

# **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 Ghr̥ta

**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, Viṣajavrana, 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, Kṣataksaya, 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, Mārka, 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.

-

### 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, Prasāriṇi 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, Bhodroparnni
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**

<b>Rasa</b>	:	Madhura, Amla, Kaṣāya
<b>Guṇa</b>	:	Guru, Snigdha, Sara
<b>Vīrya</b>	:	Śīta
<b>Vipāka</b>	:	Madhura
<b>Karma</b>	:	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.**

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**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, Indravaruni, Tuntikai, Kadukavadi
Kashmiri	:	--
Malayalam	:	Valiyakattuvell, Valiya Pekkumatti, Cheeyakattuvellari
Marathi	:	Endrayāna, Indravarāna
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, Indravārunīkā, 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** - Atīsāra, 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>Guna</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 Virajāīya

**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**

**Rasa** : Kaṭu, Tikta, Kaṣāya

**Guṇa** : Tīkṣṇa

**Vīrya** : Uṣṇa

**Vipāka** : Kaṭu

**Karma** : 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-Methoxyfuranone (2", 3" 7 : 8), flavone and 5-Methoxy-3'4' Methylene dioxyfuranone (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 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
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>Guṇa</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 Guṭikā

**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, Kuṭajāvaleha, 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

<b>Rasa</b>	:	Kaṭu, Tikta, Kaṣāya, Madhura
<b>Guṇa</b>	:	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.

## NĀGAKĒŚARA (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 the 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>Gūṇa</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

**Guna** : 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.

## PRIYAṄGU (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, Bṛṃhaṇa, 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)

Śāṅkhapuṣpī 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	:	Śāṅkhuṣpā, 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 Śaṅkhaṣpī

## 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, Atīsāra

**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; perisperm 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, Tulasī
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, Dādhika 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.