppermint

### REGIONAL LANGUAGE NAMES

### DESCRIPTION

#### a) Macroscopic

Colourless, hexagonal crystals, usually needle-like, or in fused masses or crystalline powder; odour, pleasant and peppermint-like; taste, warm and aromatic followed by a cool sensation.

### IDENTITY, PURITY AND STRENGTH

**Acidity or Alkalinity** A solution in alcohol is neutral to litmus.

**Non-volatile matter** Not more than 0.05 per cent,

**Melting range** Between 42<sup>0</sup> and 44<sup>0</sup> Appendix 3.2.1

**Specific optical rotation** Between -49<sup>0</sup> and -50<sup>0</sup> Appendix 3.3.B

**Congealing range** Between 27<sup>0</sup> and 28<sup>0</sup> Appendix 3.2.2

on prolonged stirring the temperature rises between 30<sup>0</sup> and 32<sup>0</sup>

### PROPERTIES AND ACTION

**Rasa** : Tikta, Kaṭu

**Guṇa** : Tīkṣṇa, Snigdha, Laghu, Viśada

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : Dīpana, Kaphahara, Mukha-śodhana, Pācana, Pūtiḥara, Śūlapraśamana, Uttejaka, Vātahara, Vedanāsthāpana

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ajīrṇa (indigestion), Dantaśūla (toothache), Jīrṇa jvara (chronic fever), Kaphaja vikāra (disorders due to Kapha doṣa), Mukharoga (disease of mouth), Udaraśūla (pain in the abdomen), Śūla (pain / colic), Vraṇa (ulcer)

**DOSE** - 10 to 30 mg

**STORAGE** -Store in well-closed container at a temperature not above 300

## ŚARKARĀ (Sugar)

Śarkarā is a powder prepared from sugarcane juice by open pan process.

**SYNONYMS :** Matsyṅdikā, Sitā, Sikatā, Sitopalā, Śuklā, Subhrā

### REGIONAL LANGUAGE NAMES

Assamese	:	Chini
Bengali	:	Chini
English	:	Sugar
Gujrati	:	Shaakar
Hindi	:	Chini
Kannada	:	Sakkare
Malayalam	:	Panchasara
Marathi	:	Sakhara
Oriya	:	Chini
Punjabi	:	Chini
Tamil	:	Sarkkarai
Telugu	:	Panchadhara, Chekkera
Urdu	:	Sakkara

### DESCRIPTION

#### a) Macroscopic

A brown to yellowish brown powder with sweet taste. When a representative sample is spread in a thin layer, it should be free from dirt, filth, iron filings and similar foreign matter.

## IDENTITY, PURITY AND STRENGTH

<b>Moisture content</b>	Not more than 1.5 per cent by wt.	Appendix 2.2.10
<b>Acid -Insoluble Ash</b>	Not more than 0.7 per cent by wt.	Appendix 2.2.4
<b>Sucrose</b>	Not more than 93 per cent by wt.	Appendix 5.1.7
<b>Sulphur dioxide</b>	Absent	Appendix 5.1.6
<b>Calcium Oxide</b>	Not more than 100 (mg/100g)	Appendix 2.3.9
<b>Heavy Metal</b>	Complies with API	Appendix 2.3
<b>Microbial Limit</b>	Complies with API	Appendix 2.4
<b>Pesticide Residue</b>	Complies with API	Appendix 2.5
<b>Storage</b>	Should be stored in air tight container.	

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Caḡṣuṣya, Dhātuvardhaka, Hṛdya, Pittahara, Vātahara, Vṛṣya

## IMPORTANT FORMULATIONS - Cyavanaprāśa, Vāsāvāleha, Kaṇṭakāryavāleha

**THERAPEUTIC USES** - Arśa (piles), Aruci (tastelessness), Bhrama (vertigo), Chardi (emesis), Dāha (burning sensation), Daurbalya (weakness), Jvara (fever), Kṛmi (worm infestation), Kṣata (wound), Madātyaya (alcoholism), Moha (delusion), Mūrcchā (syncope), Raktapitta (bleeding disorder), Raktasruti (Haemorrhage), Raktavikāra (disorders of blood), Śrama (fatigue / lethargy), Tṛṣṇā (thirst), Vātarakta (Gout), Viṣavikāra (disorders due to poison)

**DOSE** - 5 to 30 g

## SARŞAPA TAILA (Mustard Oil)

Sarşapa Taila consists of the fixed oil expressed from clean and healthy seeds of *Brassica campestris* L. (Fam. Brassicaceae), cultivated widely in India.

**SYNONYMS** : Kaṭusneha, Kaṭutaila

### REGIONAL LANGUAGE NAMES

Assamese	:	Sariah
Bengali	:	Sarishaa
English	:	Mustard oil
Gujrati	:	Sarasiya Tail
Hindi	:	Kaduva Tela
Kannada	:	Saasve, Saasive enne
Malayalam	:	Kadukuenna
Marathi	:	Shirsiche Tela
Oriya	:	Sorisha Tela
Punjabi	:	Sarso ka Saka
Tamil	:	Kaduguennai
Telugu	:	Aavanune
Urdu	:	Rogana Sarsafa

### DESCRIPTION

#### a) Macroscopic

A pale yellow oil with a slightly pungent recalling sulphurous odour.

### IDENTITY, PURITY AND STRENGTH

**Specific gravity at 15<sup>0</sup>** 0.9140-0.9206

Appendix 3.1.2

**Refractive Index at 40<sup>0</sup>** 1.4630-1.4670

Appendix 3.1.1

<b>Essential Oil content</b>	Not less than	0.4%	Appendix 2.2.12
<b>Acid value</b>	Not more than	6.0	Appendix 3.9
<b>Iodine value</b>	Between	115 and 125	Appendix 3.8
<b>Saponification value</b>	Between	190 and 198	Appendix 3.7
<b>Unsaponifiable matter</b>	Not more than	1.5 per cent by wt.	Appendix 3.11
<b>Test for Sulphur</b>	Positive		Appendix 5.1.6
<b>Test for Argemone oil</b>	Negative		Appendix 2.2.18
<b>Heavy Metals</b>	Complies with API		Appendix 2.3
<b>Microbial limits</b>	Complies with API		Appendix 2.4
<b>Pesticide residue</b>	Complies with API		Appendix 2.5

### PROPERTIES AND ACTION

<b>Rasa</b>	:	Tikta, Kaṭu
<b>Guṇa</b>	:	Snigdha, Tīkṣṇa, Laghu
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Garbhāśayottejaka, Kaphahara, Kṛmighna, Lekhana, Mūtrajanana, Snehana, Tvacya, Vātahara, Vedanāsthāpana, Vidāhi

**IMPORTANT FORMULATIONS** - Unmatta Taila, Pancānana Taila, Sindūrādyā Taila, Jīrakādyā Taila, Arkaman ḥṣilā Taila

**THERAPEUTIC USES** - Aṅgamarda (body ache), Arśa (piles), Dantapūya (Pyorrhoea), Duṣṭakṛmi (worm infestation), Karṇaroga (disease of ear), Kaṇḍū (itching), Koṭha (ringworm / Impetigo / Erythema), Kṛmi (worm infestation), Kuṣṭha (Leprosy / diseases of skin), Netraroga (diseases of the eye), Plīha roga (splenic disease), Śīroroga (disease of head), Slīpada (Filariasis), Śvetakuṣṭha (Leucoderma), Tvakroga (skin diseases), Vāta vikāra (disorder due to Vāta doṣa), Vraṇa (ulcer)

**DOSE** - 5 to 10 ml

**STORAGE**- Should be stored in well closed containers away from heat, preferably between 200 to 250.

## TAILAPARNA TAILA (Eucalyptus Oil)

Tailaparna Taila is the essential oil obtained by steam distillation of the fresh leaves of *Eucalyptus globulus* Labill or from other species of *Eucalyptus* (Fam. Myrtaceae).

**SYNONYMS** : Sugandhapatra taila, Ekalipta, Nilagiri taila, Tailaparna

### REGIONAL LANGUAGE NAMES

English	:	Eucalyptus
Gujrati	:	Nilgiri tail
Hindi	:	Nilagiri, Yukeliptus
Kannada	:	Nilagiri enne
Malayalam	:	Nilagiri
Marathi	:	Nilagiri Tela
Oriya	:	Nilagiri
Punjabi	:	Eucalyptus
Tamil	:	NilagiriTailam
Telugu	:	Nilagiri, Eucalyptus
Urdu	:	Rogan Eucalyptus

### DESCRIPTION

#### a) Macroscopic

A colourless to pale-yellow liquid; odour, aromatic and camphoraceous; taste, pungent and camphoraceous, followed by a cold sensation.

### IDENTITY, PURITY AND STRENGTH

<b>Wt. per ml at 25<sup>0</sup></b>	0.901 to 0.920g	Appendix 3.1.2
<b>Optical rotation</b>	+5 <sup>0</sup> to +10 <sup>0</sup>	Appendix 3.3
<b>Refractive Index (at 25<sup>0</sup>)</b>	1.457 to 1.469	Appendix 3.1.1

**Assay**

Not less than 60.0 per cent,  
w/w of Cineole C<sub>10</sub>H<sub>18</sub>O

Appendix 2.2.21

**PROPERTIES AND ACTION**

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya
<b>Guna</b>	:	Laghu, Snigdha
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Anulomana, Dīpana, Durgandhanāśaka, Kapha niḥsāraka, Kṛmighna, Mūtrala, Pācana, Pratiḍṣaka, Pūtiḥara, Śūlaghna, Svedajanana, Uttejaka, Vātahara, Vedanāsthāpaka, Viṣamajvarapratibandhaka

**IMPORTANT FORMULATIONS** - Pañcagūṇa Taila

**THERAPEUTIC USES** - Agnimāndya (digestive impairment), Āmavāta (Rheumatism), Bāla pratiśyāya (sinusitis in children), Bastiśoṭha (cystitis), Duṣṭa vranā (non-healing ulcer), Jīrṇapūyāmeḥa (chronic pyaemia), Jvara (fever), Kāsa (cough), Kṛmi (worm infestation), Pīnasa (chronic rhinitis / sinusitis), Pratiśyāya (coryza), Sandhivāta (arthritis due to Vāta doṣa), Śiraḥśūla (headache), Sūtikā Jvara (puerperal fever), Śvāsa (Asthma), Tvakroga (skin diseases), Yakṣmā (Tuberculosis)

**DOSE** - 1 to 5 drops

**STORAGE**- Eucalyptus Oil should be kept in well-filled, well-closed container, protected from light, and stored in cool place.

## TILA TAILA (Sesamum Oil)

Tila Taila is a fixed oil expressed from clean and healthy seeds of *Sesamum indicum* L. (Fam. Pedaliaceae) widely cultivated in India. It has light golden colour with pleasant aroma.

**SYNONYMS :** Taila

### REGIONAL LANGUAGE NAMES

Assamese	:	Tila taila
Bengali	:	Tilataila
English	:	Sesamum oil, Gingely oil
Gujrati	:	Tal taila
Hindi	:	Til tela, Tilli tela
Kannada	:	Ellu, Wollelu, ellenne
Malayalam	:	Ellu
Marathi	:	Tila tela
Oriya	:	Rasi tel
Punjabi	:	Tila tail
Tamil	:	Nalennai
Telugu	:	Nuvvulanune
Urdu	:	Rogana taila

### DESCRIPTION

#### a) Macroscopic

A light golden coloured oil with pleasant aroma. Slightly soluble in *alcohol*, miscible with chloroform, solvent ether, light petroleum and carbon disulphide. Does not solidify when cooled to 0°.

## IDENTITY, PURITY AND STRENGTH

<b>Specific gravity</b>	0.9160-0.9190	Appendix 3.1.2
<b>Refractive index (at 40°)</b>	1.4650 to 1.4665	Appendix 3.1.1
<b>Wt. per ml (at 25°)</b>	0.916 to 0.921g	Appendix 3.1.2
<b>Acid value</b>	Not more than 2.0	Appendix 3.9
<b>Iodine value</b>	Between 103 and 116	Appendix 3.8
<b>Saponification value</b>	Between 188 and 195	Appendix 3.7
<b>Unsaponifiable matter</b>	Not more than 1.5 per cent	Appendix 3.11
<b>Cottonseed oil</b>	Absent	Appendix 2.2.19
<b>Microbial limits</b>	Complies with API	Appendix 2.4
<b>Pesticide residue</b>	Complies with API	Appendix 2.5

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Madhura
<b>Guṇa</b>	:	Snigdha, Guru, Sūkṣma, Vyavāyī, Viśada, Sara, Vikāśī
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	Balya, Cakṣuṣya, Dīpana, Garbhāśaya Śodhana, Keśya, Medhya, Sandhānīya, Snehana, Stanyajanana, Tvak prasādana, Vātahara, Vraṇaropaṇa, Vraṇaśodhana, Vṛṣya

**IMPORTANT FORMULATIONS** - Nārāyana Taila, Mahālākṣādi Taila, Balā Taila

**THERAPEUTIC USES** - Agnidagdha (fire burns), Ardita (facial palsy), Bhagna (fracture), Dantaśūla (toothache), Kaṇḍū (itching), Karṇaśūla (otalgia), Kṛmi (worm infestation), Daurbalya (weakness), Pakṣāghāta (Paralysis / Hemiplegia), Pūyameha (urinary infection), Śiraḥśūla (headache), Śūla (pain / colic), Vātavikāra (disorders due to Vāta Doṣa), Vraṇa (ulcer)

**DOSE** - 5 to 20 ml

## YAVĀNĪ SATVA (Thymol)

Yavānī satva (Thymol) is a crystalline phenolic component, chemically 2-isopropyl-5-methylphenol) obtained from the volatile oil of *Thymus vulgaris* L. and *Trachyspermum ammi* (L.) Sprague (Fam. Lamiaceae).

**SYNONYMS :** Yamānī ghanasāra

### REGIONAL LANGUAGE NAMES

Assamese	:	Ajaina satva
Bengali	:	Yamaani sattva
English	:	Thymol
Gujrati	:	Yavaan sara, Javaain sara
Hindi	:	Ajvayana sat, Ajavaan phulla
Marathi	:	Ovaa phul
Oriya	:	Juaani saram
Punjabi	:	Ajvaayan kaa Sat
Telugu	:	Vaamu satva
Urdu	:	Sat-ajavayan

### DESCRIPTION

#### a) Macroscopic

Colourless crystals or white, crystalline powder; odour pungent and aromatic, thyme like; taste, pungent and aromatic.

### IDENTITY, PURITY AND STRENGTH

<b>Melting range</b>	Between	48 <sup>0</sup> and 51 <sup>0</sup>	Appendix 3.2.1
<b>Non-volatile matter</b>	Not more than	0.05 per cent	

**Acidity or Alkalinity** 4.0 w/v solution in alcohol (50 per cent) is neutral to litmus solution

## ASSAY

Thymol contains not less than 99 per cent of C<sub>10</sub>H<sub>14</sub>O, when analysed as below:

Weigh accurately about 0.1 g, transfer to an iodine flask and dissolve in 25 ml of 1N sodium hydroxide. Add 20 ml of hot dilute hydrochloric acid and immediately titrate with 0.1 N bromine (1 to 2 ml). Warm the solution to about 75°, add two drops of methyl orange solution and continue the titration slowly, swirling vigorously after each addition, When the colour of the methyl orange is bleached, add two drops of 0.1 N bromine, shake well, add one drop of methyl orange solution and shake vigorously. If the solution is red, continue the titration, drop wise and with shaking until the red colour does not appear. Repeat the alternate addition of 0.1 N bromine and methyl orange solution until the red colour is discharged after the addition of the methyl orange solution.

Each ml of 0.1 N bromine is equivalent to 0.003755 g of C<sub>10</sub>H<sub>14</sub>O.

<b>Microbial limits</b>	Complies with API	Appendix 2.4
<b>Pesticide residue</b>	Complies with API	Appendix 2.5

## PROPERTIES AND ACTION

<b>Rasa</b>	:	Kaṭu, Tikta
<b>Guṇa</b>	:	Laghu, Rūkṣa, Tīkṣṇa
<b>Vīrya</b>	:	Uṣṇa
<b>Vipāka</b>	:	Kaṭu
<b>Karma</b>	:	Dīpana, Lekhana, Pācana, Partidūṣaka, Śleṣmaghna, Śūlaghna, Uttejaka, Vātānulomana, Vedanāśāmaka, Viṣaghna

**IMPORTANT FORMULATIONS** - Used as single drug

**THERAPEUTIC USES** - Ajīrṇa (indigestion), Āmavāta (Rheumatism), Ānāha (distension of abdomen due to obstruction to passage of urine and stools), Aṅkuśa kṛmi (hookworm infestation), Aruci (tastelessness), Bālātisāra (infantile diarrhoea), Chardi (emesis), Dantaśūla (toothache), Gulma (abdominal lump), Kṛmi (worm infestation), Mūtrakṛcchra (dysuria), Plīhodara (splenomegaly), Sandhiśūla (joint pain), Śiraḥśūla (headache), Tvakroga (skin diseases), Udara (diseases of abdomen), Udaraśūla (pain in the abdomen), Vātārśa (dry piles), Visūcikā (Gastro-enteritis with piercing pain)

**DOSE** - 25 to 125 mg

**STORAGE:** Store in tightly-closed, light-resistant containers.