THE AYURVEDIC PHARMACOPOEIA OF INDIA

PART- I
VOLUME – III

GOVERNMENT OF INDIA
MINISTRY OF HEALTH AND FAMILY WELFARE
DEPARTMENT OF ISM & H

CONTENTS

MONOGRAPHS

LEGAL NOTICES

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

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

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

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

GENERAL NOTICES

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

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

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

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

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

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

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

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

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

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

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

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

The term "Foreign Matter" is used to designate any matter, which does not form part of the drug as defined in the monograph. Vegetable drugs used as such or in formulations, should be duly identified and authenticated and be free from insects,

pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

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

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

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

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

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

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

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

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

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

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

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

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

Percentage of alcohol - All statements of percentage of alcohol (C_2H_5OH) refer to percentage by volume at 15.56 °C.

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

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

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

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

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

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

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

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

The following table indicates the meaning of such terms :-

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

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

Doses – The doses mentioned in each monograph are in metric system of weights, which are the approximate conversions from classical weights mentioned in Ayurvedic

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

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

The abbreviations commonly employed are as follows:

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

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

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

ĀḌHAKĪ (Root)

Āḍhakī consists of dried root of *Cajanus cajan* (Linn.) Millsp. (Fam. Fabaceae); an annual or perennial, erect shrub, 1.2-3.1 m high, cultivated almost throughout as a pulse crop upto an altitude of 1830 m in the Himalayas. It is mainly grown in Uttar Pradesh, Madhya Pradesh, Bihar, Maharashtra and Tamil Nadu.

SYNONYMS

Sanskrit	:	Tuvarī
Assamese	:	Ruharmah
Bengali	:	Adar, Aaharee, Arhar
English	:	Pigeon Pea, Red Gram
Gujrati	:	Tuvar, Tuvera, Tur, Tuver
Hindi	:	Arahad, Arahar
Kannada	:	Togari, Tovaree, Togari, Kari Uddu, Togaribele
Kashmiri	:	--
Malayalam	:	Thuvara, Tuvara
Marathi	:	Toor, Toori, Tura
Oriya	:	Harada, Kandulagachha
Punjabi	:	Arhar
Tamil	:	Tovarai, Thovary, Adagi Tuvari, Thuvarai, Tuvarai, Thovarai
Telugu	:	Kandulu, Kadulu
Urdu	:	Arhar

DESCRIPTION

a) Macroscopic

Root stout, branched, cylindrical, tapering having a number of secondary roots and rootlets, surface rough due to transversely running light brown lenticels, cream to light yellow externally, dirty white internally; fracture, hard and fibrous; odour, characteristic;

taste, acrid.

b) Microscopic

Mature root shows 3-7 layers of cork of rectangular, tangentially elongated, thin walled cells, interrupted at certain places by lenticels; secondary cortex consists of outer 3-7 layers of thin-walled, somewhat tangentially elongated parenchymatous cell, followed by a row of oval to elongated stone cells, thick-walled, elliptical, with wide lumen; some adjoining parenchymatous cells contain prismatic crystals of calcium oxalate; in the inner region strands of isolated or groups of 2-12 lignified fibres present; secondary phloem consists of sieve elements, fibres and phloem parenchyma, traversed by phloem rays; phloem fibres lignified, variable in size with pointed tips and wide lumen scattered throughout phloem region in single or in groups; some stone cells, mostly in groups and possessing yellowish contents, also found scattered in inner phloem; phloem rays numerous, uni to triseriate and straight; ray cells rectangular to rounded in inner phloem region, rounded to tangentially elongated in outer phloem; cambium consisting of 4-6 rows of thin-walled, narrow, tangentially elongated colourless cells; xylem occupies bulk of root and composed of vessels, tracheids, xylem parenchyma and fibres; vessels of varying sizes having pitted walls occur in small groups of 2-3 and also as occasionally isolated units in larger groups of 4-7; fibres short with wide lumen and pointed tips; parenchyma thin walled and rectangular; xylem rays numerous, uni to triseriate, biseriate being more common, straight, 3-25 cells high, radially elongated.

Powder - Cream coloured; shows numerous pieces of pitted vessels, fibres, cork cells, sclereids and a few prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Ethylacetate : Methanol (90 : 10) *v/v* shows under U.V. (366 nm) six fluorescent zones at Rf. 0.06, 0.20, 0.69, 0.80, 0.90 (all blue) and 0.92 (yellow). On spraying with 5% Methanolic Sulphuric acid six spots appear on heating the plate at 105°C for about ten minutes at Rf. 0.06, 0.22, 0.30, 0.80, 0.88 and 0.92 (all grey).

CONSTITUENTS - Saponins and Reducing Sugars.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Madhura
Guṇa	:	Rūkṣa, Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vātakara, Pittahara, Kaphahara, Grāhī, Varṇya, Rucikara, Viṣaghna

IMPORTANT FORMULATIONS - Mahā Pañcagavya Ghṛta, Kāṅkāyana Guṭikā

THERAPEUTIC USES - Raktavikāra

DOSE - 2-6 g of the drug in powder form

AGNIMANTHA (Root)

Agnimantha consists of dried mature roots of *Clerodendrum phlomidis* Linn. (Fam. Verbenaceae); a large shrub or small tree reaching upto 9 m in height, with more or less pubescent branches, found in dry parts throughout the country.

SYNONYMS

Sanskrit	:	Gaṇikārikā , Jayantī, Jayā
Assamese	:	--
Bengali	:	Ganiyari, Arni, Goniari
English	:	--
Gujrati	:	Arani, Aranimula, Arni
Hindi	:	Urni
Kannada	:	Taggi, Taggi Beru
Kashmiri	:	--
Malayalam	:	Munja
Marathi	:	Takalimula
Oriya	:	Ganiary
Punjabi	:	--
Tamil	:	Tazhutazhai
Telugu	:	Taluki
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Drug pieces 7-15 cm long, 0.2 -3.0 cm thick, occasionally branched, cylindrical, tough, yellowish-brown externally, bark thin, occasionally easily peeled, outer surface rough due to exfoliation, wood light yellow, fracture hard; taste, slightly astringent.

b) Microscopic

Root shows exfoliating cork, consisting of 10-15, occasionally more, rows of tangentially elongated, thin-walled cells; secondary cortex consists of round to oval parenchymatous cells, a few containing rhomboidal crystals of calcium oxalate; secondary phloem consists of isodiametric, thin-walled, parenchymatous cells, a few of them containing rhomboidal crystals of calcium oxalate; phloem rays distinct, consisting of radially elongated cells; secondary xylem shows a wide zone, consisting of usual elements, all being lignified; vessels found in single as well as in groups of 2-3, scattered throughout xylem region; xylem parenchyma simple pitted, squarish wide lumen; xylem rays 1-5 seriate, consisting of radially elongated cells; rhomboidal crystal of calcium oxalate packed in xylem parenchyma and xylem rays; abundant simple, round starch grains measuring 6-17 μ in dia., found scattered throughout.

Powder - Dull yellow; shows fragments of cork cells, small, pointed, aseptate, lignified fibres, simple, pitted vessels, lignified cells packed with rhomboidal crystals of calcium oxalate and numerous simple, round to oval starch grains having narrow hilum, measuring 6-11 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (85 : 15) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.10 (light yellow), 0.38, 0.59 and 0.90 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.10, 0.38,

0.59, 0.78, 0.87 and 0.98 (all yellow). On spraying with 5% MethanolicPhosphomolybdic acid reagent and heating the plate for about ten minutes at 105°C six spots appear at Rf. 0.10, 0.38, 0.59, 0.78, 0.87 and 0.98 (all grey).

CONSTITUENTS - Sterols

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Śvayathuhara, Vātakara

IMPORTANT FORMULATIONS - Daśamūlāriṣṭa, Daśamūla Kvātha Cūrṇa, Indukānta Ghṛta, Dhānvantara Ghṛta, Gorocanādi Vaṭī, Nārāyaṇa Taila

THERAPEUTIC USES - Śotha, Pāṇḍu, Arśa, Vātavikāra, Vibandha, Agnimāndya, Ādhmāna, Gulma, Mūtrakṛcchra, Mūtrāghāta

DOSE - 12-24 g of the drug in powder form for decoction.

AMBAṢṬHAKĪ (Root)

Ambaṣṭhakī consists of dried roots of Hibiscus sabdariffa Linn. (Fam. Malvaceae); an annual, erect, shrub, generally cultivated in the hotter parts of India.

SYNONYMS

Sanskrit	:	--
Assamese	:	--
Bengali	:	Masts Pal, Mesta
English	:	Jamaican Sorrel
Gujrati	:	Ambodi
Hindi	:	Patsan, Patna
Kannada	:	Pudisoppu, Kempu Pundrike Pullichekir
Kashmiri	:	--
Malayalam	:	Pariccakam, Pulicheera
Marathi	:	Lalambari
Oriya	:	Khataa, Kaunria, Tak Bhend
Punjabi	:	Kolada
Tamil	:	Pulichikire
Telugu	:	Pundikura, Gongura
Urdu	:	Patsan

DESCRIPTION

a) Macroscopic

Tap root greyish-brown in colour, stout, cylindrical with many lateral branches gradually tapering towards lower end, moderately rough due to minute longitudinal wrinkles, 1-2 cm thick; fracture, fibrous in bark region and short in wood region; no characteristic odour and taste.

b) Microscopic

Mature root shows 3-5 layers of cork consisting of tangentially elongated rectangular cells; secondary cortex almost absent, when present 2-3 layered, oval to polygonal, thin-walled, parenchymatous cells; secondary phloem composed of usual elements; secondary xylem consists of vessels, tracheids, fibres and parenchyma traversed by xylem rays; vessels solitary or 2-4 in groups with pitted thickening; fibres and tracheids short to moderately long with pitted walls; medullary rays 1-3 cells wide and multicelled in height; starch grains both simple and compound and the later having 2-3 components, measuring 5.5-14 μ in dia. present in phloem parenchyma, xylem parenchyma and ray cells.

Powder - Greyish-brown; shows pitted vessels, fragments of cork cells, fibres and tracheids, both simple and compound starch grains measuring 5.5-14 μ in dia. having 2-3 components.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid : Water (4: 1: 5) shows under U. V. (366 nm) four fluorescent zones at Rf. 0.36, 0.61, 0.92 (all blue) and 0.95 (pink). On exposure to Iodine vapour twelve spots appear at Rf. 0.06, 0.12, 0.17, 0.22, 0.29, 0.36, 0.44, 0.59, 0.61, 0.72, 0.82 and 0.92 (all yellow). On spraying with 5% Ethanolic Sulphuric acid reagent and heating the plate at 105°C for ten minutes seven spots appear at Rf. 0.29 (grey), 0.36 (violet), 0.44, 0.61, 0.73, 0.82 and 0.92 (all grey).

CONSTITUENTS - Sterols and Polysaccharides

PROPERTIES AND ACTION

Rasa	:	Madhura, Amla, Tikta, Kaṣāya
Guṇa	:	Laghu
Vipāka	:	Amla
Karma	:	Pittahara, Kaphahara, Asthisandhānaka, Vraṇaropaṇa, Rucikara, Dīpana, Kaṇṭhaśodhana

IMPORTANT FORMULATIONS - Puṣyānuga Cūrṇa

THERAPEUTIC USES - Pakvātisāra, Kapharoga, Galaroga, Vātaroga, Asthibhagna, Vraṇa

DOSE - 5 -10 g

ĀMRA (Seed)

Āmra consists of dried seed of *Mangifera indica* Linn. (Fam. Anacardiaceae), a tree found wild or cultivated throughout the country.

SYNONYMS

Sanskrit	:	Āmrabījamajjā
Assamese	:	--
Bengali	:	Am
English	:	Mango
Gujrati	:	Aambaro, Ambanoo, Aambo, Keri
Hindi	:	Aam
Kannada	:	Amavina
Kashmiri	:	--
Malayalam	:	Manga
Marathi	:	Aamba
Oriya	:	Amkoili, Ambakoiti
Punjabi	:	Amb
Tamil	:	Mangottai Paruppu, Maangottai
Telugu	:	Mamidi-Jeedi
Urdu	:	Aam

DESCRIPTION

a) Macroscopic

Seed 3-4.5 cm long, 1.5-2.5 cm wide, ovoid, oblong covered with wrinkled integument, both outer and inner integument closely united, outer integument buff coloured, inner integument reddish-brown; taste, bitter and astringent.

b) Microscopic

Seed shows outer integument consisting of tangentially elongated, irregular, thin-walled, parenchymatous cells, with poorly developed conducting tissues of vessels showing spiral thickenings towards inner integument, inner integument consisting of slightly rectangular, wavy and large thin-walled parenchymatous cells; cotyledons 2, composed of isodiametric, parenchymatous cells fully packed with simple and compound starch grains; compound starch grains consisting of 2-6 components, each starch grain round to oval, measuring 2-28 μ in dia., a few conducting tissues with spiral vessels also found scattered in parenchymatous cells of cotyledons.

Powder - Greyish-buff; shows reddish-orange coloured cells of integument, thin-walled, parenchymatous cells, simple and compound starch grains, consisting of 2-6 components, measuring 2-28 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.62 (yellowish) and 0.92 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.07, 0.29, 0.62, 0.77 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C five spots appear at Rf. 0.07 (grey), 0.29 (grey), 0.62 (grey), 0.77 (brown) and 0.93 (brown).

CONSTITUENTS - Tannins - Pyrogallotannins

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Madhura
Guṇa	:	Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Saṃgrāhī, Vātakara, Kṛmighna

IMPORTANT FORMULATIONS - Puṣyānuga Cūrṇa, Bṛhat Gaṅgādhara Cūrṇa, Aśokāriṣṭa

THERAPEUTIC USES - Atīsāra, Pravāhikā, Chardi, Dāha, Tvagroga

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

ĀMRA (Stem Bark)

Āmra consists of dried stem bark of Mangifera indica Linn. (Fam. Anacardiaceae), a tree found wild or cultivated throughout the country.

SYNONYMS

Sanskrit	:	Āmra
Assamese	:	Aam
Bengali	:	Am, Ama
English	:	Mango
Gujrati	:	Ambo
Hindi	:	Ama
Kannada	:	Mavu
Kashmiri	:	--
Malayalam	:	Mavu
Marathi	:	Amba
Oriya	:	Am, Amba
Punjabi	:	Amb
Tamil	:	Mamaram
Telugu	:	Amaramu
Urdu	:	Aam

DESCRIPTION

a) Macroscopic

Drug occurs in pieces of variable size and thickness, surface rough due to longitudinal cracks, fissures and scattered, raised lenticels, greyish to dark brown externally and yellowish-white to reddish internally; odour, pleasant; taste, astringent.

b) Microscopic

Mature bark, shows a wide cork consisting of tangentially elongated cells, a few outer layers brown and inner lighter in colour, at a few places lenticels appear; secondary cortex almost absent; secondary phloem wide, consisting of sieve elements, parenchyma and phloem fibres, traversed by medullary rays, resin canals and yellow coloured elongated, tannin sacs abundantly scattered throughout phloem region; stone cells thick walled, lignified, rectangular with wide lumen also present in single or in groups; starch grains and prismatic crystals of calcium oxalate present in number of phloem cells; phloem fibres in groups composed of 2-15 or more cells, long and thick walled, phloem rays 1-3 seriate, 3 seriate rays more common, somewhat wavy, thin-walled, radially elongated and filled with crystals of calcium oxalate and simple, round starch grains, measuring 12-16μ in diameter.

Powder - Brown; shows fragments of cork cells, stone cells, single or in groups; phloem fibres, prismatic crystals of calcium oxalate; simple, spherical to elliptical, starch grains measuring 12 - 16 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 : 1 : 5) shows under U.V. (366 nm) three violet spots at Rf. 0.12, 0.73 and 0.87.

On exposure to Iodine vapour four yellow coloured spots appear at Rf. 0.33, 0.51, 0.74 and 0.88. On spraying with 5% Methanolic-Sulphuric acid reagent and after heating the plate at 105°C for ten minutes, three grey coloured spots appear at Rf. 0.49, 0.69 and 0.88.

CONSTITUENTS - Tannins - Protocatechuic Acid, Catechin, Mangiferin, Alanine, Glycine, α -Aminobutyric acid, Kinic and Shikimic Acids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Grāhī, Kaphapittaśāmaka, Vraṇaropaṇa, Rucya

IMPORTANT FORMULATIONS - Nyagrodhādi Cūrṇa, Nyagrodhādi Kvātha Cūrṇa, Candanāsava, Grahaṇīmihira Taila, Mūtra Saṃgrahaṇīya Kaṣāya Cūrṇa

THERAPEUTIC USES - Atīsāra, Vraṇa, Agnimāndya, Grahaṇī, Prameha, Yoni Roga

DOSE - 3-6 g of powder

25-50 g for decoction

ĀMRĀTA (Stem)

Āmrāta consists of dried stem of *Spondias pinnata* (Linn. f.) Kurz Syn. *S. mangifera* Willd., *S. acuminata* Roxb. non Gamble (Fam. Anacardiaceae); a small, aromatic, deciduous tree, upto 27 m high and 2-5 m in girth, found wild or cultivated almost throughout the country, ascending upto an altitude of 1500 m in the Himalayas, and also distributed in Andamans.

SYNONYMS

Sanskrit	:	Āmrātaka, Markaṭamrah, Kapītana
Assamese	:	Amda
Bengali	:	Amda
English	:	Indian Hog Plum, Hog Plum
Gujrati	:	Jangali Ambo, Ambeda
Hindi	:	Ambada
Kannada	:	Ambate, Amatemara
Kashmiri	:	--
Malayalam	:	Ambazham
Marathi	:	Ambada
Oriya	:	Aabada
Punjabi	:	--
Tamil	:	Mampulecci, Mampulicci
Telugu	:	Ambalamu
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Stem occurs in cut pieces, about 3.5 - 10.0 cm long, 1.0-3.0 cm in dia., cylindrical, more or less rough due to longitudinal wrinkles; occasionally a few round, prominent leaf

scars also present, reddish-grey externally having lenticel, white or cream coloured internally with prominent dark brown centre, light in weight; fracture very hard; odour and taste not characteristic.

b) Microscopic

Mature stem shows a wide zone of cork ranging from 15-25 rows, comprising of tangentially elongated, radially arranged, thin-walled cells containing reddish-brown contents, a few outer cells exfoliating; secondary cortex consisting of 15-17 layers, oval to polygonal, tangentially elongated, thin-walled cells, followed by 2-3 tangential bands comprising of groups of stone cells; secondary phloem consisting of usual elements; phloem fibres arranged in tangential bands, thick-walled, lignified; prominent lysigenous cavities surrounded by a number of tannin sacs present in between the patches of phloem fibres; phloem parenchyma consisting of thin-walled cells having a few prismatic crystals of calcium oxalate; secondary xylem consists of usual elements, lignified; vessels single or in groups of 2-4 having simple pits, occasionally reticulate thickening, fibres fusiform with blunt tips; tracheids thick-walled; xylem rays 1-2 cells wide and 3-11 cells high; starch grains simple, round to oval having concentric striations and hilum, measuring 3-14 μ in dia., present in secondary cortex, phloem parenchyma, xylem parenchyma and xylem rays.

Powder - Grey; shows fragments of cork cells, phloem fibres, stone cells mostly in groups, occasionally single; a few prismatic crystals of calcium oxalate, simple and reticulate vessels; starch grains simple, round to oval having concentric striations and hilum in centre, measuring 3-14 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Ethylacetate : Formic acid (5 : 4 : 1) shows in visible light three spots at Rf. 0.08, 0.74 and 0.83 (all grey). Under UV (366 nm) five fluorescent zones are visible at Rf. 0.04, 0.79, 0.83, 0.87 (all blue) and 0.93 (sky blue). On exposure to Iodine vapour six spots appear at Rf. 0.13, 0.48, 0.74, 0.83, 0.87 and 0.93 (all yellow). On spraying with 10% Ferric chloride solution (aqueous) reagent two spots appear at Rf. 0.04 and 0.93 (both blue).

CONSTITUENTS - Tannins

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Amla
Guṇa	:	Guru
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātaghna, Sāraka

IMPORTANT FORMULATIONS - Dādhika Ghṛta

THERAPEUTIC USES - Dāha, Kṣaya, Rakta Vikāra, Atīsāra

DOSE - 1-3 g of powder

APĀMĀRGA (Root)

Apāmārga consists of dried root of *Achyranthes aspera* Linn. (Fam. Amaranthaceae); a stiff erect, 0.1-0.9 m high, herb found commonly as a weed throughout the country up to 900 m.

SYNONYMS

Sanskrit	:	Adhaḥśalya, Śikhari, Mayūraka
Assamese	:	Chirchita
Bengali	:	Apang
English	:	Prickly Chaff Flower
Gujrati	:	Aghedo
Hindi	:	Chirchira, Latjira
Kannada	:	Uttarane, Uttaren
Kashmiri	:	--
Malayalam	:	Kadaledee
Marathi	:	Anghada
Oriya	:	--
Punjabi	:	Puthakanda, Lattajeera
Tamil	:	Nayuruvi
Telugu	:	Uttareni
Urdu	:	Chirchita

DESCRIPTION

a) Macroscopic

Tap root cylindrical slightly ribbed, upto 1.0 cm in thickness, gradually tapering, rough due to presence of some root scars; secondary and tertiary roots present; yellowish-brown; odour, not distinct; taste not characteristic.

b) Microscopic

Mature root shows 6-10 layered, rectangular, tangentially elongated, thin-walled cork cells; secondary cortex consisting of 6-9 layers, oval to rectangular, thin-walled parenchymatous cells having scattered, thick-walled, irregular lignified stone cells, followed by 5-6 discontinuous rings of anomalous secondary thickening, composed of vascular tissues; small patches of sieve tubes are distinct in the phloem parenchyma demarcating the xylem rings; secondary xylem composed of tracheids, fibres and parenchyma; vessels with both simple and bordered pits and with scalariform thickening, measuring 135-348 μ in length and 32-64 μ in width; fibres pointed at both ends with walls moderately thickened, measuring 260-740 μ in length and 12-24 μ in width; tracheids have tapering ends, measuring 165-535 μ in length and 17-34 μ in width.

In *A. bidentata* BL. vessels show bordered pits and reticulate thickening; medullary rays not distinct; stone cells and prismatic crystals absent in cortex.

Powder - Yellowish-brown; shows fragments of rectangular cork cells, stone cells, vessels showing bordered pits and scalariform thickening, fibres and a few prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (95:5) shows under UV (366 nm) five fluorescent zones at Rf. 0.05, 0.19, 0.43, 0.50 and 0.97 (all light blue). On exposure to Iodine vapour six spots appear at Rf. 0.05, 0.12, 0.43, 0.50, 0.92 and 0.97 (all yellow). On spraying with Dragendorff reagent followed by 5%

Methanolic-Sulphuric acid reagent two spots appear at Rf 0.12 and 0.97 (both light orange).

CONSTITUENTS - Saponins

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Dīpana, Pācana, Rucya, Vātahara, Kaphanāśaka, Medohara, Mūtrala, Vāntihara

IMPORTANT FORMULATIONS - Agastya Harītakī Rasāyana, Mahā Pañcagavya Ghṛta, Vastyāmayāntaka Ghṛta, Mahā Viṣagarbha Taila, Apamārga Kṣāra Taila, Kṣāra Taila, Panaviralādi Kṣāra

THERAPEUTIC USES - Chardi, Ādhmāna, Kaṇḍū, Śūla, Apacī, Granthi, Bhagandara, Hṛdroga, Jvara, Śvitra, Bādhirya, Udara Roga, Yakṛt Roga, Danta Roga, Rakta Vikāra

DOSE - 5-10 g

ARALU (Stem Bark)

Aralu consists of dried stem bark of *Ailanthus excelsa* Roxb. (Fam. Simarubaceae); a large deciduous tree occurring in Bihar, Chhota Nagpur, Madhya Pradesh, forests of Ganjam, Vishakhapatnam and Deccan.

SYNONYMS

Sanskrit	:	Kaṭvaṅga, Dīrghavṛnta
Assamese	:	Aralu
Bengali	:	--
English	:	--
Gujrati	:	Aralavo
Hindi	:	Arlu, Maruk, Ghoda Karanj
Kannada	:	Hiremara Hebbever
Kashmiri	:	Merumaram, Mattipongilyam
Malayalam	:	Merumaram, Mattipongilyam
Marathi	:	Ghoda Karanj
Oriya	:	Dakshinakabala, Mahala
Punjabi	:	Aruo
Tamil	:	Peruvagai
Telugu	:	Peddmanu
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Bark thick, external surface light grey, granular and rough due to presence of longitudinal ridges, internal surface yellowish-white and fibrous; fracture, fibrous; odour, disagreeable when fresh; taste, bitter.

b) Microscopic

Stem Bark cork multilayered, compactly arranged, tangentially elongated, thinwalled cells obliterated at certain points due to rhytidoma; secondary cortex narrow, composed of tangentially elongated cells, a few cells contain rosette and prismatic crystals of calcium oxalate; phloem, wide, consisting of sieve elements, parenchyma, fibres and stone cells; a few layers of outer phloem collapsed forming ceratenchyma; stone cells, in groups and in singles, present towards outer region of phloem; lignified fibres present in groups in radial rows in inner phloem region; calcium oxalate crystals similar to those found in secondary cortex also found in phloem region; medullary rays not distinct.

Powder - Brownish-yellow, fragments of cork cells; groups or single, oval to polygonal, thick-walled, lignified, stone cells, having wide lumen with distinct striations, lignified phloem fibres, a few rosette and prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5.5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (95 : 5) shows under U.V. (366 nm) twelve fluorescent zones at Rf. 0.07 (sky blue), 0.10 (sky blue) 0.21, 0.38, 0.47 (all yellow), 0.57 (sky blue), 0.71 (light sky blue), 0.76, 0.81 (both yellow), 0.84 (sky blue), 0.93 (whitish blue) and 0.97 (sky blue). On exposure to Iodine vapour twelve spots appear at Rf. 0.07, 0.10, 0.21, 0.38, 0.47, 0.57, 0.71, 0.76, 0.81, 0.84, 0.93 and 0.97 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for fifteen minutes thirteen spots appear at Rf. 0.07, 0.01(both grey), 0.21 (light brown), 0.24 (blue), 0.38, 0.47 (both light brown), 0.52 (pink), 0.59 (blue), 0.71, 0.76 (both light brown), 0.84 (blue), 0.93 and 0.97 (both dark grey).

CONSTITUENTS - β-Sitosterol, Quassinoids, Ailantic Acid, 2-6 Dimethoxy-Benzoquinone and Melanthin.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Kaphapitta Śāmaka, Dīpana, Pācana, Grāhī, Vraṇaśodhana, Śodhaka

IMPORTANT FORMULATIONS - Puṣyānuga Cūrṇa, Bṛhat Gaṅgādhara Cūrṇa, Aralu Puṭapāka

THERAPEUTIC USES - Atīsāra, Kṛmi, Arśa, Sannipāta Jvara, Bhrama, Tvagroga, Chardi, Kuṣṭha, Pravāhikā, Grahaṇī, Prameha, Śvāsa, Gulma, Mūṣaka Viṣaja Roga

DOSE - 1-3 g

ARKA (Stem Bark)

Arka consists of dried stem bark of *Calotropis procera* (Ait.) R. Br. (Fam. Asclepiadaceae); an erect shrub exuding milky white latex from cut parts, found wild more or less throughout India.

SYNONYMS

Sanskrit	:	Sūrya
Assamese	:	Akand, Akan
Bengali	:	Akanda, Akone
English	:	Maddar
Gujrati	:	Aakado
Hindi	:	Aak, Madar, Akavana
Kannada	:	Ekka, Ekkagida
Kashmiri	:	--
Malayalam	:	Errikku
Marathi	:	Rui
Oriya	:	Arakka
Punjabi	:	Akk
Tamil	:	Vellerukku, Erukku
Telugu	:	Jilledu
Urdu	:	Madar, Aak

DESCRIPTION

a) Macroscopic

Drug occurs in channelled, quilled and fibrous pieces, upto 0.1 - 0.5 cm thick, external surface yellowish brown having longitudinal cracks, internal surface greenish, smooth, with an occasional wood tissue attached; fracture, fibrous; odour and taste not distinct.

b) Microscopic

Stem bark shows exfoliated cork, consisting of 6-8 layers of tangentially elongated, thick-walled cells; where cork has not developed, epidermis present consisting of a single layered rectangular cells covered externally with striated cuticle; secondary cortex composed of tangentially elongated, oval, rounded or rectangular thin-walled, parenchymatous cells having intercellular spaces, some cells contain rosette crystals of calcium oxalate, a number of rounded, oval to elongated, single or groups of stone cells and latex cells also found scattered in this region; pericyclic fibres numerous, lignified; secondary phloem composed of sieve elements, phloem parenchyma, phloem fibres and phloem rays; phloem parenchyma rectangular to polygonal in shape having rosette crystals of calcium oxalate, latex cells and stone cells similar to those found in secondary cortex; phloem fibres aseptate with bordered pits; phloem rays mostly uniseriate and run straight.

Powder - Light yellowish-green; shows fibres, stone cells, rosette crystals of calcium oxalate and latex cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	15	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (1: 1) shows under UV (366 nm) four fluorescent zones at Rf. 0.63, 0.71, 0.81 and 0.87 (all

blue). On spraying with Dragendorff reagent followed by 5% Methanolic Sulphuric acid reagent one spot appears at Rf. 0.08 (orange).

CONSTITUENTS - α - and β- Calotropeols, β-Amyrin, Giganteol, a Colourless wax, small amount of Tetracyclic Terpenes and Traces of Sterols.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śodhana, Virecana, Vātahara, Dīpana, Lekhana, Ropaṇa

IMPORTANT FORMULATIONS - Abhayā Lavaṇa, Arka Lavaṇa

THERAPEUTIC USES - Udararoga, Kuṣṭha, Kaṇḍū, Vraṇa, Plīhāroga, Gulma, Arśa, Kṛmiroga

DOSE - 0.5-1 g in powder form

ASANA (Stem Bark)

Asana consists of dried stem bark of *Pterocarpus marsupium* Roxb. (Fam. Fabaceae); a moderate to large sized, deciduous tree, upto 30 m high and 2.5 m in girth, with straight clear bole, found throughout deciduous forests in peninsular India.

SYNONYMS

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

DESCRIPTION

a) Macroscopic

Drug consists of pieces of stem bark, 1-1.5 cm thick, channeled, usually yellowish-grey with brownish spots due to exudates, outer surface rough and uneven due to protuberances and exfoliations, longitudinal and horizontal cracks present, inner surface fairly smooth; fracture fibrous, breaks with much difficulty; taste, astringent.

b) Microscopic

Stem bark shows the presence of rhytidoma; idioblasts consisung of lysigenous cavities, present in a row just below cork; secondary cortex not distinct; secondary phloem occupies almost two third of the thickness of bark consisting of sieve elements, phloem parenchyma, phloem fibres, crystal fibres and traversed by a number of phloem rays; sieve elements and parenchyma found collapsed towards the middle and outer regions of phloem, forming ceratenchyma; phloem parenchyma thin-walled, circular to oval; phloem fibres single usually numerous in groups forming alternating bands throu-ghout phloem region, thick-walled and lignified with a small lumen; rhomboidal crystals of calcium oxalate found scattered throughout the region; lysigenous cavities and tanniniferous ducts filled with red colour masses distributed throughout phloem region; phloem rays very close to each other, mostly uniseriate but biseriate rays also occasionally found .

Powder - Yellowish-brown; shows plenty of lignified fibres, crystal fibres, reddish - brown contents and free rhomboidal crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2 per cent, Appendix	2.2.2.
Total Ash	Not more than	18 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7.5 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11.5 per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic Acid: Water (4:1:5) shows six spots at Rf 0.09, 0.22, 0.41 0.52, 0.63 and 0.78 (all brown). On exposure to Iodine vapour six spots appear at Rf 0.09, 0.22, 0.41, 0.63,0.78 (all brown) and 0.92 (yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent six spots appear on heating the plate at 105°C for about ten minutes at Rf. 0.09, 0.22 (both blue), 0.41 (faint blue), 0.63, 0.78 and 0.92 (all blue).

CONSTITUENTS - Tannins and Gum Kino (which contains Kino-Tannic Acid, l--Epicatechin and a reddish brown colouring matter).

PROPERTIES AND ACTION

Rasa : Kaṣāya, Kaṭu, Tikta

Guṇa : Laghu, Rūkṣa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Sāraka, Vātārtidoṣanut, Galadoṣaghna, Keśya, Tvacya, Raktamaṇḍalnāśin ī, Śleṣmahara, Pittahara

IMPORTANT FORMULATIONS - Nārasiṃha Ghṛta Rasāyana

THERAPEUTIC USES - Pāṇḍu, Prameha, Medodoṣa, Kuṣṭha, Kṛmiroga, Śvitra, Madhumeha, Sthaulya

DOSE - 32-50 g of the drug for decoction

ASTHISAMHṚTA (Stem)

Asthisaṃhṛta consists of dried stem of *Cissus quadrangularis* Linn. (Fam. Vitaceae); a perennial fleshy cactus-like climber with tendrils and a quadrangular stem, found throughout the hotter parts of India alongside hedges.

SYNONYMS

Sanskrit	:	Vajravallī, Caturdhārā
Assamese	:	Harjara
Bengali	:	Hadajora
English	:	--
Gujrati	:	Hadasankala
Hindi	:	Hadjod
Kannada	:	Mangaraballi
Kashmiri	:	--
Malayalam	:	Changalam Parande
Marathi	:	Kandvel
Oriya	:	Hadbhanga
Punjabi	:	Haddjor
Tamil	:	Perandai
Telugu	:	Nalleru
Urdu	:	Hathjod

DESCRIPTION

a) Macroscopic

Drug occurs as pieces of stem of varying lengths; stern quadrangular, 4-winged, internodes constricted at nodes; a tendril occasionally present at nodes; internodes 4-15 cm long and 1-2 cm thick; surface smooth, glabrous, buff coloured with greenish tinge, angular portion reddish-brown; no taste and odour.

b) Microscopic

Mature stern shows squarish outline with prominent projection at each anular point; epidermis single layered, covered externally with thick cuticle; epidermal cells thin-walled, rectangular and tangentially elongated, followed by 2-3 layers of cork and single layered cork cambium; cortex composed of 8-16 layers of thin-walled, circular to oval parenchymatous cells; four patches of collenchymatous cells present in all the four angular points embedded in cortical region like an umbrella arching over large vascular bundles; in the projected portion of angular region cortical cells filled with brown-red contents present; endodermis not distinct; stele consists of a large number of vascular bundles varying in size arranged in the form of a ring separated by rays of parenchyma; 3 -4 vascular bundles larger in size, in each angular region, below collenchymatous patch, while rest of bundles smaller in size; vascular bundles collateral and open type, capped by sc1erenchymatous sheath which is well developed in larger bundles; cambium and interfascicular cambium quite distinct; central region occupied by a wide pith composed of thin-walled, circular to oval parenchymatous cells; idioblasts containing raphides and isolated acicular crystals of calcium oxalate present in the outer region of cortex and also in a number of cells throughout the region; rosette crystals of calcium oxalate also found in most of the cells in cortical region; starch grains present throughout the cortical and the pith regions.

Powder - Brown; shows fragments of vessels, fibres, parenchymatous cells and a few rosette crystals of calcium oxalate, starch grains and idioblast, containing raphides and isolated acicular crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	22	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.59 and 0.91 (both blue). On exposure to Iodine vapour four spots appear at Rf. 0.46, 0.56, 0.66 and 0.91 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.06, 0.46 (both violet), 0.59 (light violet), 0.66 and 0.91 (both violet).

CONSTITUENTS - Calcium Oxalate, Carotene and Ascorbic Acid

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Madhura
Guṇa	:	Laghu, Rūkṣa, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Dīpana, Vātāśleṣmahara, Asthisandhānakara, Cakṣuṣya, Vṛṣya

THERAPEUTIC USES - Kṛmi, Arśa, Asthibhagna, Sandhi Cyuta

DOSE - 10-20 ml (Svarasa)

3-6 g (Powder)

ĀTMAGUPTĀ (Seed)

Ātmaguptā consists of dried mature seed of *Mucuna prurita* Hook., Syn. M. pruriens Baker. (Fam. Fabaceae); a slender extensive climbing plant found almost all over the country.

SYNONYMS

Sanskrit	:	Kapikacchu, Markaṭī, Kaṇḍura
Assamese	:	Banar Kakua
Bengali	:	--
English	:	Cowhage
Gujrati	:	Kavach, Kaucha
Hindi	:	Kewanch, Kaunch
Kannada	:	Nasugunne, Nasugunnee
Kashmiri	:	--
Malayalam	:	Naikuruna
Marathi	:	Khajkuhilee, Kavach
Oriya	:	Baikhujnee
Punjabi	:	Tatgajuli, Kawach
Tamil	:	Poonaikkali
Telugu	:	Doolagondi, Duradagondi
Urdu	:	Kanwach, Konch

DESCRIPTION

a) Macroscopic

Seed ovoid, slightly laterally compressed, with a persistent oblong, funicular hilum, dark brown with spots; usually 1.2-1.8 cm long, 0.8-1.2 cm wide, hard, smooth to touch, not easily breakable; odour, not distinct; taste, sweetish-bitter.

b) Microscopic

Mature seed shows a thin seed-coat and two hard cotyledons; outer testa consists of single layered palisade-like cells; inner testa composed of 2 or 3 layers, outer layer of tangentially elongated, ovoid, thin-walled cells, inner I or 2 layers of dumb-bell or beaker-shaped, thick-walled cells; tegmen composed of a wide zone of oval to elliptical, somewhat compressed, thin-walled, parenchymatous cells; some cells contain starch grains; cotyledons composed of polygonal, angular, thin-walled, compactly arranged, parenchymatous cells, containing aleurone and starch grains; starch grains small, simple, rounded to oval measuring 6-41 μ in dia., but not over 45 μ in dia.; a few vascular bundles with vessels showing reticulate thickening or pitted present,

Powder - Pale cream coloured; shows fragments of testa with palisade-like cells thinwalled parenchyma, reticulate and pitted vessels, aleurone and starch grains small, simple, rounded to oval measuring 6-41 μ in dia., but not over 45 μ. in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.
Fixed oil	Not less than	3	per cent, Appendix	2.2.8

ASSAY

T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate, using n-Butanol : Acetic acid: Water (4:1:5), shows in visible light four spots at Rf. 0.51, 0.59, 0.69 (all grey) and 0.92 (light yellow). Under UV (366 nm) six fluorescent zones are visible at Rf. 0.45 (blue), 0.51, 0.59, 0.69 (all grey), 0.79 (light blue) and 0.92 (blue). On spraying with Ninhydrin reagent

and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.17, 0.28, 0.34 (all pink) 0.51 (orange), 0.59 (pink), 0.69 (grey) and 0.92 (pink).

CONSTITUENTS - Fixed Oil, Alkaloid and 3,4-Dihydroxyphenylalanine.

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta
Guṇa	:	Guru, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātaśamana, Vṛṣya, Kaphanāśaka, Pittanāśaka, Raktadoṣanāśaka, Bṛṃhaṇa, Balya

IMPORTANT FORMULATIONS - Bṛhat Māṣa Taila

THERAPEUTIC USES - Vātavyādhi, Kaṃpavāta, Klaibya, Raktapitta, Duṣṭavraṇa, Daurbalya

DOSE - 3-6 g

BHĀRAṄGĪ (Root)

Bhāraṅgī consists of dried roots of *Clerodendrum serratum* (Linn.) Moon (Fam. Verbenaceae); a shrub distributed throughout the country.

SYNONYMS

Sanskrit	:	Aṅgāravallī, Brāhmaṇayaṣṭikā
Assamese	:	--
Bengali	:	Bamun Hatee, Baman hatee, Bhuijam
English	:	--
Gujrati	:	Bharangee
Hindi	:	Bharangee
Kannada	:	Gantubarangee
Kashmiri	:	--
Malayalam	:	Cheruteku
Marathi	:	Bharangee, Bharang
Oriya	:	Chinds
Punjabi	:	Bhadangee
Tamil	:	Cheruteku
Telugu	:	Gantubharangee
Urdu	:	Bharangi, Baharangi

DESCRIPTION

a) Macroscopic

Mature root hard, woody, cylindrical, upto 5 cm thick, external surface light brown having elongated lenticels; bark, thin and easily separated from a broad wood which shows marked medullary rays and concentric growth rings in a transversely cut surface; fracture, short; taste, acrid.

b) Microscopic

Mature root shows stratified cork composed of 14-20 layers of thin-walled, tangentially elongated cells; each stratification consists of 3-5 layers of cells; secondary cortex wide, outer 2 or 3 layers radially arranged and tangentially elongated, inner cells polyhedral or circular to ellipsoidal with intercellular spaces; a few cells modified into stone cells with greatly thickened wall having concentric striations and radiating canals with narrow lumen; some cells contain acicular crystals of calcium oxalate and a few contain brown colouring matter; secondary phloem consists of sieve elements and parenchyma mostly collapsed in outer region, forming ceratenchyma; some phloem parenchymatous cells modified into stone cells similar to those in secondary cortex but somewhat smaller and with greater thickening' of walls; secondary xylem diffused porous consisting of vessels, tracheids, fibres and xylem parenchyma traversed by xylem rays; macerated preparation show wider vessels cylindrical, drum-shaped, some being elongated at one end having bordered pits, rarely reticulate or pitted, while narrower ones elongated with spiral to reticulate thicken- tracheids long, cylindrical with tapering ends and bordered pits; xylem fibres moderately thick-walled with mostly tapering, pointed ends and oblique bordered pits; xylem parenchyma square to rectangular with simple pits on their walls; medullary rays 1-4 cells wide and 2-50 cells high, 2 or 3 cell wide rays more common, having simple pits on their walls; acicular crystals and abundant simple and compound starch grains measuring up to 20 μ in dia. present in a number of cells throughout the region.

Powder - Light-brown; shows vessels reticulate, spiral and with bordered pits, starch grains simple and compound, round to oval, measuring upto 20 μ in dia. and acicular crystals; stone cells as describes under microscopy present.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	11	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light two spots at Rf. 0.62 and 0.74 (both dirty yellow). Under UV light (366 nm) three fluorescent zones are visible at Rf. 0.62 (yellowish green), 0.68 (blue) and 0.74 (yellowish green). On spraying with 5% Methanolic Sulphuric acid and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.62 and 0.74 (both grey).

CONSTITUENTS - Saponins

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Dīpana, Pācana, Śvāsahara, Rucya

IMPORTANT FORMULATIONS - Ayaskṛti, Kanakāsava, Daśamūlāriṣṭa, Rāsnādi Kvātha Cūrṇa, Dhānvantara Ghṛta, Mahā Vātagajāṅkuśa Rasa

THERAPEUTIC USES - Gulma, Jvara, Śvāsa, Kāsa, Yakṣmā, Pīnasa, Śotha, Hikkā, Raktadoṣa

DOSE - 3-6 g of powder

10-20 g of kwatha curna

BĪJAPŪRA (Fresh Fruit)

Bījapūra consists of fresh fruit of *Citrus medica* Linn. (Fam. Rutaceae); an evergreen shrub or small tree, about 3.6 m high with short, thick and thorny branches, cultivated sparsely throughout the warm-moist regions of the eountry.

SYNONYMS

Sanskrit	:	Mātuluṅga
Assamese	:	Jaradeda
Bengali	:	Bijipura, Mutulanga
English	:	Wild Lemon, Citron
Gujrati	:	Bijora
Hindi	:	Bijoura
Kannada	:	Madavala, Madalahannu, Madala
Kashmiri	:	--
Malayalam	:	Matala Narakam, Gonapatinarakam, Bongi, Mathulanarakam, Mathulanga
Marathi	:	Mahalunga, Bijora
Oriya	:	Jambhira
Punjabi	:	Galgal
Tamil	:	Turunji Pazham, Kadarangai
Telugu	:	Madi Phalam
Urdu	:	Turanj

DESCRIPTION

a) Macroscopic

Fruit-hesperidium, 5-10 cm long, ovoid, oblong or globose, nipple-shaped at the end with thick, rough or irregular or warted rind; dark green when unripe and yellow when ripe; pulp, pale yellow; taste, acidic and sweetish.

b) Microscopic

IDENTITY, PURITY AND STRENGTH

Foreign matter	Nil	per cent, Appendix	2.2.2.
Total Ash	Not more than	5 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2 per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20 per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	45 per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene : Ethylacetate (9 : 1) shows under U.V. (3661 nm) seven fluorescent zones at Rf. 0.03 (light sky blue), 0.08 (yellowish green), 0.11(light sky blue), 0.19(light sky blue), 0.39 (light sky blue), 0.56 (dark sky blue) and 0.66 (light sky blue). On exposure to Iodine vapour ten spots appear at Rf. 0.03, 0.04, 0.08, 0.11, 0.16, 0.38, 0.43, 0.53, 0.72 and 0.93 (all yellow).

CONSTITUENTS - Volatile oil

PROPERTIES AND ACTION

Rasa : Amla, Madhura

Guṇa : Laghu, Snigdha

Vīrya : Uṣṇa

Vipāka : Amla

Karma : Vātahara, Pittahara, Kaphahara, Dīpana, Hṛdya, Kaṇṭha Śodhaka, Jihvāśodhaka, Varṇanāśaka, Medhya, Chardinigrahaṇa, Śodhaka

IMPORTANT FORMULATIONS - Kṣāra Taila, Hiṅgvādi Cūrṇa, Kāṅkāyana Guṭikā, Taruṇārka Rasa, Śaṅkha Drāvaka, Mādiphala Rasāyana

THERAPEUTIC USES - Raktapitta, Śvāsa, Kāsa, Aruci, Tṛṣṇā, Udara Roga, Vibandha, Madātyaya, Hikkā, Agnimāndya

DOSE - 10-20 ml of juice

BILVA (Root)

Bilva consists of dried root of *Aegle marmelos* Corr. (Fam. Rutaceae); an armed, medium sized tree, occurring in the plains and upto 1000 m in the hills, as well as cultivated throughout the country, particularly in sacred groves.

SYNONYMS

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

DESCRIPTION

a) Macroscopic

Root cream yellow or pale yellowish-brown, thin, irregularly and shallowly ridged due to formation of longitudinal and transverse lenticels, surface ruptured, peeling off in layers, internal surface cream to light yellow; fracture, short; taste, sweet.

b) Microscopic

Root shows lignified and stratified cork consisting of 3 or 4 alternating bands of 4-14 layers of smaller cells and a few layers of larger cells having golden yellow contents; secondary cortex, a wide zone, consisting of large, polyhedral, parenchymatous cells and stone cells of varying shapes and sizes, thick-walled, lignified, scattered throughout region; secondary phloem consists of sieve elements, fibres, parenchyma and crystals fibres traversed by phloem rays; some sieve elements compressed, forming tangential bands of ceratenchyma alternating with bands of lignified phloem fibres in outer phloem region, but intact in inner phloem region; phloem parenchyma radially and transversely elongated; phloem fibre groups arranged in concentric rings, fibre groups in inner phloem region extend tangentially from one meduallary ray to another, each group consisting of 2-35 or more cells; fibres long, generally with tapering ends but occasionally forked, lignified, some others have wavy walls; crystal fibres numerous, long, about 9-30 chambered, each containing a prismatic crystal of calcium oxalate; medullary rays uni to triseriate in inner region while bi to pentaseriate in outer region of phloem; cambium consists of 3-7 rows of tangentially elongated to squarish cells; secondary xylem consists of vessels tracheids, fibres and xylem parenchyma; vessels scattered throughout xylem region, in groups of 2-5, single vessels also found, varying in shape and size, mostly drum-shaped, with bordered pits some having a pointed, tail-like process at one end; fibres thick-walled with blunt or pointed tips; xylem parenchyma rectangular in shape; medullary rays uni to triseriate, bi and triseriate rays more common, triseriate rays 12-40 cells high, uniseriate rays 4-10 cells high; prismatic crystals of calcium oxalate present; starch grains simple, 5-19 μ in dia., mostly round to oval with centric hilum; compound starch grains having 2-3 components present in inner few layers of cork cells, secondary cortex, phloem and xylem rays.

Powder - Grey to greyish-brown; shows thick-walled, angular cells of cork, numerous prismatic crystal of calcium oxalate, crystal fibres, starch grains simple, 5-19 μ in dia., mostly round to oval with centric hilum; compound starch grains having 2-3 components, fragments of xylem vessels with bordered pits and thick-walled xylem fibres.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.

Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under UV (366 nm) three fluorescent zones at Rf. 0.54 (bright sky blue). 0.84 (light sky blue) and 0.93 (bright sky blue). On exposure to Iodine vapour seven spots appear at Rf. 0.15, 0.27, 0.54, 0.67, 0.78 and 0.93 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes eight spots appear at Rf. 0.15, 0.27, 0.32, 0.38 (all grey), 0.54 (yellow) 0.67, 0.84 (light grey) and 0.93 (brown)

CONSTITUENTS - Auraptene, Coumarins, Glycosides

PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Mūtrala, Tridoṣaghna

IMPORTANT FORMULATIONS - Mānasa Mitra Vaṭaka, Amṛtāriṣṭa, Dantyādyariṣṭa, Agastya Harītakī Rasāyana, Daśamūlāriṣṭa, Daśamūla Kvātha Cūrṇa, Bilvādi Leha

THERAPEUTIC USES - Vātavyādhi, Śotha, Śūla, Agnimāndya, Chardi, Mūtrakṛcchra, Āmavāta

DOSE - 2-6 g of the drug in powder form

BIMBĪ (Whole plant)

Bimbī consists of dried whole.plant of *Coccinia indica* W. & A. = *C. cordifolia Cogn.* *S*yn. *Cephalandra indica* Naud. (Fam. Cucurbitaceae); a climbing or prostrate, much branched, perennial herb, growing wild throughout the country.

SYNONYMS

Sanskrit	:	Tuṇḍikā, Tuṇḍikerī
Assamese	:	Kawabhaturi
Bengali	:	Bimbu, Telakucha
English	:	Ivy-Gourd
Gujrati	:	Kadavighilodi, Ghilodi
Hindi	:	Kundaruki-Bel
Kannada	:	Tonde-Balli
Kashmiri	:	--
Malayalam	:	Kova, Nallakova
Marathi	:	Tondale
Oriya	:	Pitakundii, Kainchikakudi
Punjabi	:	Kanduri
Tamil	:	Kovai
Telugu	:	Donda Tiga
Urdu	:	Kunduru

DESCRIPTION

a) Macroscopic

Root -Root available in cut pieces with a few lateral roots, surface rough due to longitudinal striations and lenticels, cylindrical, 0.5 -2.5 cm in dia., greyish-brown.

Stem -Slender, soft, 0.3-1.5 cm in dia., branched, longitudinally grooved, glabrous, nodes swollen, whitish dots over external surface, a few tendrils attached with nodes, greyish

coloured externally and cream to light yellow internally, fracture, fibrous; no odour and taste.

Leaf -Petiolate, petiole cylindrical, simple 2-3.2 cm long, 3.8-9 cm or rarely 10 cm long, palmately lobed, with 3 to 5 lobes or angles, lobes broad, obtuse or acute, more or less sinuate, occasionally constricted at the base, often with circular patches of glands between nerves; lamina bright green above, paler beneath, surface studded and sometimes rough with papillae.

Flower -Ebracteate, pedicellate, incomplete, unisexual, actinomorphic, pentamerous. *Male Flower* pedicel 2-3.8 cm long, subfiliform, calyx tube glabrous, broadly campanulate, 4.5 mm long linear; corolla 2.5 cm long, white, veined, pubescent inside, glabrous outside, segments 4.5 -7.5 mm long, triangular, acute, staminal column glabrous, capitulum of anthers subglobose; *Female Flower* pedicel 1.3 - 2.5 cm long, calyx and corolla as in male flowers; staminodes 3, subulate, 3 mm long, ovary fusiform, glabrous, slightly ribbed, stigma 3, bifid.

Fruit -A pepo, ovoid, glabrous, 3.5 - 4.5 cm long and 1.5-2 cm thick, greenish-brown to yellowish-brown with white linings; no odour and taste.

Seed - Somewhat obovoid, 0.7 cm long and 0.2-0.3 cm wide rounded at apex, much compressed, yellowish-grey.

b) Microscopic

Root - Shows 7 or more rows of thin-walled cork cells having lenticels at places; secondary cortex 4-7 layered, oval to elliptical, tangentially elongated, thin-walled, parenchymatous cells having groups of oval to rectangular, elongated stone cells in lower region; secondary phloem composed of usual elements; phloem fibres absent; secondary xylem consists of usual elements; vessels mostly solitary with simple pits; tracheids simple pitted; fibres simple pitted with pointed tips and arranged around the vessels; medullary rays 6-10 or more cells wide; starch grains abundant, simple, round to oval, measuring 3-11 μ in dia., and compound having 2-4 components present in secondary cortex, phloem and xylem parenchyma and ray cells.

Stem -Mature stem with ridges and furrows, shows a single layered epidermis composed of tabular cells externally covered with cuticle, or the epidermis interrupted at certain places due to formation of cork cells; collenchyma 2-4 layered consisting of isodiametric cells;

secondary cortex narrow, consisting of thin-walled, parenchymatous cells; pericycle present in the form of discontinuous ring of pericyclic fibres; vascular bundles 10 in number, bicollateral, widely separated by broad strips of ground tissue arranged in a single ring, inner part of which almost meeting at centre of stem; secondary phloem consists of sieve-tubes, companion cells and phloem parenchyma; inner phloem semi-lunar in shape; secondary xylem in the centre of each bundle, consists of vessels, tracheids, fibres and xylem parenchyma; vessels numerous uniformly scattered throughout xylem, lignified, pitted and with spiral thickening; tracheids pitted; pith small, composed of thin walled parenchymatous cells.

Leaf -

Petiole - Shows single layered epidermis, consisting of flattened, tangentially elongated cells, covered externally with, striated cuticle; cortex differentiated into 2-5 layered collenchyma and 2-6 layered circular, thin-walled, parenchymatous cells with conspicuous intercellular spaces; vascular bundles bicollateral, arranged in a single ring, usually nine, seven larger and two smaller, traversed by wide parenchymatous cells of medullary rays; some bundles capped by one or two layered, thick-walled, lignified, polygonal pericyclic sclerenchyma; centre occupied by very wide pith composed of large isodiametric parenchymatous cells.

Midrib -Single layered epidermis, on either side, externally covered with striated cuticle, followed by 1-3 layers of well developed collenchyma on the dorsal side and 3-5 layers on the ventral side; vascular bundles, bicollateral, three, ventral larger and two dorsal smaller; layers of collenchymatous cells gradually reduce to 2 or 3 towards dorsal side, 1 or 2 on ventral side and ultimately towards apex of leaf, collenchyma reduces to 1 layer on ventral side and 2 layers on dorsal side; parenchyma 2-3 layered on both sides; vascular bundles single, semicircular; vessels arranged in radial rows.

Lamina -Dorsiventral structure with single layered upper and lower epidermis, externally covered with striated cuticles; epidermal cells show almost straight walls and anomocytic stomata in surface view; below upper epidermis palisade single layered; spongy parenchyma represented by 3-6 layers of loosely arranged cells, a number of veins surrounded by parenchyma, present in mesophyll.

Fruit -Epicarp single layered; mesocarp composed of a wide zone of thin-walled parenchymatous cells differentiated into two regions, outer 5-6 layers rectangular to polygonal, smaller in size, while inner region composed of oval to polygonal cells of larger size; a few fibro-vascular bundles present in this region.

Seed -Testa show ridges and furrows at a few places, more prominent at lateral sides, and consisting of oval to polygonal, thin-walled parenchymatous cells, upper most layer forms radially elongated thin-walled colourless cells; tegmen consists of single layered radially elongated, thin walled, lignified cells, followed by a layer of thin-walled, collapsed parenchymatous cells; a few starch grains 3-6 μ in dia. scattered in this region; embryo consists of hexagonal to polygonal, thin-walled cells having a few oil globules.

Powder - Greyish-brown; shows groups of round to polygonal parenchymatous cells, reticulate, spiral and pitted vessels, aseptate fibres, palisade cells, stone cells, simple and compound, round to oval, starch grains, measuring 3-11 μ in diameter, fragments of epidermis with straight walled cells and anomocytic stomata.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	21	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol : Ammonia (90:18:2) shows under UV (366 nm) three fluorescent zones at Rf. 0.23 (blue), 0.47 (red) and 0.61 (blue). On spraying with Dragendorff reagent one spot appears at Rf. 0.38 (orange).

CONSTITUENTS - Saponins and Fixed Oil in seeds.

PROPERTIES AND ACTION

Rasa : Tikta, Madhura

Guṇa : Guru, Rūkṣa

Vīrya : Śīta

Vipāka : Kaṭu

Karma : Vātakara, Pittahara, Atirucya, Lekhana, Stambhana, Vibandhādhmānakara, Chardikara

IMPORTANT FORMULATIONS - Vastyāmayāntaka Ghṛta

THERAPEUTIC USES - Kāsa, Śvāsa, Jvara, Raktavikāra, Dāha , Śopha, Pāṇḍu

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

5-10 ml (Svarasa)

CĀṄGERĪ (Whole Plant)

Cāṅgerī consists of dried whole plant of *Oxalis corniculata* Linn. (Fam. Oxalidaceae); a small annual or perennial, more or less erect herb with creeping or subterranean stem, 6-25 cm high, found throughout warmer parts of the country and also in all tropical and temperate climate, growing upto an elevation of 3000 m in North- West Himalayas.

SYNONYMS

Sanskrit	:	Cāṅgerī, Amlapatrikā
Assamese	:	Chengeritenga
Bengali	:	Amrul
English	:	Indian Sorrel
Gujrati	:	Ambolee, Changeri, Teen Panaki, Rukhadi
Hindi	:	Ambilosa, Tinpatiya, Changeri
Kannada	:	Pullamouradi, Sivargee, Purachi Soppu
Malayalam	:	Pulliparel
Marathi	:	Ambutee, Ambatee, Ambti, Bhui Sarpati
Punjabi	:	Khatkal, Khatmittha, Khattibootee
Tamil	:	Puliyarai
Telugu	:	Pulichinta
Urdu	:	Changeri, Teen Patiya

DESCRIPTION

a) Macroscopic

Root - Dark brownish, thin, about 1-2 mm thick, branched, rough, soft; no odour and taste.

Stem - Creeping, brownish-red, soft, very thin, easily breakable; no odour and taste.

Leaf - Palmately compound, trifoliate; petiole-green, thin, about 3-9 cm long, cylindrical,

pubescent; leaflet-green, 1-2 cm long, obcordate, glabrous, sessile or sub sessile, base cuneate; taste, somewhat sour.

Flower -Yellow, axillary, sub-umbellate.

Fruit - Capsules cylindrical, tomentose.

Seed -Tiny, dark brown, numerous, broadly ovoid transversely striate.

b) Microscopic

Root - Shows 3-4 layers of cork, composed of thin-walled rectangular cells, brownish in appearance; cortex, a wide zone, consisting of rectangular and oval, thin-walled parenchymatous cells filled with simple starch grains, yellowish pigment and tannin; inner cortical cells rectangular and polygonal, smaller in size than miter ones; cortex followed by thin strips of phloem consisting of sieve tubes, companion cells and phloem parenchyma, cambium not distinct; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels cylindrical, pitted some with tail-like projection at one end; tracheids pitted with pointed ends; a few starch grains simple, round to oval measuring 3-11μ in dia., present scattered throughout the region.

Stem - Shows single layered epidermis, composed of rectangular to oval cells, some of which are elongated to become unicellular covering trichomes; cortex consists of 4-5 layers of thin-walled, circular and polyhedral parenchymatous cells; endodermis single layered of thin-walled rectangular cells; pericycle composed of two or three layers of squarish and polygonal sclerenchymatous cells; vascular bundles 6-7 in number, arranged in a ring, composed of a few elements of phloem towards outer side and xylem towards inner side; xylem composed of pitted vessels, tracheids, fibres and xylem parenchyma; central region occupied by pith composed of thin-walled, parenchymatous cells, a few simple, round to oval starch grains measuring 3-11 μ in dia, scattered throughout the region.

Leaf -

Petiole - Shows rounded or plano-convex outline consisting of single layered epidermis of rectangular or circular, thin-walled cells; cortex 3-4 layers of thin-walled, circular, oval or polygonal parenchymatous cells, generally filled with green pigment; endodermis single layered followed by 2-3 layers of sclerenchymatous pericycle, less developed towards upper side of petiole; vascular bundles 5 in number, arranged in a ring, consisting of

phloem towards outer side and xylem towards inner side; centre occupied by a small pith; a few simple, round to oval starch grains, measuring 3-11 μ in dia., scattered throughout.

Lamina - Shows single layered epidermis on upper and lower surfaces, composed of rectangular cells; covering trichomes unicellular; palisade single layered composed of thin-walled, columnar cells, filled with green pigment; below palisade 2-3 layers of thinwalled, spongy parenchyma consisting of circular to oval cells filled with green pigment; stomata paracytic.

Powder- Greenish-brown; shows fragments of trichomes, parenchymatous, sclerenchymatous cells, fibres, epidermis showing irregular cell walls in surface view; a few simple, rounded to oval starch grains, measuring 3-11 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	20	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	10	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

T.L.C.

T.L.C.of the alcoholic extract on Silica gel 'G' plate using Toluene :Ethylacetate (8 : 2) shows under UV (366 nm) one fluorescent zone at Rf. 0.65 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.27, 0.53 and 0.65 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.27, 0.53 and 0.65 (all grey).

CONSTITUENTS - Vitamin C, Carotene, Tartaric Acid, Citric Acid and Malic Acid.

PROPERTIES AND ACTION

Rasa	:	Amla, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Amla
Karma	:	Grāhī, Pittakara, Dīpana, Agnivardhaka, Rucikara, Vātahara, Kaphahara

IMPORTANT FORMULATIONS - Cāṅgerī Ghṛta

THERAPEUTIC USES - Grahaṇī, Arśa, Kuṣṭha, Atīsāra

DOSE - 5-10 ml (Svarasa)

It is also used externally

CIRABILVA (Fruit)

Cirabilva consists of dried fruit of *Holoptelea integrifolia* Planch. (Fam. Ulmaceae); a large, spreading, glabrous, deciduous tree, 15-18 m high, distributed throughout the greater part of India upto an altitude of 600 m and sometimes grown on the road side.

SYNONYMS

Sanskrit	:	Pūtigandha
Assamese	:	--
Bengali	:	--
English	:	--
Gujrati	:	Kanjo, Chirbil, Chirmil
Hindi	:	Chirabil, Chiramil, Papri
Kannada	:	Tapasimara, Chirabilwa
Malayalam	:	Aval, Avil
Marathi	:	Vavala, Baval
Oriya	:	Karanj, Duranja, Putikaranj
Punjabi	:	Papri, Chirbid
Tamil	:	Avil Pattai
Telugu	:	Nemalinara, Tapazi
Urdu	:	Papri

DESCRIPTION

a) Macroscopic

Fruit a one seeded samara; light brown, obliquely elliptic or orbicular, 1.5- 2.5 cm wide, 2.5-3.5 cm long, winged and stalked, indehiscent, pubescent, wings reticulately veined.

b) Microscopic

Fruit shows single layered epicarp having numerous, pointed, unicellular hairs; mesocarp composed of 3-5 layered, oval to polygonal, elongated parenchymatous cells; a few vascular bundles and tannin cells found scattered in this region; endocarp consisting of 2-3 layered, round to oval, sclerenchymatous cells with striations and narrow lumen; perisperm in seed composed of single layered, parenchymatous cells filled with reddish-brown content; endosperm and embryo composed of colourless cells containing oil globules.

Powder - Reddish-brown; shows fragments of thin walled, oval to polygonal parenchymatous cells of endosperm, taniniferous oil globules, unicellular hairs, thick-walled, polygonal, sclerenchymatous cells, polygonal cells of testa in surface view.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) a fluorescent zone at Rf 0.85 (blue). On exposure to Iodine vapour five spots appear at Rf 0.11, 0.38, 0.44, 0.50 and 0.85 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes five spots appear at Rf. 0.11, 0.38, 0.44, 0.50 and 0.85 (all violet)

CONSTITUENTS - Fixed Oil

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Pittahara, Stambhaka

IMPORTANT FORMULATIONS - Pīyūṣavallī Rasa, Gandharvahastādi Kvātha Cūrṇa

THERAPEUTIC USES - Chardi, Arśa, Kṛmi, Kuṣṭha, Prameha

DOSE - 1-3 g

DANTĪ (Root)

Dantī consists of dried root of *Baliospermum montanum* Muell.-Arg. (Fam. Euphorbiaceae); a leafy undershrub, distributed in outer range of Himalayas from Kashmir to Assam and in moist deciduous forests elsewhere in India.

SYNONYMS

Sanskrit	:	Dantī
Assamese	:	Danti
Bengali	:	Danti
English	:	Wild Croton
Gujrati	:	Danti
Hindi	:	Danti
Kannada	:	Kadu Haralu
Malayalam	:	Dantti, Neervalam
Marathi	:	Danti
Oriya	:	Danti
Punjabi	:	Danti
Tamil	:	Konda Amudamu, Danti
Telugu	:	Konda Amudamu
Urdu	:	Danti

DESCRIPTION

a) Macroscopic

Root pieces almost cylindrical, straight or ribbed with secondary and tertiary roots, 0.2-1 cm thick and upto 10 cm or more in length, tapering at one end, tough, externally brown; surface, rough due to longitudinal striations, transverse cracks and scars of rootlets; internally cream-coloured; transversely smoothened root shows thin, brown bark and yellowish-white central core; taste, bitter.

b) Microscopic

Shows 5-18 layered cork, consisting of brown coloured, suberised or lignified brick-shaped cells, a few cells containing tannin and red colouring matter; secondary cortex consists of 2-7 layers of oval to elliptical, tangentially elongated cells, a few cortical fibres are also present in this region; secondary phloem consists of usual elements, traversed by uni to biseriate phloem rays; secondary xylem consists of usual elements; vessels and tracheids, bordered pits, a few having reticulate thickening; fibres slightly thick-walled, narrow lumen and blunt tips; xylem rays 1 or 2 cells wide; rosette crystals of calcium oxalate and starch grains, present only in secondary cortex and phloem; starch grains solitary and in groups, simple, round to oval measuring 6-17 μ in dia.

Powder - Brown; shows fragments of cork more or less rectangular, thick-walled in surface view; rosette crystals of calcium oxalate; numerous phloem fibres with narrow lumen and blunt tips, border pitted- and reticulate vessels, tracheid and tannin cells, round to oval simple starch grains measuring 6-17 μ in diameter, and in groups occasionally.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under U.V. (366 nm) a fluorescent zone at Rf 0.65 (blue). On exposure to Iodine vapour two spots appear at Rf 0.51 and 0.65 (both yellow). On spraying with 50% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C two spots appear at Rf 0.51 and 0.65 (both grey).

CONSTITUENTS - β - Sitosterol and Triterpenoids, Resinous Glycosides, Phorbol Esters.

PROPERTIES AND ACTION

Rasa	:	Kaṭu
Guṇa	:	Tīkṣṇa, Sara, Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphahara, Raktadoṣahara, Viḍhara, Dīpana, Rocaka, Śodhaka, Vikāśi, Vraṇa

IMPORTANT FORMULATIONS - Dantyādyariṣṭa, Punarnavā Maṇḍura, Abhayāriṣṭa, Kāṅkāyana Guṭikā, Dantīharītakī, Kalyaṇaka Kṣāra, Kaiśora Guggulu

THERAPEUTIC USES - Tvak doṣa, Dāha, Śotha, Udararoga, Śūlaroga, Kṛmi, Arśa, Aśmarī, Kaṇḍū, Kuṣṭha, Vraṇa, Plīhā Vṛddhi, Gulma, Kāmalā

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

DHATTŪRA (Seed)

Dhattūra consists of dried seeds of *Datura metel* Linn.; Syn. *D. fastuosa* L., *D. alba* Ramph; *D. cornucopaea* Hort. (Fam. Solanaceae); occurring wild throughout the country.

SYNONYMS

Sanskrit	:	Kanaka, Dhustūra, Ummatta
Assamese	:	Dhatura
Bengali	:	Dhutura, Dhutra
English	:	White Thorn Apple
Gujrati	:	Dhaturo
Hindi	:	Dhatura
Kannada	:	Umbe
Kashmiri	:	--
Malayalam	:	Ummam
Marathi	:	Dhatra
Oriya	:	Dudura
Punjabi	:	Dhatura
Tamil	:	Oomattai, Umattai
Telugu	:	Ummettha, Erriummetta
Urdu	:	Dhatura

DESCRIPTION

a) Macroscopic

Seed reniform, compressed, flattened, surface finely pitted; 0.6 cm long, 0.4 cm wide; light brown to yellowish-brown in colour; thicker towards the curved edge, which is rugose; large, pale strophiole near micropyle; odourless; taste, bitter.

b) Microscopic

Shows in outline more or less elongated, irregular or wavy structure having bulgings at either side; testa single layered consists of thick-walled, lignified, sclerenchymatous cells forming club-shaped structure, followed by 3-5 layered more or less tangentially elongated, thin-walled, parenchymatous cells; endosperm encloses more or less curved embryo composed of polygonal, thin-walled, parenchymatous cells, filled with aleurone grains and abundant oil globules.

Powder - Brown and oily; shows fragments of testa of groups of thick-walled, light brown sclerenchymatous cells; polygonal, thin-walled parenchymatous cells containing oil globules and aleurone grains.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene Ethylacetate: Diethylamine (7:2: I) shows under U.V. (366 nm) three fluorescent zones at Rf 0.18, 0.33 (both light blue) and 0.93 (blue). On exposure to Iodine vapour three spots appear at Rf 0.33, 0.47 and 0.93 (all yellow). On spraying with Dragendorff reagent two spots appear at Rf 0.33 and 0.47 (both orange).

CONSTITUENTS - Alkaloids - Tropane Alkaloids - Hyoscyamine etc. and Fixed Oil

PROPERTIES AND ACTION

Rasa : Madhura, Kaṭu, Kaṣāya, Tikta

Guṇa : Tīkṣṇa, Rūkṣa, Guru

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Madakārī, Kaphahara, Viṣahara, Kṛmihara, Vraṇahara, Kaṇḍūhara, Bhramahara, Varṇya, Vāmaka

IMPORTANT FORMULATIONS - Kanakāsava, Sūtaśekhara Rasa, Jvarāṅkuśa Rasa, Lakṣmī Vilāsa Rasa (Nāradīya), Kanakasundara Rasa, Dugdha Vaṭī, Pīyūṣavallī Rasa

THERAPEUTIC USES - Kṛmi, Yūkā, Likṣā

DOSE - 30-60 mg

DRĀKṢĀ (Fruit)

Drākṣā consists of dried mature fruits of *Vitis vinifera* Linn. (Fam. Vitaceae); a deciduous climber, mostly cultivated in north western India in Punjab, Himachal Pradesh and Kashmir for their use as dessert fruit. However, the dried fruits, known in trade as 'Raisins', are mostly imported into India, from the Middle East and Southern European countries.

SYNONYMS

Sanskrit	:	Mṛdvikā, Gostanī
Assamese	:	Dakh, Munaqqa
Bengali	:	Maneka
English	:	Dry Grapes, Raisins
Gujrati	:	Drakh, Darakh
Hindi	:	Munkka
Kannada	:	Draksha
Kashmiri	:	--
Malayalam	:	Munthringya
Marathi	:	Draksha, Angur
Oriya	:	Drakya, Gostoni
Punjabi	:	Munaca
Tamil	:	Drakshai, Kottai Drakshai
Telugu	:	Draksha
Urdu	:	Munaqqa

DESCRIPTION

a) Macroscopic

Fruit a berry, sticky and pulpy, dark brown to black; oblong or oval, sometimes spherical; 1.5 -2.5 cm long and 0.5-1.5 cm wide; outer skin irregularly wrinkled forming ridges and furrows; usually contain 1-4 seeds, 4-7 mm long, ovoid rounded to triangular or

simply ovoid, brown to black; odour, sweetish and pleasant; taste, sweet.

b) Microscopic

A single layered epidermis cells filled with reddish-brown contents; mesocarp pulpy, made up of thin-walled, irregular cells containing prismatic crystals of calcium oxalate, measuring 13.75 -41 μ in dia.; some fibro-vascular bundles also present in this region; seeds composed of testa and endosperm; testa composed of thick-walled yellowish cells; endosperm composed of angular parenchymatous cells containing oil globules and cluster crystals of calcium oxalate, measuring 11-16 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	25	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	70	per cent, Appendix	2.2.7.
Loss on drying	Not more than	15	per cent, Appendix	2.2.9

ASSAY

T.L.C.

T.L.C of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: I: 5) shows under UV (366 nm) a fluorescent zone at Rf. 0.29 (blue). On exposure to Iodine vapur four spots appear at Rf. 0.08, 0.29, 0.69 and 0.85 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.08 (black), 0.29 (black) and 0.98 (violet)

CONSTITUENTS - Malic, Tartaric & Oxalic Acids, Carbohydrates and Tannins.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Guru, Sara, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Bṛṃhaṇa, Cakṣuṣya, Vṛṣya, Vātapittahara, Svarya

IMPORTANT FORMULATIONS - Drākṣāsava, Drākṣāriṣṭa, Drākṣāvaleha, Drākṣādi Kvātha Cūrṇa, Drākṣādi Cūrṇa, Elādi Guṭikā

THERAPEUTIC USES - Tṛṣṇā, Jvara, Kāsa, Śvāsa, Dāha, Śoṣa, Kāmalā, Raktapitta, Kṣata Kṣīṇa, Vibandha, Arśa, Agnimāndya, Madātyaya, Pāṇḍu, Udāvarta, Āsya Śoṣa, Vātarakta

DOSE - 5-10 g of the drug

DŪRVĀ (Root)

Dūrvā consists of dried fibrous roots of *Cynodon dactylon* (Linn.) Pers. (Fam. Poaceae); an elegant, hard, perennial, creeping grass growing throughout the country and ascending to 2440 m.

SYNONYMS

Sanskrit	:	Śatavīrya
Assamese	:	--
Bengali	:	Durva
English	:	Creeping Cynodon, Conch Grass
Gujrati	:	Khadodhro, Lilidhro, Dhro
Hindi	:	Doob
Kannada	:	Garike Hullu
Kashmiri	:	--
Malayalam	:	Koruka Pullu
Marathi	:	Doorva, Hariyalee, Harlee
Oriya	:	--
Punjabi	:	Dubada
Tamil	:	Aruvam Pullu
Telugu	:	Garika, Pacchgaddi
Urdu	:	Doob Ghas, Doob

DESCRIPTION

a) Macroscopic

Roots fibrous, cylindrical, upto 4 mm thick, minute hair-like roots arise from the main roots; cream coloured.

b) Microscopic

Mature root shows epiblema or piliferous layer composed of single layered, thin-walled, radially elongated to cubical cells; hypodermis composed of 1-2 layered, thin-walled, tangentially elongated to irregular shaped cells; cortex differentiated into two zones, 1 or 2 layers of smaller, thin-walled, polygonal, lignified sclerenchymatous and 4-6 layers of thin-walled, elongated parenchymatous cells being larger; endodermis quite distinct being single layered, thick-walled, tangentially elongated cells; pericycle 1-2 layers composed of thin-walled sclerenchymatous cells; vascular bundles consisting of xylem and phloem, arranged in a ring on different radials; xylem exarch, having usual elements; centre occupied by wide pith, composed of oval to rounded thick-walled parenchymatous cells containing numerous simple, round to oval or angular starch grains measuring 4-16 μ in dia., and compound starch grains having 2-4 components.

Powder - Cream coloured; fragments of xylem vessels with pitted walls, thick-walled lignified sclerenchymatous cells and numerous simple round to oval or angular starch grains measuring 4-16 μ in dia., and compound starch grains having 2-4 components.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under UV (366 nm) three fluorescent zones at Rf 0.70, 0.89 (both blue) and 0.92 (pink). On exposure to Iodine vapour six spots appear at Rf 0.22, 0.30, 0.37, 0.80, 0.89 and 0.92 (all yellow) On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appear at Rf 0.22, 0.30, 0.37, 0.80, 0.89, 0.92 (all grey).

CONSTITUENTS - Phenolic Phytotoxins and Flavonoids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Madhura, Tikta
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Kaphapittaśāmaka, Raktapittanāśaka, Dāhaghna, Atisāraghna, Śramahara, Tṛptikara

IMPORTANT FORMULATIONS - Balāśvagandhalākṣādi Taila, Madhuyaṣṭyādi Taila, Marma Guṭikā, Mānasa Mitra Vaṭaka, Candrakalā Rasa

THERAPEUTIC USES - Raktapitta, Tṛṣṇāroga, Dāharoga, Visarpa, Tvagroga, Arocaka, Duḥsvapna, Bhūtaroga, Chardi, Mūrcchā, Raktapradara, Mūtra Dāha

DOSE - 5-10 ml (Svarasa)

ERAṆḌA (Fresh Leaf)

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

SYNONYMS

Sanskrit	:	Gandharva-Hasta, Pañchāṅgul, Vātāri
Assamese	:	Erri
Bengali	:	Bherenda
English	:	Castor Oil Plant
Gujrati	:	Erando
Hindi	:	Erand, Rendee, Andu
Kannada	:	Harlu
Kashmiri	:	--
Malayalam	:	Ambanakka, Avanakku
Marathi	:	Erand, Erandee
Oriya	:	Bheranda
Punjabi	:	Erand
Tamil	:	Amanakku
Telugu	:	Amudanu, Amudmuchetu
Urdu	:	Erand

DESCRIPTION

a) Macroscopic

Leaves green or reddish-green, broad, palmately lobed, with 5-11 lobes, 30-60 cm. dia., nearly orbicular, lobes oblong linear, acute or acuminate, margin serrate, vary from 4-20 cm in length, 2.5 -7.5 cm in width; petiole 10-20 cm long, cylindrical or slightly

flattened towards distal and peltately attached to the blade, solid when young, becomes hollow on maturity.

b) Microscopic

IDENTITY, PURITY AND STRENGTH

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṭu, Kaṣāya
Guṇa	:	Snigdha, Tīkṣṇa, Sūkṣma
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Kaphavātaśāmaka, Vṛṣya, Kṛmighna, Pittaprakopaka, Raktaprakopaka, Yakṛtuttejaka

IMPORTANT FORMULATIONS - Caturbhuja Rasa, Caturmukha Rasa, Cintāmaṇi Caturmukha Rasa

THERAPEUTIC USES - Kṛmi, Mūtrakṛcchra, Gulma, Vātavyādhi, Vasti Śūla, Arocaka, Vidradhī

DOSE - 10-20 ml (Svarasa)

2-5 g (Powder)

ERAṆḌA (Seed)

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

SYNONYMS

Sanskrit	:	Gandharva-Hasta, Pañchāṅgul, Vātāri
Assamese	:	Erri
Bengali	:	Bherenda
English	:	Castor Oil Plant
Gujrati	:	Erando
Hindi	:	Andeo, Erand, Rendee
Kannada	:	Harlu
Kashmiri	:	--
Malayalam	:	Avanakku, Abanakka
Marathi	:	Eramd, Eramdee
Oriya	:	Bheranda
Punjabi	:	Erand
Tamil	:	Amanakku
Telugu	:	Amudamu, Amudmuchetu
Urdu	:	Erand

DESCRIPTION

a) Macroscopic

Seeds oblong, one face convex and the other slightly flattened, 1-1.5 cm long, 0.6-0.9 cm wide, 0.4-0.8 cm thick, testa hard, glossy, smooth, grey or brown to reddish-brown or black and may be variously marbled or striped, raphe extends from the caruncle to chalaza; odour, not distinct; taste, weakly acrid.

b) Microscopic

Seed shows a hard testa, membraneous tegmen, a fleshy endosperm, and thin embryo with flat, broad cotyledons; testa consists of hard, single layered epidermis, radially elongated, compactly arranged, slightly curved tabular cells, having reddishbrown contents followed by 8-10 layered, tangentially elongated parenchymatous cells, most of them containing oil globules, fibro-vascular bundles found scattered in this zone; endosperm consisting of oval, irregular cells filled with oil globules, abundant aleurone grains, measuring 8.2 - 13.75 μ in dia.; cotyledons, thin, flat and leafy.

Powder - Dark brown, oily; shows fragments of numerous elongated thick-walled, polygonal cells of testa, reddish-brown tabular cells, thin-walled oval to round parenchymatous cells of endosperm oil globules, numerous aleurone grains measuring upto 13.75 μ in dia. and including crystalloids and globoids within.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	36	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.
Fixed oil	Not less than	37	per cent, Appendix	2.2.8

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Ethylacetate (95 : 5) shows under U.V. (366 nm) a fluorescent spot at Rf. 0.95 (sky blue). On exposure to Iodine vapour seven spots appear at Rf. 0.39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all yellowish brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 105° C seven spots appear at Rf. 0,39, 0.50, 0.64, 0.72, 0.80, 0.89 and 0.95 (all brown).

CONSTITUENTS - - Fixed Oil.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṭu, Kaṣāya
Guṇa	:	Snigdha, Tīkṣṇa, Sūkṣma
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Dīpana, Āmapācana, Viḍbhedana, Anulomana, Srotośodhana, Vayasthāpana, Medohara

IMPORTANT FORMULATIONS - Bṛhat Saindhavādi Taila, Gandharvahastādi Taila, Siṃhanāda Guggulu, Miśraka Sneha

THERAPEUTIC USES - Āmavāta, Vibandha, Yakṛt Roga, Plīhodara, Arśa, Kaṭi Śūla, Gṛdhrasī

DOSE - 1/2 - 3 g (Powder)

GAMBHĀRĪ (Stem)

Gambhārī consists of dried stem of *Gmelina arborea* Roxb. (Fam. Verbenaceae), an unarmed, moderate sized, deciduous tree, found scattered in deciduous forest throughout the greater part of India upto an altitude of 1500 m., and the Andamans

SYNONYMS

Sanskrit	:	Kāśmarī
Assamese	:	Gomari
Bengali	:	Gamar, Gambar
English	:	Candahar Tree, Cashmere Tree
Gujrati	:	Sawan, Shewan
Hindi	:	Gambhari
Kannada	:	Seevani, Kasmiri-mara
Kashmiri	:	--
Malayalam	:	Sevana, Kumizhu
Marathi	:	Sivan
Oriya	:	Gambhari
Punjabi	:	Khambhari
Tamil	:	Perunkurmizh
Telugu	:	Gummaditeku
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Stem occurs as longitudinally and transversely cut pieces having varying length and thickness; hard, woody, smooth except for a few scars of branches; yellowish-grey externally and cream coloured internally.

b) Microscopic

Thin stem shows 10-15 or more layers of lignified cork, consisting of tangentially elongated, rectangular cells; secondary cortex 5-10 layers, oval to elliptical, thin-walled cells with tangential groups of fibres; pericycle present in the form of continuous ring consisting of patches of fibres alternating with stone cells: secondary phloem composed of usual elements, phloem fibres absent; in thick stem secondary cortex almost absent; secondary phloem well developed, consisting of usual elements; groups of stone cells and fibres scattered throughout this region; secondary xylem consists of usual elements; vessels solitary or 2-4 in groups having spiral thickening and bordered pits; fibres mostly aseptate but some septate with wide lumen; parenchyma paratracheal, a few in number; medullary rays 3-22 cells high and 1-4 cells wide; starch grains, simple as well as compound having 2-4 components measuring 3-11μ in dia., present in secondary cortex, phloem and xylem parenchyma and ray cells.

Powder - Crearnish-grey; shows fragments of lignified cork cells, thin-walled, parenchymatous cells, aseptate and a few septate fibre with wide lumen; vessels with spiral thickening and bordered pits, stone cells, simple, round to oval starch grains, measuring 3-1 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

T.L.C.

T. L C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (95 : 5) shows under U.V. (366 nm) two fluorescent zones at Rf 0.39 and 048 (both blue) On exposure to Iodine vapour three spots appear at Rf 0.39, 0.48 and 0.85 (all yellow). On

spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C three spots appear at Rf 0.39, 0.48 and 0.85 (all violet)

CONSTITUENTS - Lignans

PROPERTIES AND ACTION

Rasa : Madhura, Tikta, Kaṣāya, Kaṭu

Guṇa : Guru

Vīrya : Uṣṇa

Vipāka : Madhura

Karma : Vātahara, Pittahara, Kaphahara, Dīpana, Pācana, Bhedanī, Medhya, Virecanopaga, Viṣahara, Śramahara

IMPORTANT FORMULATIONS - Karpūrādi Kuzambu (Laghu), Candanāsava, Dantyādyariṣṭa, Uśīrāsava

THERAPEUTIC USES - Śopha, Jvara, Dāha, Tṛṣṇā, Raktadoṣa, Viṣavikāra, Arśa, Śūla, Raktapitta, Bhrama, Śoṣa, Āma Śūla

DOSE - 5-10 g of the drug for decoction

GOJIHVĀ (Aerial Part)

Gojihvā consists of dried leaf and stem portion of *Onosma bracteatum* Wall. (Fam. Boraginaceae); a perennial, hirsute or hispid herb, sparsely distributed in North Western Himalayas from Kashmir to Kumaon at altitudes of 3,500-4,500 m.

SYNONYMS

Sanskrit	:	Darvīpatra, Vṛṣajihvā, Kharaparṇinī
Assamese	:	--
Bengali	:	Gojika Sak, Gojialata, Dadisha
English	:	--
Gujrati	:	Bhonpathari, Galajibhi
Hindi	:	Gaujaban, Gojiya
Kannada	:	Shankha Huli, Aakalanalige, Gojaba
Kashmiri	:	--
Malayalam	:	Kozhuppu
Marathi	:	Govjaban, Paatharee
Oriya	:	Kharsan, Kharaptra
Punjabi	:	Kazban
Tamil	:	Dharviptra, Kharaptra, Kozha
Telugu	:	Yeddunaluka
Urdu	:	Gaozaban

DESCRIPTION

a) Macroscopic

Stem - Cut pieces available in 5-9 cm long and 3.2 to 4.7 cm in dia., flattened, erect, stout; rough due to white, hard, hispid hairs and cicatrices, and longitudinal wrinkles; colour greenish-yellow; fracture, short; odour and taste not characteristic.

Leaf - Lanceolate to ovate-lanceolate, 12-30 cm long, 1.5-3.5 cm broad, acuminate

tubercle-based hispid hairs present on both surfaces; greenish to light yellow on top and white beneath.

b) Microscopic

Stem - shows single-layered epidermis, covered with thick cuticle, some epidermal cells elongate to form long, warty, tubercle-based unicellular hairs, cortex differentiated in two zones, 5-7 layered outer collenchyrna, 3-4 layered inner parenchymatous cells, consisting of thin-walled, round to oval cells; phloem composed of usual elements; phloem fibres absent; xylem consisting of usual elements, vessels mostly solitary or rarely 2-3 in groups having spiral thickening, and fibres and tracheids having blunt tips and simple pits; xylem ray not distinct: pith consisting of round, thin-walled, parenchymatous cells.

Leaf -

Midrib -single layered epidermis with thick cuticle and long warty, tubercle-based unicellular hairs present on both surfaces followed by 5-7 layers of collenchymatous and 3-4 layers parenchymatous cortical cells; vascular bundle situated centrally.

Lamina - isobilateral, single layered epidermis on either surface covered with thick cuticle, long warty, tubercle-based, simple, unicellular hairs present on both surfaces; palisade 2 layered, spongy parenchyma 8-10 layered, stomata paracytic

Powder - Greenish-brown; shows groups of oval to polygonal, thin-walled straight epidermal cells; spiral vessels; a few fibres entire or in pieces, elongated with blunt tips; long warty, tubercle-based unicellular hairs and a few paracytic stomata.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	26	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.

-

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol ; Acetic acid: Water (4 : 1 : 5) shows in visible light six spots at Rf. 0.38 (yellow), 0.55 (grey), 0.62, 0.69 (both yellow), 0.76 (grey) and 0.99 (green). Under UV (366 nm) six fluorescent zones at Rf. 0.30 (pale blue), 0.55 (violet), 0.62, 0.69 (both yellow), 0.76 (green) and 0.99 (red). On exposure to Iodine vapour eight spots appear at Rf. 0.29, 0.38, 0.46 (all yellow), 0.56 (grey), 0.62, 0.66 (both yellow), 0.76 and 0.99 (both grey). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes, six spots appear at Rf. 0.29, 0.56, 0.62, 0.66, 0.76 and 0.99 (all violet).

CONSTITUENTS - Tannin and Sugars

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta, Madhura
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātala, Pittahara, Kaphahara, Hṛdya, Grāhī

THERAPEUTIC USES - Raktapitta, Kuṣṭha, Jvara, Śvāsa, Kāsa, Aruci, Prameha, Raktavikāra, Vraṇa, Danta Roga

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

GRANTHIPARṆĪ (Root)

Granthiparṇī consists of root of *Leonotis nepetaefolia* R. Br. (Fam. Lamiaceae), an ornamental herb or shrub, 1.2 -1.8 m high, cultivated and naturalized throughout the hotter parts of the country.

SYNONYMS

Sanskrit	:	Kākapuccha
Assamese	:	Granthika
Bengali	:	Hejurchei
English	:	Knod Grass
Gujrati	:	Hatisul
Hindi	:	Gathivan
Kannada	:	--
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Dipmal
Oriya	:	--
Punjabi	:	--
Tamil	:	--
Telugu	:	Ranathem
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Root system well developed, numerous lateral roots arise from main root, about 0.8 cm in dia., secondary and tertiary roots thin and fibrous, greyish coloured, main root slightly brownish coloured with a few longitudinal furrows; fracture, hard and short; no characteristic odour and taste.

b) Microscopic

Mature root shows a thin bark and a very wide xylem; cork exfoliating, generally detached, where present, consists of a few layers of tangentially elongated compressed cells possessing brown contents; secondary cortex, a narrow zone, composed of 3-6 layers or more, rounded, irregular or tangentially elongated, thin- walled, parenchymatous cells having brown contents; secondary phloem consists of thin-walled cells of sieve elements; fibres absent; secondary xylem forms major part of root consisting of vessels, xylem fibres and xylem parenchyma; vessels more or less uniformly distributed throughout secondary xylem; vessels with bordered pits and of various shapes and sizes, a few having elongated projection at one or both ends; xylem fibres elongated, lignified with pointed ends with moderately wide lumen; xylem parenchyma rectangular or square in shape and pitted; medullary rays uni to triseriate, uni and biseriate rays being more common.

Powder - Brown; shows numerous parenchymatous cells of secondary cortex, a few fragments and entire xylem vessels with bordered pits, fibres and xylem parenchyma

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) on exposure to Iodine vapour shows six spots at Rf. 0.04, 0.05, 0.08, 0.19, 0.23 and 0.35 (all yellow). On spraying with Vanillin Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.04, 0.08 and 0.35 (all violet).

CONSTITUENTS - Sterols.

PROPERTIES AND ACTION

Rasa	:	Tikta
Guṇa	:	Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Dīpana, Kaphavātahara, Daurgandhyanāśana

IMPORTANT FORMULATIONS - Bṛhat Guḍūcī Taila, Mṛtasañjīvanī Surā

THERAPEUTIC USES - Śvāsa, Kaṇḍū, Viṣa

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

HAṂSAPADĪ (Whole Plant)

Haṃsapadī consists of dried whole plant of *Adiantum lunulatum Burm.* (Fam. Polypodiaceae); a fern found throughout moist places, generally on the slopes of hills, ascending up to an elevation of about 1370 m.

SYNONYMS

Sanskrit	:	Haṃsapādī, Raktapādī, Kiṭamātā, Tripādikā
Assamese	:	Sharul Arj, Sharujeena, Parsiyav
Bengali	:	Kali Jhat
English	:	Maiden Hair
Gujrati	:	Hansaraja
Hindi	:	Hanspadee, Hansaraj
Kannada	:	Hamsapadi
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Hamsaraj
Oriya	:	--
Punjabi	:	Hamsaraj
Tamil	:	--
Telugu	:	Hamsapadi
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Root - Very thin, fibrous, about 10-15 cm long, reddish-black in colour, soft and branched.

Rhizome - Long, upto 2 mm thick, glabrous, prostrate or erect, dark reddish-brown or a black in colour.

Frond - Rachis shiny black, simply pinnate, pinna roughly lunulate, subdimidiate, lower edge nearly in line and oblique with its black shiny petiole, upper edge bluntly rounded and more or less lobed, a few sori in a continuous line on the under surface along the edge, with a false indusium.

b) Microscopic

Root mature root shows single layered epidermis consisting of thin-walled, small and irregular cells, followed by 3-4 layers of large thick-walled, polygonal, parenchymatous cells of cortex; endodermis single layered composed of square or somewhat rounded cells; pericycle single layered composed of square shaped sclerenchymatous thick and dark reddish-brown wall; pericycle encloses a diarch stele with a few elements of xylem and phloem.

Rhizome - Mature rhizome consists of thick walled, rectangular, small cells of epidermis, followed by 3-4 layers of sclerenchymatous cells of hypodermis, composed of thickwalled cells; cortex wide, made up of thin-walled, rounded or oval-shaped parenchymatous cells, enclosing an amphiphloic siphonostele; endodermis present; vascular bundle with xylem consisting protoxylem towards both ends and metaxylem in centre; phloem surrounds the xylem externally and also internally; tracheid with scalariform to reticulate thickening present; a central pith consists of thick-walled cells, and fibres, and is sclerenchymatous.

Frond-

Petiole - Shows concave-convex outline; epidermis single layered; hypodermis consists of 2 or 3 layers, lignified, thick-walled, sclerenchymatous cells; ground tissue composed of oval to polygonal, thin-walled parenchymatous cells; stele single, slightly triangular in shape, located centrally and surrounded by peri cycle and endodermis.

Pinnule - Shows single layered epidermis on either surface; mesophyll round to oval in shape and not differentiated into palisade and spongy parenchyma; a few stomata present only on lower surface; a few sori also seen.

Powder - Dark reddish-brown in colour; shows dark reddish-brown pieces of sclerenchymatous cells and light coloured crushed cells of cortex, a few tracheids having reticulate thickening, fibres and a few spores.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	11	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 :1 : 5) shows under UV (366 nm) two fluorescent zones at Rf. 0.80 and 0.96 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.19, 0.30 and 0.80 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.19, 0.30 and 0.80 (all yellowish brown).

PROPERTIES AND ACTION

Rasa : Kaṣāya, Tikta

Guṇa : Guru

Vīrya : Śīta

Vipāka : Kaṭu

Karma : Raktavikārahṛt, Viṣaghna

IMPORTANT FORMULATIONS - Madhuyaṣṭyādi Taila, Mānasa Mitra Vaṭaka, Muktā Pañcāmṛta Rasa, Svarṇabhūpati Rasa, Kālakūṭa Rasa

THERAPEUTIC USES - Visarpa, Vraṇa, Dāha, Atīsāra, Lutā Viṣa, Bhūta Graha, Kakṣa Sphoṭa, Rakta Vikāra

DOSE - 1-3 g

HAPUṢĀ (Fruit)

Hapuṣā consists of dried fruit of *Juniperus communis* Linn (Fam. Cupressaceae); a dense, more or less procumbent shrub, rarely a small tree, found in the Himalayas from Kumaon westwards at an altitude of 1500-4250 m.

SYNONYMS

Sanskrit	:	Havuṣā, Matsyagandha
Assamese	:	Arar, Abahal, Habbul
Bengali	:	Hayusha
English	:	Juniper Berry, Common Juniper
Gujrati	:	Palash
Hindi	:	Havuber, Havubair
Kannada	:	Padma Beeja
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Hosh
Oriya	:	--
Punjabi	:	Havulber
Tamil	:	--
Telugu	:	Hapusha
Urdu	:	Abhal, Aarar

DESCRIPTION

a) Macroscopic

Fruit sub-spherical, berry like, purplish-black, occasionally showing a 'bloom', about 0.5-1.0 cm in dia., apex shows triradiate mark and.depression indicating the suture of three fleshy-bracts; at the base are six, small, pointed, bracts arranged in 2 whorls, but occasionally 3 or 4 whorls present; three hard, triangular seeds are embedded in the fleshy mesocarp, each with a woody testa bearing large partly sunk oily glands; odour terebinthine

and taste bitter.

b) Microscopic

Outer layer of fruit shows 3-4, large, cubic or tabular cells having thick, brown porous walls externally covered by single layered, colourless cuticle; sarcocarp consists of large, elliptical, thin-walled, loosely coherent cells, containing drops of essential oil and prismatic crystals of calcium oxalate; oval to elongated, elliptical, triangular or irregular shaped cells abundant in this region; seed coat shows 2 or 3 layers of tabular, thin-walled cells covered externally by a thin cuticle and followed internally by a wide zone of thick-walled polygonal sclerenchymatous cells; endosperm and embryo not distinct.

Powder - Brown; shows oval to elongated, elliptical and irregular shaped, thick-walled stone cells; rectangular to hexagonal, straight, thick walled epidermal cells in surface view; prismatic crystals of calcium oxalate and oil globules.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.11 (light blue), 0.20 (light blue) and 0.58 (blue). On exposure to Iodine vapour ten spots appear at Rf. 0.17, 0.25, 0.30, 0.36, 0.46, 0.58, 0.64, 0.67, 0.90 and 0.96 (all yellow). On spraying with Vanillin Sulphuric acid and heating the plate for ten minutes at 110°C twelve spots appear at Rf. 0.11, 0.17, 0.25, 0.30 (all brown), 0.36 (light brown), 0.46, 0.52 (both brown), 0.58 (dirty yellow), 0.64 (brown), 0.73 (light brown), 0.90 (light brown) and 0.96 (brown).

CONSTITUENTS - Essential Oil and Flavonoids

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Guru, Mṛdu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Agnidīpaka, Vātanāśaka, Kaphanāśaka, Viṣaghna

IMPORTANT FORMULATIONS - Kumāryāsava, Saptaviṃśatika Guggulu, Dādhika Ghṛta, Nārāyaṇa Cūrṇa, Trayodaṣāṅga Guggulu, Pradarāntaka Lauha, Nityānanda Rasa

THERAPEUTIC USES - Pittodara, Arśa, Grahaṇī, Gulma, Śūla, Kṛmi, Vātodara, Plīhāroga

DOSE - 2-6 g in powder form

INDRAVĀRUṆĪ (Fruit)

Indravāruṇī consists of dried/peeled cut pieces of the fruit of *Citrullus colocynthis Schrad.* (Fam. Cucurbitaceae); an annual or perennial creeper growing wild in the warm, arid and sandy tracts of North West, Central and Southern parts of the country.

SYNONYMS

Sanskrit	:	Gavākṣī, Indravallī, Aindrī
Assamese	:	Gavadani
Bengali	:	Rakhal
English	:	Colocynth
Gujrati	:	Indrayan
Hindi	:	Indrayan
Kannada	:	Havumekke
Kashmiri	:	--
Malayalam	:	Kattu Vellarikkai, Valiya Pekkummatti
Marathi	:	Endrayana
Oriya	:	Gothakakudi, Indrayanalata, Garukhiya
Punjabi	:	Indrayana
Tamil	:	Peitummatti
Telugu	:	Chedupuchcha, Peikummatti
Urdu	:	Hanjal

DESCRIPTION

a) Macroscopic

White or pale yellowish-white, light, pithy fragments upto about 6 cm long and 2 cm thick; externally convex with ridges and flattened areas 5-10 mm wide reulting from peeling with a knife; internally irregularly concave and showing numerous ovoid depressions about 10 mm long, left by the removal of the seeds; pulp bitter, seeds flattened, ovoid, yellowish-white to dark brown, about 7 x 5 x 2 mm; endosperm narrow and oily; cotyledons 2, oily;

radicle, small; epicarp woody, about I mm thick, buff coloured externally; odourless; taste, intensely bitter.

b) Microscopic

Pulp consists of large, thin-walled, pitted parenchyma of rounded cells showing oval, flat, pitted areas where they are in contact with many slender bicollateral vascular strands having spiral vessels and occasional associated latex vessels; epicarp, where present, with epidermis of radially elongated cells having thick outer walls and thin inner walls and partially thickened anticlinal walls with occasional stomata of the anomocytic type; the adjacent parenchymatous layer about 15 cells thick, and an inner layer of sclereids, the outer sclereids very thick, smaller, about 15 to 30 μ in diameter, isodiaroetric and the inner sclereids layer upto about 60 μ, radially elongated, with thinner walls; seed, testa with outer epidermis of thick-walled unlignified palisade cells having ertical strips of thickening on the anticlinal walls, with inner layers of very thick-walled, striated, pitted, lignified sclereids, and an inner most layer of sclereids with reticulately thickened walls; endosperm and cotyledons parenchymatous with fixed oil and aleurone grains upto 7 μ in diameter.

Powder - Yellowish-brown; shows, groups of pitted parenchymatous cells, annular and spiral vessels, stone cells, oil globules and aleurone grains measuring up to 7 μ dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than 2 per cent, Appendix	2.2.2.
Total Ash	Not more than 14 per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than 7 per cent, Appendix	2.2.4.
Light petroleum soluble matter :	On continous extraction with light petrolium (b.p.40'C to 60'C) and drying at 100'C, not more than 3.0 percent	

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.88 (light blue) and 0.98 (yellow). On exposure to Iodine vapour two spots appear at Rf. 0.88 and 0.98 (both yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for ten minutes at 105°C four spots appear at Rf. 0.65 (blue), 0.84 (blue), 0.96 (blue) and 0.98 (dark blue).

CONSTITUENTS - Resins - Resinous Glycosides (Colocynthin and Colocynthitin), Phytosterol Glycoside, Citrullol, Pectin and Albuminoids, Cucurbitacins - Cucurbitacin E & I.

PROPERTIES AND ACTION

Rasa	:	Tikta
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vāmaka, Recana, Kṛmighna, Śleṣmahara, Viṣahara

IMPORTANT FORMULATIONS - Jvaraghni Guṭikā (II)

THERAPEUTIC USES - Kṛmiroga, Kāmalā, Śvāsa, Kāsa, Kuṣṭha, Gulma, Udararoga

DOSE - 0.125 - 0.5 g of powder

0.25 - 0.5 g of powder

INDRAYAVA (Seed)

Indrayava consists of dried seeds of *Holarrhena antidysenterica* Wall. (Fam. Apocynaceae); a small to medium sized tree, found throughout India.

SYNONYMS

Sanskrit	:	Bhadra Yava, Kaliṅga, Śakra, Vatsaka
Assamese	:	Dudhkuri
Bengali	:	Kurchi
English	:	Ester Tree, Conessi Seeds
Gujrati	:	Kuda, Kudo
Hindi	:	Indraju, Kurchi, Kuraiya
Kannada	:	Kodasige Beeja
Kashmiri	:	--
Malayalam	:	Kutakappala
Marathi	:	Kudayache Beej
Oriya	:	Kurei, Keruan
Punjabi	:	Indrajau, Kaurasakh, Kura
Tamil	:	Kudasapalai
Telugu	:	Kodisapala Vittulu, Palakodisa-Vittulu
Urdu	:	Tukhm-e-Kurchi, Indarjao Talkh

DESCRIPTION

a) Macroscopic

Seeds compressed, linear, or oblong, elongated, margins curved inside, one side convex and other side concave with a longitudinal striation; 1-2 cm long, 0.2-0.3 cm thick, surface light yellowish- brown; odour, not distinct; taste, bitter.

b) Microscopic

Seed shows 2-3 layered integument consisting of single layered, rounded, oval or radially elongated, thick-walled, reddish-brown parenchymatous cells, some of them elongate outwards forming small papillose structure, covered by a few unicellular, and uniseriate, multicellular types of trichomes; below this layer, 1 or 2 layers of small rounded or irregular cells, a few having single prismatic crystals of calcium oxalate, followed by a few layers of collapsed, brown coloured cells; endosperm 4-6 layered consisting of rounded, oval or polygonal, thin-walled, parenchymatous cells, containing aleurone grains; most of the cells also contain oil globules; embryo having conical radicle and two foliaceous, convoluted cotyledons consisting of single layered tabular epidermal cells towards dorsal side and rectangular cells towards ventral side, and externally covered with cuticle; rest of the cotyledon cells composed of rounded, oval or rectangular parenchymatous cells containing rosette crystals of calcium oxalate and oil globules.

Powder - Light yellowish-brown; shows fragments of endosperm, pigment cells, oil globules, prismatic and rosette crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (1:1) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.67, 0.72, 0.76 and 0.93 (all blue). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent five spots appear at Rf. 0.15, 0.28, 0.43, 0.59 and 0.67 (all orange).

CONSTITUENTS - Alkaloids -Steroidal Alkaloid, Conessine etc., Fats, Tannin and resin.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Dīpana, Tridoṣaśāmaka, Saṃgrāhī

IMPORTANT FORMULATIONS - Pañca Nimba Cūrṇa, Palāśa Bījādi Cūrṇa, Laghu Gaṅgādhara Cūrṇa, Kṛmi Kuṭhāra Rasa, Pīyūṣavallī Rasa, Jvaraghni Guṭikā, Siddha Prāṇeśvara Rasa, Ahiphenāsava

THERAPEUTIC USES - Atīsāra, Kuṣṭha, Jvarātisāra, Kṛmi, Visarpa, Grahaṇī, Raktātisāra, Śūla, Chardi, Tvagroga, Dāha

DOSE - 3-6 g (Cūrna)

20-30 g (Decoction)

ĪŚVARĪ (Root)

Īśvarī consists of dried root of *Aristolochia indica* Linn, (Fam. Aristolochiaceae); a perennial shrubby, twiner, found throughout the low hills and plains of India,

SYNONYMS

Sanskrit	:	Gandhnākulī, Nāgadamanī
Assamese	:	Jarvande
Bengali	:	Isheri
English	:	Indian Birthwort, Serpent Root
Gujrati	:	Ruhimool, Iswarimool
Hindi	:	Ishwari
Kannada	:	Ishwari Beru, Toppalu
Kashmiri	:	--
Malayalam	:	Karaleyan
Marathi	:	Sapsan
Oriya	:	Gopikaron
Punjabi	:	--
Tamil	:	Perumarundu, Ichchuramule
Telugu	:	Iswari, Nallaiswari
Urdu	:	Zarawand Hindi

DESCRIPTION

a) Macroscopic

Root considerably long, cylindrical, a few irregularly bent; 2-10 mm in dia; surface almost smooth with fine longitudinal wrinkles and transverse cracks; external surface, light greyish-brown; inner whitish; fracture, short and splintery; odour, camphoraceous; taste, strongly bitter.

b) Microscopic

Cork 8-10 layers, composed of tabular, thin-walled cells excepting the outer most layer, having thick-walled cells externally and filled with brownish content; cork cambium single layered; secondary cortex 15 to 17 layers of thin-walled, somewhat rounded and isodiametric cells in the outer region but tangentially elongated in the inner region; plenty of simple, round to oval starch grains measuring 5-18 μ in dia. and compound starch grains having 2-4 components measuring 10-15 μ in dia. and oil globules present in a few cells; in the middle region stone cells round, rectangular, oval or elongated present in small irregular patches having simple pits and radiating canals; centre occupied by xylem, split into strips of radiating arms by wedgeshaped masses of parenchyma; each xylem arm is capped by thin patches of phloem consisting of sieve elements and phloem parenchyma, phloem fibres, and occasionally stone cells also found in this region; a ring of cambium present between phloem and xylem; xylem consists of large vessels, tracheids, fibres tracheids and parenchyma, all being lignified; in older roots, tyloses formation takes place in vessels; medullary rays 8 to l0 in number, multiseriate and dilating towards periphery and alternating with radiating arms of wood; scattered group of stone cells present in a few wider rays; micro-crystals with a few appearing as elongated small prisms and unaffected by acids, are present in a few cortical and ray cells.

Powder - Brownish-yellow; fragments of cork cells, very few, oval to rectangular, lignified, thick-walled stone cells having distinct striations with narrow lumen, vessels with spiral thickenings, non-lignified, thick-walled tracheids, numerous simple, round to oval, starch grains measuring 5-18 μ in dia., and compound grains having 2 to 4 components, measuring 10 - 15 μ in dia., a few crystals and oil globules

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene. Ethylacetate (85 : 15) shows under UV (366 nm) four fluorescent zones at Rf 0.21, 0.60 (both blue), 0.89 (red), 0.96 (blue). On exposure to Iodine vapour six spots appear at Rf 0.11, 0.21, 0.50, 0.63, 0.96 and 0.98 (all yellow) On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf 0.14, 0.63 (both violet) and 0.96 (brown)

CONSTITUENTS - Alkaloids, Essential Oils, Bitter Principles and Fixed Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmaka, Śothahara, Rakṣoghna, Grahabādhaghna

IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila, Gorocanādi Guṭikā

THERAPEUTIC USES - Sarpaviṣa, Lūtā Viṣa, Jālagardabha, Vṛścikaviṣa, Jvara, Kṛmi, Vraṇa

DOSE - 1-2 g (For external use also)

JĀTĪ (Leaf)

Jātī consists of dried leaves of *Jasminum officinale* Linn. (Fam. Oleaceae); a large climbing shrub with dark green twigs and pinnate leaves, found in Kashmir at an altitude of 900 - 2700 m and cultivated throughout the country.

SYNONYMS

Sanskrit	:	Mālatī
Assamese	:	Yasmeen
Bengali	:	Chamelee
English	:	Jasmine
Gujrati	:	Chamelee
Hindi	:	Chamelee
Kannada	:	Jati Maltiga, Sanna Jati Mallige
Kashmiri	:	--
Malayalam	:	Pichi
Marathi	:	Chamelee
Oriya	:	--
Punjabi	:	Chamelee
Tamil	:	Pichi, Jatimalli
Telugu	:	Jati, Sannajati
Urdu	:	Chameli, Yasmeen

DESCRIPTION

a) Macroscopic

Leaf single or in groups of 2-7 leaflets, upto 7.5 cm long and upto 2.5 cm broad; imparipinnately compound; terminal leaflet larger; ovate or lanceolate, acuminate; lateral leaflets shorter, acute, sessile or shortly petiolate; brownish-green; taste, bitter

b) Microscopic

Rachis - Rachis shows more or less convex outline with two lateral wings; epidermis single layered covered by thick cuticle; hairs mostly unicellular with pointed apex, glandular rarely found only on the upper surface; collenchyma 2 - 5 layered; pericycle represented by slightly lignified small fibre groups; vascular bundles three, median crescent-shaped, small accessory bundle present in each wing.

Midrib - shows similar structure as rachis; 3 - 5 layers of collenchymatous cells towards lower surface; pericycle present in the form of non-lignified fibre groups; vascular bundle single and crescent-shaped.

Lamina - shows dorsiventral structure, epidermis single layered on either side, covered by a thick striated cuticle; hairs as in rachis; palisade 1- 2 layered; spongy parenchyma 4-6 layers; stomata anomocytic only in lower surface.

Powder - Yellowish-green; shows palisade and spongy parenchyma, unicellular hairs, fibres and vessels with spiral thickening, polygonal epidermal cells and anomocytic stomata in surface view.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	18	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene. Ethylacetate (9 : 1) shows under UV (366 nm) three fluorescent zones at Rf 0.44 (blue), 0.52 (light blue) and 0.91 (blue). On exposure to Iodine vapours ten spots appear at Rf. 0.08, 0.18, 0.38, 0.44, 0.49, 0.53, 0.59, 0.67, 0.81 and 0.91 (all yellow). On spraying with Dragendorff reagent

followed by 5% Methanolic-Sulphuric acid reagent four spots appear at Rf. 0.08, 0.18 (both orange), 0.44 and 0.91 (both light orange). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C many spots of brown, yellow, blue and violet colour appear from the point of application to the solvent front.

CONSTITUENTS - Resin, Salicylic Acid, Alkaloid (Jasminine) and Essential Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu, Snigdha, Mṛdu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śirovirecana, Cakṣuṣya

IMPORTANT FORMULATIONS - Jātyādi Taila, Jātyādi Ghṛta, Vasanta Kusumākara Rasa

THERAPEUTIC USES - Śiroroga, Akṣiroga, Viṣaroga, Kuṣṭha , Vraṇa, Arśa, Mukhapāka, Pūtīkarṇa, Stana Śotha, Raktavikāra

DOSE - 10-20 g of powder for decoction

KADALĪ (Rhizome)

Kadalī consists of fresh rhizome of *Musa paradisiaca* Linn. (Fam. Musaceae); plant found cultivated throughout India, upto 1200 m.

SYNONYMS

Sanskrit	:	Vāraṇā, Ambusārā, Rambhā
Assamese	:	Kal, Talha
Bengali	:	Kela, Kala, Kanch Kala, Kodali
English	:	Banana
Gujrati	:	Kela
Hindi	:	Kela
Kannada	:	Bale Gadde
Kashmiri	:	--
Malayalam	:	Vazha
Marathi	:	Kela
Oriya	:	Kadali, Kadila
Punjabi	:	Kela
Tamil	:	Vazhai
Telugu	:	Arati Gadda
Urdu	:	Kela

DESCRIPTION

a) Macroscopic

Drug available in 0.1-4 cm thick, transversely cut pieces, pinkish-brown to greyish-brown, occasionally attached with a few roots.

b) Microscopic

IDENTITY, PURITY AND STRENGTH

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T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under U.V. (366 nm) two fluorescent zones at Rf 0.25 (orange) and 0.33 (green). On exposure to Iodine vapour three spots appear at Rf. 0.11, 0.25 and 0.73 (all yellow).

CONSTITUENTS - Fixed Oil and 4 á -Methyl Sterol Ketone.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Śīta, Guru, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Balya, Kaphahara, Pittahara, Dīpana, Rucya, Keśya

IMPORTANT FORMULATIONS - Abhraka Bhasma (Śataputī), Kṣāra Taila

THERAPEUTIC USES - Kṛmi, Kuṣṭha, Karṇa Śūla, Somaroga, Amlapitta, Dāha, Raktavikāra, Rajodoṣa, Mūtrakṛcchra

DOSE - 10-20 g in powder form

10-20 ml in juice form.

KĀKAJAṄGHĀ (Root)

Kākajaṅghā consists of dried root of *Peristrophe bicalyculala* Nees (Fam. Acanthaceae) an erect, hispid, herb or undershrub, 60-180 cm high found in forest undergrowth, hedges and waste lands almost throughout the country.

SYNONYMS

Sanskrit	:	Nadīkāntā, Kākatiktā, Prācibalā, Sulomaśā
Assamese	:	--
Bengali	:	Nasabhaga, Naskaga
English	:	--
Gujrati	:	Kaliadhedi, Kariadhedi, Lasiadhedi
Hindi	:	Atrilal, Itrelal, Masi, Nasbhanga, Kakajangha
Kannada	:	Cibigid, Cibirsoppu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Ghatipittapapada, Ramkirayat, Pitpapra
Oriya	:	--
Punjabi	:	--
Tamil	:	Chebisa
Telugu	:	Chebira
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Root occurs upto 0.7 cm thick, and upto 4 cm long cylindrical with branched lateral roots, dirty brown; fracture, fibrous; odour and taste not characteristic.

b) Microscopic

Shows poorly developed cork, consisting of 2-4 layers of tangentially elonated, thin-walled cells; where cork is not developed, epidermis present, consisting of single layered cells; secondary cortex narrow, consisting of 5-7 layers of elliptical or tangentially elongated, thin-walled, parenchymatous cells; secondary phloem narrow, consisting of sieve elements and parenchyma; phloem rays not distinct; secondary xylem consisting of pitted vessels, fibres, tracheids and parenchyma; vessels occur singly or in groups of 2-4 or more and arranged radially throughout secondary xylem; vessels with simple pits, tracheids thick-walled and lignified.

Powder - Dirty-brown; shows parenchymatous cells, aseptate fibres and pitted vessels.

IDENTITY, PURITY AND STRENGTH

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

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (93:7) shows under U.V. (366 nm) five fluorescent zones at Rf. 0.15, 0.30, 0.52, 0.90 and 0.98 (all light blue). On exposure to Iodine vapour six spots appear at Rf. 0.07, 0.15, 0.30, 0.43, 0.57 and 0.98 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.07, 0.30, 0.43, 0.57 and 0.98 (all violet).

CONSTITUENTS - Volatile Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Sara, Picchila
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara, Kaphahara, Varṇya

IMPORTANT FORMULATIONS - Āragvadhādi Kvātha Cūrṇa

THERAPEUTIC USES - Vraṇa, Jvara, Raktapitta, Kaṇḍū, Kṛmi, Kuṣṭha, Raktavikāra, Viṣa Vikāra, Sidhma, Ślīpada, Bālagraha, Aikāhnikajvara, Bādhirya, Anidrā, Rājayakṣmā, Pradara, Dantakṛmi, Sarpaviṣa

DOSE - 1-5 g in powder form.

KĀKANĀSIKĀ (Seed)

Kākanāsikā consists of dried seed of *Martynia annua* Linn. Syn. M diandra Glox. (Fam. Martyniaceae); an annual herb found throughout the country in waste places.

SYNONYMS

Sanskrit	:	Kākāṅgī, Śirobal, Cerasnaya
Assamese	:	--
Bengali	:	Kurki, Kaih, Baghnoki
English	:	Tigers Claw, Devil's Claw
Gujrati	:	--
Hindi	:	Bichu Hathajori, Kawathodi
Kannada	:	Garuda Mugu
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Vinchuachajada
Oriya	:	--
Punjabi	:	Kaktundi, Bichu, Hathajari
Tamil	:	Kakatundi
Telugu	:	Garudamukku, Telukondikaya
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Seed oblong, hard, woody, 2-5 cm long and 1.5-1.7 cm wide; surface wrinkled, light brown to black; two sharp recurved hooks present at anterior end; four prominent grooves present each on convex and concave side and on lateral sides, 2-4 hairy spines present inside groove on concave side; no taste and odour.

b) Microscopic

Powder- Black and rough; shows groups of thick-walled cells, numerous fibres, unicellular hairs and oil globules.

IDENTITY, PURITY AND STRENGTH

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

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.66 and 0.95 (both blue). On exposure to Iodine vapour four spots appear at Rf. O.11, 0.42, 0.57 and 0.95 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105^{0} C four spots appear at Rf. 0.11, 0.42, 0.57 and 0.95 (all violet).

CONSTITUENTS - Fixed Oil- (Semidrying type).

PROPERTIES AND ACTION

Rasa : Madhura

Guṇa : Śīta

Vīrya : Śīta

Vipāka : Madhura

Karma : Pittaghna, Dārḍhyakara, Rasāyana

IMPORTANT FORMULATIONS - Cyavanaprāśa, Avaleha, Tryūṣaṇādi Ghṛta

THERAPEUTIC USES - Palita

DOSE - 2 - 5 g

KĀKOLĪ (Tuberous Root)

Kākolī consists of dried tuberous root of *Lilium polyphyllum* D.Don (Fam. Liliaceae); a plant found growing in Western temperate Himalayas from 1800-3600 m from Kumaon to Kashmir.

SYNONYMS

Sanskrit	:	Vāyasolī, Svādumānisi
Assamese	:	--
Bengali	:	Kakoli
English	:	--
Gujrati	:	Kakoli
Hindi	:	Kakoli
Kannada	:	Kakoli
Kashmiri	:	--
Malayalam	:	Kakoli
Marathi	:	Kakoli
Oriya	:	Kakoli
Punjabi	:	--
Tamil	:	Kakoli
Telugu	:	Kakoli, Kakoli Moola, Kandhambu
Urdu	:	Kakoli

DESCRIPTION

a) Macroscopic

Roots straight or curved, dark brown and occur in bunches of 4-15; each root about 2-10 cm long, upto 0.7 cm thick; external surface rough due to presence of longitudinal wrinkles; odour, slightly aromatic; taste, acrid.

b) Microscopic

Tuberous root shows ridges and furrows in outline; cork 8-10 layered, consisting of thin-walled, tangentially elongated, almost radially arranged cells, upper cells filled with reddish-brown content; secondary cortex consisting of oval to elongated, thin-walled, parenchymatous cells filled with abundant, simple, ovoid to ellipsoidal starch grains, measuring 5-11μ in dia.; vascular bundles composed of usual elements, vessels arranged alternatively with phloem patches, vessels mostly solitary with spiral thickening; pith composed of oval to polygonal, thin-walled, parenchymatous cells.

Powder - Greenish-yellow; slightly aromatic in smell; shows spiral vessels, fragments of cork cells and simple, ovoid to ellipsoidal starch grains, measuring 5-11 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows in visible light two spots at Rf. 0.84 (yellow) and 0.97 (light yellow). Under UV (366 nm) five fluorescent zones visible at Rf. 0.23, 0.31 (both yellow), 0.44 (light yellow), 0.54 and 0.97 (both blue). On exposure to Iodine vapour thirteen spots appear at Rf. 0.15, 0.22, 0.23, 0.25, 0.31, 0.44, 0.54, 0.68, 0.78, 0.84, 0.88, 0.92 and 0.97 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C five spots appear at Rf. 0.44, 0.54, 0.78, 0.84 and 0.97 (all violet).

CONSTITUENTS - Sugars.

PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Guru, Śīta
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātahara, Pittahara, Śukrala, Bṛṃhaṇa

IMPORTANT FORMULATIONS - Bṛhat Aśvagandhā Ghṛta, Bṛhacchāgalādya Ghṛta, Daśam ūlāriṣṭa, Śivā Guṭikā, Amṛtaprāśa Ghṛta

THERAPEUTIC USES - Raktapitta, Śoṣa, Jvara, Śvāsa, Kāsa, Kṣaya, Dāha

DOSE - 3-6 g

KAMALA (Rhizome)

Kamala consists of dried rhizome with roots attached at nodes of *Nelumbo nucifera* Gaertn. Syn. *Nelumbium nelumbo* Druce, *N. speciosum* Willd. (Fam. Nymphaeaceae); an aquatic herb, with stout creeping rhizome found in lakes and ponds throughout the warmer parts of the country, ascending upto 1000 m.

SYNONYMS

Sanskrit	:	Padnakanda, Sāluka, Ambhoruha
Assamese	:	Kamal Kakdi
Bengali	:	--
English	:	Sacred Lotus
Gujrati	:	Loda
Hindi	:	Kamal Kand, Kamal Kakdi
Kannada	:	Tavare Kanda
Kashmiri	:	--
Malayalam	:	Tamara Kizangu
Marathi	:	Kamal Kand
Oriya	:	Padma
Punjabi	:	Kaul, Bhein
Tamil	:	Tamardi Kizangu
Telugu	:	Tamara Gadda
Urdu	:	Kanwal Kakdi

DESCRIPTION

a) Macroscopic

Drug occurs as cut pieces of rhizome with distinct nodes and internodes, cylindrical, 0.5-2.5 cm in dia., longitudinally marked with brown patches, smooth, yellowish white to yellowish-brown; root adventitious, less developed, 0.5-1 mm thick, attached to node of

rhizome; dark brown.

b) Microscopic

Rhizome - Shows a single layered epidermis followed internally by 2-4 layered lignified cells; cortex differentiated into three regions; outer cortex consisting of a wide zone of isodiametric thin-walled cells of which outer 5-6 layers collenchymatous and rest parenchymatous, having intercellular spaces and groups of fibres; middle cortex mostly composed of air cavities traversed by trabeculae of thin-walled small and nearly isodiametric cells; inner cortex forming central core, consists of spherical cells enclosing large intercellular spaces; vascular strands consists of scattered closed vascular bundles surrounded by thick-walled, lignified sclerenchymatous fibres, resembling a monocotyledonous structure; vessels having spiral and spiro-reticulate thickening; phloem composed of sieve tubes and companion cells; air cavities large, elliptic or rounded, largest at middle cortex and smaller towards inner cortex; air cavities lined by thin-walled, elongated, parenchymatous epithelial cells; starch grains abundant, rounded to oval, mostly simple, rarely compound measuring 8-27 μ in dia., loaded in cells.

Root - Appears more or less circular in outline, epidermis consists of oval, thin-walled parenchymatous cells; cortex composed of 5-8 layers of oval to polygonal, thin-walled parenchymatous cells, vascular elements surrounded by slightly lignified endodermis; phloem cells, xylem fibres aseptate with blunt ends; vessels with spiral thickening, rounded to oval, poorly developed and consisting of usual elements; xylem composed of vessels, tracheids and parenchyma; vessels and tracheids have simple pits.

Powder -Light brown; shows groups of oval to elongated, parenchymatous cells, xylem fibres aseptate with blunt ends; vessels with spiral thickening, rounded to oval simple starch grains measuring 8-27 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.

Water-soluble extractive	Not less than	6.5 per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (4:1) shows in visible light one spot at Rf. 0.97 (light yellow). Under U.V. (366 nm) seven fluorescent zones visible at Rf. 0.06 (blue), 0.13 (blue) 0.43 (blue) 0.55 (blue), 0.78 (blue) 0.91 (blue) and 0.98 (reddish). On exposure to Iodine vapour eight spots appear at Rf. 0.13, 0.31, 0.45, 0.64, 0.76, 0.86, 0.93 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid and heating the plate for about ten minutes at 110°C four spots appear at Rf. 0.10 (grey), 0.64 (brown), 0.76 (brown) and 0.96 (brown).

CONSTITUENTS - Starch and Reducing Sugars.

PROPERTIES AND ACTION

Rasa : Tikta, Madhura, Kaṣāya, Kaṭu, Lavaṇa

Guṇa : Guru, Rūkṣa

Vīrya : Śīta

Vipāka : Madhura

Karma : Pittahara, Kaphahara, Rucya, Viṣṭambhakara, Vṛṣya, Cakṣuṣya, Varṇya, Kṛmighna, Dāhaśāmaka, Raktaduṣṭihara, Durjara, Stanyajanana, Saṃgrāhī, Mūtravirecanīya, Viṣaghna, Vātakara

IMPORTANT FORMULATIONS - Guḍūcyādi Modaka

THERAPEUTIC USES - Dāha, Tṛṣṇā, Chardi, Raktapitta, Mūrcchā, Kāsa, Vātagulma, Visarpa, Visphoṭa, Mūtrakṛcchra, Daṃśodbhava, Jvara, Bhrama, Śoṣa, Hṛdroga

DOSE - 10-20 ml of the drug in juice form

5-10 g of the drug in powder form

KARAVĪRA (Root)

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

SYNONYMS

Sanskrit	:	Aśvamāraka, Śatakumbha, Divyapuṣpa, Hayamara
Assamese	:	Diflee, Sammulhimar
Bengali	:	Karbbe, Karbee
English	:	Sweet-Scented Oleander
Gujrati	:	Kaner
Hindi	:	Kaner
Kannada	:	Kanagilu, Kharjahar, Kanigale, Kanagile
Kashmiri	:	--
Malayalam	:	Kanaveeram
Marathi	:	Kanher
Oriya	:	--
Punjabi	:	Kanir
Tamil	:	Sevvarali, Arali
Telugu	:	Kastooripatte, Errugumeru
Urdu	:	Kaner

DESCRIPTION

a) Macroscopic

Drug available in cut pieces, 0.5-2.6 cm thick, branched, cylindrical, external surface greyish with long irregular streaks caused by rupture of bark, internal surface cream coloured; fracutre, short; taste, bitter.

b) Microscopic

Root shows cork consisting of 5-12 layered, thin-walled, rectangular, compactly arranged, parenchymatous cells, with a few outer layers occasionally exfoliated; secondary cortex consisting of 6-10 layers of oval, tangentially elongated, thinwalled, parenchymatous cells, a few thick-walled laticiferous cells present in this region; secondary phloem composed of oval to polygonal, thin-walled, parenchymatus cells; secondary xylem consisting of usual elements, having pitted vessels, fibres with pointed tips; xylem rays usually uniseriate and rarely biseriate; prismatic crystals of calcium oxalate and simple starch grains scattered in secondary cortex, secondary phloem and phloem rays; simple, oval to round, elliptical starch grains measuring 3-11 μ in dia., found-scattered in cortical cells, phloem and xylem rays.

Powder - Greyish-brown; shows thin-walled, parenchymatous cells, fragments of cork cells, pitted xylem fibres and vessels, a few prismatic crystals of calcium oxalate, simple, round to oval, elliptical starch grains measuring 3-11 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (8 : 2) shows under U.V. (366 om) ten fluorescent zones at Rf. 0.11, 0.15 (both yellow) 0.19 (blue), 0.26 (yellow), 0.49 (pink), 0.60, 0.64, 0.72, 0.88 (all blue) and 0.95 (yellow). On exposure to Iodine vapour ten spots appear at Rf. 0.11, 0.22, 0.30, 0.49, 0.53, 0.64, 0.68, 0.72, 0.90 and 0.95 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 105°C for about ten minutes eleven spots appear at Rf. 0.05, 0.11,

0.22, 0.30, 0.49, 0.53 (all grey) 0.64 (yellow), 0.68, 0.72 (both grey), 0.90 (violet) and 0.95 (brown).

CONSTITUENTS - Glycosides-Cardiac Glycosides and Resinous Matter.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Rūkṣa, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śothaghna, Kṛmighna, Kaṇḍūghna, Kuṣṭhahara, Śirovirecana, Cakṣuṣya

IMPORTANT FORMULATIONS - Bṛhanmaricādya Taila, Karavīrādya Taila

THERAPEUTIC USES - Vraṇa, Upadaṃśa, Kuṣṭha, Jalodara, Kaṇḍū

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

KARAMARDA (Root)

Karamarda consists of dried root of *Carissa carandas* Linn. (Fam. Apocynaceae); a dichotomously branched large shrub or small tree with strong simple or forked thorns in pairs, found throughout the country.

SYNONYMS

Sanskrit	:	Karamla, Karamardaka
Assamese	:	--
Bengali	:	Karamacha
English	:	--
Gujrati	:	Karamada
Hindi	:	Karaonda, Karaondi
Kannada	:	Karayige
Kashmiri	:	--
Malayalam	:	Modakam
Marathi	:	Karabanda
Oriya	:	--
Punjabi	:	--
Tamil	:	Kalakkai
Telugu	:	Vaka, Karavande
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Root considerably long, often irregularly bent, woody, cylindrical; rusty or yellowish-brown; 1-1.5 cm thick; surface smooth; fracture, hard; odour and taste, not distinct.

b) Microscopic

Mature root shows a stratified cork, lignified and tangentially elongated cells, consisting of alternating bands of smaller and larger cells; a few inner layers filled with red contents; secondary cortex very narrow, composed of 1 or 2 layers of thinwalled cells; secondary phloem composed of usual elements having a number of cavities, present in a row just below the secondary cortex; a number of stone cells present in large compact patches in different rows, in outer and inner phloem regions interrupting phloem rays; phloem rays uni-to biseriate; prismatic crystals of calcium oxalate occur in a number of cells throughout phloem region; cambium not distinct; secondary xylem very wide consisting of xylem vessels, fibres, tracheids and xylem parenchyma, all elements being lignified, xylem rays uni to biseriate, consisting of radially elongated cells; simple, round to oval, starch grains measuring 5.5-11 μ in dia., present throughout.

Powder - Yellowish-brown; shows patches of stratified cork, xylem fibres, stone cells, prismatic crystals of calcium oxalate and simple, round to oval, starch grains, measuring 5.5 - 11 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on silica gel 'G' plate using Toluene: Ethylacetate (9: 1) shows under U.V. (366 nm) a conspicuous fluorescent zone at Rf. 0.07 (sky blue). On

exposure to Iodine vapour four spots appear at Rf. 0.07, 0.26, 0.46 and 0.80 (all yellowish brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C five spots appear at Rf. 0.07, 0.26, 0.46, 0.80 and 0.92 (all violet).

CONSTITUENTS - Glycosides -Cardiac Glycosides

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vāmaka, Mūtrala

IMPORTANT FORMULATIONS - Marma Guṭikā

THERAPEUTIC USES - Mūtra Roga, Visphoṭa, Vidradhī, Vraṇa

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

KĀŚA (Root Stock)

Kāśa consists of dried root stock with attached stem portion of *Saccharum spontaneum* Linn. (Fam. Poaceae), a perennial grass with slender culms, found throughout the country in warmer parts ascending upto 1,800 m in the Himalayas.

SYNONYMS

Sanskrit	:	Kāśa, Śvetacāmara
Assamese	:	--
Bengali	:	Chhote-Kase, Kash, Keshe
English	:	Thatch-Grass
Gujrati	:	Kansado, Kansa, Kansado, Ghans
Hindi	:	Kans, Kasa
Kannada	:	Kirayikagachchha, Kasalu
Kashmiri	:	--
Malayalam	:	Nannana, Kusa, Kuruvikarimpu
Marathi	:	Kasai
Oriya	:	--
Punjabi	:	Kani
Tamil	:	Nanal, Nanalu, Karumbu, Kasa, Amaver
Telugu	:	Kakicheraku, Relu
Urdu	:	Kansa, Kasa

DESCRIPTION

a) Macroscopic

Drug occurs in the form of root stock with attached stem portions having numerous dark brown roots; cylindrical, yellowish-brown to brown, 2-25 cm or more in length and 0.2-1 cm thick; fracture, splintery.

b) Microscopic

Root stock shows single layered epidermis, consisting of slightly oval, thinwalled cells, a few elongated, pointed, aseptate, long unicellular hairs arise from epidermis; cortex composed of 2-3 layered, elongated, thick- walled, palisade-like cells and 3-4 layers of thin-walled, oval to polygonal parenchymatous cells; endoderm is consisting of thin-walled, single layered cells, followed by 6-9 layered, thick-walled, lignified, polygonal, continuous ring of sclerenchymatous cells; pericycle single layered, composed of very small, thin-walled cells beneath endoderm is; ground tissues wide, composed of thin-walled, oval to polygonal, elongated parenchymatous cells having numerous, round to oval starch grains measuring 8-24 μ in dia., scattered 'U' shaped vascular bundle with sheath, also seen in this region.

Powder - Dark brown; shows fragments of thin-walled, tabular, somewhat rectangular, epidermal cells in surface view, oval to polygonal: thin-walled parenchymatous and thick-walled polygonal sclerenchymatous cells, pointed unicellular hairs, vessels with reticulate thickening, small round to oval starch grains, measuring 8-24 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows under U.V. (366 urn) one fluorescent zone at Rf. 0.83 (green). On exposure to Iodine vapour three spots appear at Rf. 0.30, 0.83 and 0.90 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C six spots appear at Rf. 0.13, 0.23, 0.30 (all dull yellow), 0.69, 0.83 and 0.90 (all grey).

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta
Guṇa	:	Sara
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Balakṛt, Vṛṣya, Śramahara, Rūcikṛt

IMPORTANT FORMULATIONS - Karpūrādyarka, Brāhma Rasāyana, Sukumāra Ghṛta, Traikaṇṭaka Ghṛta, Tṛṇapañcamūla Kvātha Cūrṇa, Mūtravirecanīya Kaṣāya Cūrṇa, Stanyajanana Kaṣāya Cūrṇa, Aśmarīhara Kaṣāya Cūrṇa

THERAPEUTIC USES - Raktapitta, Mūtrakṛcchra, Aśmarī, Dāha, Raktadoṣa, Śoṣa, Kṣaya

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

KAṬPHALA (Fruit)

Kaṭphala consists of dried fruit of *Myrica esculenta Buch*.- Ham. Ex D. Don Syn. *M. nagi* Hook.f. (Fam. Myricaceae); a dioecious, evergreen, small or moderate sized tree, 3-15 m high, found in sub-tropical Himalayas from Ravi eastwards to Assam, and in Khasi, Jaintia, Naga and Lushai hills a elevation of 900-2100 m,

SYNONYMS

Sanskrit	:	Mahāvalkala
Assamese	:	Ajooree, Vdulbark
Bengali	:	Kayachhal, Katphal, Kayphal
English	:	Box Myrtle, Bay Berry
Gujrati	:	Kayphal
Hindi	:	Kayphajl
Kannada	:	Kadujai Kai, Katphala, Kirisivari, Kirishivane
Kashmiri	:	--
Malayalam	:	Marut
Marathi	:	Kaayphal
Oriya	:	--
Punjabi	:	Kanphal, Kayphal
Tamil	:	Marudam, Marudampatai
Telugu	:	Kaidaryamu
Urdu	:	Kaiphal

DESCRIPTION

a) Macroscopic

Fruit - A drupe, ellipsoid or ovoid, 0.7-1.0 cm long, 0.5-0.7 cm wide, dark brown, surface tubercled, very hard; taste, sourish sweet.

Seed - Ovoid, 0.6 cm long, 0.3 cm wide, surface very smooth, light brown; taste, oily.

b) Microscopic

Fruit - Shows epicarp cells isodiametric in surface view, mass of reddish-brown, thinwalled, parenchymatous cells, a few elongated tubercled cells with smooth walls; endocarp hard and stony consisting of sclerenchymatous cells.

Seed - Seed coat shows single layered, thick, brown coloured cells; cotyledons composed of single layered, thin-walled epidermal cells containing oil gloubles and aleurone grains; mesophyll cells thin-walled, isodiametric, fully packed with oil gloubles and aleurone grams.

Powder - Yellowish-brown; shows rectangular to hexagonal, thin-walled seed coat and polygonal epidermal cells in surface view; tubercled parenchymatous cells, oil globules and aleurone grains.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'GF 254' plate using n-Butanol: Acetic acid: Water (4:1:5) shows in visible light five spots at Rf. 0.25, 0.43, 0.57, 0.75 (all grey) and 0.88 (yellowish green). Under U.V. (366 nm) seven fluorescent zones are visible at Rf. 0.09, 0.18 and 0.30 (all light blue), 0.43 (green), 0.49 (blue), 0.65 (blue) and 0.71 (pink). On exposure to Iodine vapour eleven spots appear at Rf. 0.07, 0.09, 0.12, 0.25, 0.30, 0.35, 0.43, 0.52, 0.57, 0.75 and 0.88 (all yellow). On spraying with 5% Methanolic-Sulphuric acid

reagent and heating the plate for ten minutes at 110°C six spots appear at Rf. 0.09 (black), 0.30 (black), 0.57 (light brown), 0.71 (light pink), 0.82 (light pink) and 0.88 (yellowish green).

CONSTITUENTS - Waxy Material.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātahara, Dāhahara, Mukharogaśāmaka, Dhātuvikārajit, Rucya

IMPORTANT FORMULATIONS - Bṛhatphala Ghṛta, Puṣyānuga Cūrṇa, Arimedādi Taila, Balā Taila, Mahā Viṣagarbha Taila, Khadirādi Guṭikā (Kāsa), Khadirādi Guṭikā (Mukha Roga), Mahā Vātagajāṅkuśa Rasa

THERAPEUTIC USES - Gulma, Meha, Jvara, Arśa, Grahaṇī, Pāṇḍu Roga, Hṛllāsa, Mukha Roga, Kāsa, Śvāsa

DOSE - 3-5 g

KAṬPHALA (Stem Bark)

Kaṭphala consists of dried stem bark of *Myrica esculenta Buch*.- Ham. Ex D. Don, Syn. *M. nagi* Hook.f. (Fam. Myricaceae); a dioecious evergreen, small or moderate sized tree, 3-15 m high, found in subtropical Himalayas from Ravi eastward to Assam, Khasi, Jaintia, Naga and Lushai hills upto an elevation of 900-2100 m.

SYNONYMS

Sanskrit	:	Mahāvalkala
Assamese	:	Vdulbark, Ajooree
Bengali	:	Katphal, Kayphal, Kaychhal
English	:	Bay Berry, Box Myrtle
Gujrati	:	Kayphal
Hindi	:	Kayphal
Kannada	:	Kadujai Kai, Katphala, Kirishivane, Kirisivari
Kashmiri	:	--
Malayalam	:	Marut
Marathi	:	Kaayphal
Oriya	:	--
Punjabi	:	Kanphal, Kayphal
Tamil	:	Marudam, Marudampatai
Telugu	:	Kaidaryamu
Urdu	:	Kaiphal

DESCRIPTION

a) Macroscopic

Drug occurs in pieces of variable length, 1-2.5 cm thick, slightly quilled, fissured longitudinally and transversely, outer surface rough, grey to brownish-grey, inner surface dark brown and smooth; fracture, hard; taste, bitter.

b) Microscopic

Mature stem bark shows multilayered cork, composed of rectangular, tangentially elongated, thin-walled cells, some filled with red contents; secondary cortex a wide zone, composed of thin-walled, rectangular to polygonal, parenchymatous cells, a number of cells filled with red colouring matter and simple, round to oval starch grains measuring 6-11 μ in dia.; a number of stone cells, in singles or in groups, circular polygonal or oval, thick-walled, lignified with simple pits and radiating canals, found scattered throughout secondary cortex; secondary phloem consists of sieve elements, phloem fibres, crystal fibres, stone cells and phloem parenchyma traversed by phloem rays; numerous prismatic crystals of calcium oxalate present in secondary phloem; phloem fibres with blunt or pointed end and highly thick-walled, with very narrow lumen present in groups; stone cells similar to those found in secondary cortex, mostly in singles or in groups of 2-3, sometimes associated with fibre groups in phloem parenchyma; in isolated preparation and tangential sections crystal fibres show more than twenty chambers having single prismatic crystals of calcium oxalate in each chamber; a number of phloem parenchyma cells containing red colouring matter; phloem rays 1-4 seriate, containing red colouring matter.

Powder - Rusty red; shows a number of stone cells, phloem fibres, crystal fibres and prismatic crystals of calcium oxalate and simple, round to oval, starch grains measuring 6-11 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	13	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (7 : 3) in visible light shows four spots at Rf. 0.08 (grey), 0.32 (yellow), 0.51 (grey) and 0.58 (yellow). Under UV (366 nm) three fluorescent zones appear at Rf. 0.49, 0.67 (both light blue) and 0.86 (blue). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate at 110°C for ten minutes six spots appear at Rf 0.08, 0.21 (both grey), 0.35 (Pink), 0.52, 0.67 and 0.80 (all grey).

CONSTITUENTS - Tannin and Glycosides.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta, Kaṣāya
Guṇa	:	Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātahara, Dāhahara, Mukharogaśāmaka, Dhātuvikārajit, Kaṭphalādi Nasya

IMPORTANT FORMULATIONS - Bṛhatphala Ghṛta, Puṣyānuga Cūrṇa, Arimedādi Taila, Balā Taila, Mahā Viṣagarbha Taila, Khadirādi Guṭikā (Mukha Roga), Khadirādi Guṭikā (Kāsa), Mahā Vātagajāṅkuśa Rasa

THERAPEUTIC USES - Gulma, Meha, Jvara, Arśa, Grahaṇī, Pāṇḍu Roga, Hṛllāsa, Mukha Roga, Kāsa, Śvāsa, Agnimāndya, Aruci, Kaṇṭharoga

DOSE - 3-5 g

KOLA (Fruit Pulp)

Kola consists of dried fruit pulp (devoid of seed) of *Zizyphus mauritiana* Lam. Syn. *Z. jujuba* Lam. (Fam. Rhamnaceae); a small, evergreen sub-deciduous tree, wild and also extensively cultivated throughout the country and found in Himalayan region upto about 1370 m.

SYNONYMS

Sanskrit	:	Kolī, Badarī
Assamese	:	Vagari
Bengali	:	Kul Vadar, Vadar, Vadai, Narkolikul
English	:	Jujube
Gujrati	:	Bor
Hindi	:	Desi Ber
Kannada	:	Borehannu
Kashmiri	:	--
Malayalam	:	Lanta, Lantakkura
Marathi	:	Bor
Oriya	:	Borakoli
Punjabi	:	Desi ber
Tamil	:	Ilandai
Telugu	:	Regi
Urdu	:	Ber

DESCRIPTION

a) Macroscopic

Pulp pieces irregular in shape, shrunk, with external surface smooth and glossy, 2 mm in thickness, brittle, colour, orange red; odour, not distinct; taste, sour.

b) Microscopic

Fruit pulp shows single layered epicarp consisting of thin-walled, parenchymatous cells, covered with thin layer of cuticle; mesocarp differentiated into two zones, outer zone consisting of 5-10 layers of rectangular, thin-walled, parenchymaous cells, inner mesocarp consisting of oval to polygonal, thin-walled, crushed parenchymatous cells, most of the mesocarp cells filled with reddish-brown substance, which is tannin when tested; a few fibro- vascular bundles found scattered in this region,

Powder - Orange; shows round to oval, thin-walled, reddish-brown cells of meso carp, slightly thick-walled, polygonal epicarp cells in surface view.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	4.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	25	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	45	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (9: 1: 10) shows under U.V. (366 nm) a fluorescent zone at Rf. 0.34 (light blue). On exposure to Iodine vapour seven spots appear at Rf. 0.11, 0.17, 0.34, 0.43, 0.54, 0.66 and 0.84 (all yellow). On spraying with 60 % Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 120°C five spots appear at Rf. 0.17, 0.34 (both black), 0.43, 0.66 and 0.84 (all grey). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.17 and 0.34 (both black).

CONSTITUENTS - Vitamin C, Sugars and Minerals.

PROPERTIES AND ACTION

Rasa	:	Madhura, Amla, Kaṣāya
Guṇa	:	Guru, Snigdha
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Grāhī, Vātahara, Rucya, Dīpana, Pācana

IMPORTANT FORMULATIONS - Dhānvantara Taila, Yavānī Ṣāḍava

THERAPEUTIC USES - Dāha, Raktavikāra, Tṛṣṇā, Aruci

DOSE - 3-6 g (Dried Pulp).

KOLA (Steam Bark)

Kola consists of dried stem bark of *Zizyphus mauritiana* Lam. Syn *Z. jujuba* Lam. (Fam Rhamnaceae); a small, evergreen sub-deciduous tree, wild and also extensively cultivated throughout the country and found on Himalayan region upto about 1370 m.

SYNONYMS

Sanskrit	:	Badarī, Kolī, Badara, Karkandhū
Assamese	:	Bagori, Bayur
Bengali	:	Kula
English	:	Jujube
Gujrati	:	Bor
Hindi	:	Desi Ber
Kannada	:	Boehannumara
Kashmiri	:	--
Malayalam	:	Lanta
Marathi	:	Bor
Oriya	:	Borakali
Punjabi	:	Desi ber
Tamil	:	Ilandai
Telugu	:	Regi, Regu
Urdu	:	Ber

DESCRIPTION

a) Macroscopic

Bark available in pieces of variable length, usually 0.6 - 1 cm thick, external surface, blackish-grey, hard, rough due to deep furrows and fissures, exfoliating in irregular scales exposing inner brownish-red fibrous zones; no taste or odour

b) Microscopic

Stem bark shows a thick portion of rhytidoma, made up of about 25 - 30 alternate bands of cork and dead cells of secondary cortex and secondary phloem, cork consists of thin-walled, rectangular, about 5-6 layered, crushed, parenchymatous cells, mostly filled with dark brown pigment; secondary cortex consists of round, oval and crushed rectangular cells; groups of stone cells, fibres and prismatic crystals of calcium oxalate scattered throughout rhytidorna; secondary phloem consists of sieve elements, phloem fibres, crystal fibres, phloem parenchyma, a few stone cells and phloem rays; phloem fibres arranged in alternate bands with phloem parenchyma, phloem parenchyma consists of rectangular, thin-walled cells, a few contain prismatic crystals of calcium oxalate; crystal fibres present, divided into numerous chambers, each containing single prismatic crystal of calcium oxalate; phloem rays uniseriate to biseriate, upto 10 cells high, consists of round, thin-walled, parenchymatous cells; stone cells, mostly rectangular, occur associated In groups of 2-4 with bands of phloem fibres.

Powder - Reddish-brown; shows fragments of cork cells, phloem fibres with wide lumen and pointed tips, crystal fibres, phloem rays, rectangular stone cells and prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	15	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (95 : 5) shows under U.V. (366 nm) a fluorescent zone at Rf. 0.84 (light blue). On exposure to Iodine vapour two spots appear at Rf. 0.80 and 0.84 (both yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid a spot appears at Rf. 0.84 (orange).

CONSTITUENTS - Tannins and Alkaloids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Visphoṭaśamanī, Stambhana, Vraṇaśodhana

IMPORTANT FORMULATIONS - Nyagrodhādi Kvātha Cūrṇa

THERAPEUTIC USES - Tvak, Raktātisāra, Vraṇa

DOSE - 3-5 g. (Powder)

10-2- g (Decoction).

KOṢĀTAKĪ (Whole Plant)

Koṣātakī consists of dried whole plant of *Luffa acutangula* (Linn.) Roxb. (Fam. Cucurbitaceae); a large monoecious, annual climber, found wild and also cultivated throughout the greater part of India.

SYNONYMS

Sanskrit	:	Kṛtavedhanā, Jālī, Dhāmārg
Assamese	:	--
Bengali	:	Zinga
English	:	Ribbed Gourd
Gujrati	:	Turiya, Kadawa, Turiya
Hindi	:	Turai, Satputia
Kannada	:	Hire-Valli
Kashmiri	:	--
Malayalam	:	Peerkam Kai
Marathi	:	Dodka Turiya
Oriya	:	Tarada
Punjabi	:	Turiya
Tamil	:	Peerkku
Telugu	:	Beera, Chedu beeha, Varri beera
Urdu	:	Turai

DESCRIPTION

a) Macroscopic

Root - Occurs in cut pieces, 8-12 cm long, and 0.5-0.7 cm thick, yellowish-brown; almost cylindrical, rough due to longitudinal wrinkles, having a few adventitious roots; fracture, short

Stem - 0.2-0.4 cm thick, 5 angled, glabrous, scabrid, having tendrils; brownish-yellow.

Leaf - petiole 3-8 cm long; somewhat twisted, wrinkled, scabrid, angular; brownish-yellow; lamina crimpled, curled, corrugated, pale or light-green, 6-9 cm long and broad; palmately 5-7 angled or sub lobate, scabrid on both surfaces, base cordate, nerves and veins prominent beneath

Flower - Male flower in small racemes or single, calyx pubescent, 1.3 cm long, lobes lanceolate, light greenish-yellow; corolla yellow, 2 cm long, spreading, obovate; stamens 3; Female flower solitary, yellow; pedicel 5-10 cm long; ovary strongly ribbed; stigma, trifid.

Fruit - A pepo; 9-12 cm long, and 2-4 cm broad; cylindrical or club-shaped, obovate in shape, tapering towards the base; pale yellowish-brown; outer surface covered with 8-10 prominent longitudinal ribs; three chambers, inner part being fibrous and easily detachable as a whole from the outer part.

Seed - Ovoid-oblong, 0.6-0.8 cm long, and 0.5-0.6 cm wide; much compressed, slightly corrugated on the edges, black; taste, bitter.

b) Microscopic

Root - Shows wavy outline composed of cork cells, a few outermost layers of secondary cortex disintegrated, remaining outer cortical cells lignified, and a number of large, thinwalled, lignified, variously shaped stone cells with very wide lumen found; inner cortical cells thin-walled and parenchymatous; secondary phloem consisting of thin-walled cells of usual elements; secondary xylem tissues lignified traversed by multi seriate, radially elongated, thin-walled ray cells; xylem vessel simple pitted; a few simple, round to oval starch grains measuring 4-7 μ in dia., having striations and distinct hilum found in secondary cortex.

Stem - Shows 5 prominent ridges; epidermis single layered, covered by cuticle; cortex composed of 6 -10 or more layered, oval to polygonal, collenchyma cells under ridges, followed by 4-6 layered, compact band of thick-walled, polygonal, lignified cells; ground tissues composed of round to oval, thin-walled, parenchymatous cells, embedded with 10 bicollateral, open, conjoint, endarch vascular bundles, 5 of outer ring present opposite the ridges while rest 5 of the inner ring face the furrows; secondary phloem and xylem consisting of usual elements; xylem vessel bordered pitted; a few simple starch grains, round to oval, having striations with distinct hilum, measuring 5-8 μ in dia., found scattered in cortical and pith region.

Leaf -

Petiole - shows 6-7 prominent ridges having single layered epidermis, covered by thick cuticle; secondary cortex -wide in each ridge, composed of thin-walled, parenchymatous

cells; ground tissue a wide zone having 6 or 7 bicollateral, vascular bundles present in each ridge.

Lamina - shows single layered epidermis on both surfaces, having simple unicellular hairs with blunt tips and glandular hairs with unicellular stalk of variable length and spherical head having 3 or 4 cells; mesophyll differentiated into palisade and spongy parenchyma; vascular bundles bicollateral; stomata, anomocytic, present on both surfaces; stomatal number 59 - 64 on lower surface and 29 -39 on upper surface; stomatal index 13-14 on lower surface and 9-10 on upper surface; palisade ratio not over 3; vein islets number. 14-19 per sq. mm.

Fruit - Section shows irregular outline due to 8-10 prominent ribs; epicarp consist of single layered papillose epidermis covered with thick, striated cuticle having a few bristles, followed by 4-6 layers of thin-walled, tangentially elongated parenchymatous cells, some cells especially near the ribs, having brownish contents; below this thick-walled, polyhedral, continuous band of stone cells present, measuring 24-40 μ in dia.; outer 6-8 layers of this band consists of closely packed thick-walled sclereids, while the inner 2-4 layers, thick-walled and distinctly pitted; rnesocarp broad, composed of a zone of rounded to tangentially elongated, parenchymatous cells having bicollateral vascular bundles, followed by 8-10 layers of thick-walled, polyhedral, sclerenchyma and fibres.

Seed - Testa consists of a single layer of rectangular, thick-walled, sclerenchymatous cells, followed by a tegmen, composed of 5 or 6 layered, oval to polygonal, parenchymatous cells and a single layered elongated, lignified, sclerotic palisade-like cells; endosperm composed of thin-walled, parenchymatous cells; cotyledons flat, consisting of thin-walled, oval to polygonal, parenchymatous cells.

Powder - Greyish-brown; shows fragments of cork cells, thick-walled, wavy or sinuous epidermal cells, lignified sclerotic or palisade-like cells of testa, sclerenchymatous cells, pieces of unicellular and glandular hairs, vessel with spiral and reticulate thickening, simple or groups of elongated, lignified stone cells, simple, rounded to oval starch grains having concentric striations and narrow hilum, measuring 4-7 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	16	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	13	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (8:2) shows under UV (366 nm) four fluorescent zones at Rf. 0.34, 0.74, 0.80 and 0.91 (all blue). On exposure to Iodine vapour eight spots appear- at Rf. 0.13, 0.17, 0.34, 0.51, 0.65, 0.74, 0.78 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.34, 0.78 and 0.96 (all grey).

CONSTITUENTS - Bitter Principles, Saponins, Sapogenins and Fixed Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Alpa Kaṣāya
Guṇa	:	Tīkṣṇa, Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Kaphapittaghna, Malaviśodhanī, Vamanopaga, Tridoṣahara

IMPORTANT FORMULATIONS - Abhayā Lavaṇa

THERAPEUTIC USES - Kuṣṭha, Pāṇḍu, Plīhāroga, Śopha, Gulma, Ādhmāna, Garaviṣa, Arśa, Kāmalā, Gaṇḍamālā

DOSE - 5 - 10 g

KUMUDĀ (Flower)

Kumudā consists of dried flowers of *Nymphaea alba* Linn. (Fam. Nymphaeaceae); a perennial aquatic herb, very common in ponds, streams and fresh water lakes and upto 1800 m.

SYNONYMS

Sanskrit	:	Kumudam, Sitolpalam, Śaśikāntā, Śyāmavṛntā
Assamese	:	--
Bengali	:	Kumuda, Shandh Shaluka
English	:	Indian Blue Water Lily
Gujrati	:	Piyanu
Hindi	:	Kui, Kanval, Kokka
Kannada	:	Bilenaydile, Biletavare
Kashmiri	:	--
Malayalam	:	Ampal
Marathi	:	Kamod
Oriya	:	--
Punjabi	:	--
Tamil	:	Nalla Kalav, Vellampal, Allittamarai
Telugu	:	Allikada, Tellakaluva
Urdu	:	Kamal

DESCRIPTION

a) Macroscopic

Flower white, solitary, 10-13 cm across; sepals 4, outside greenish to brownish, inside whitish; petals about 10, white; stamens many, outer ones being transformed successively from petals; anthers linear small without appendages; pistil syncarpous, carpels 10-16, sunk in fleshy disk, ovary multicellular and crowned by a large stigma with 16 rays, each with a cylindrical appendages, ovules many, fruit a berry.

b) Microscopic

Powder - Light-brown; shows polygonal, thin-walled epidermal cells in surface view, stellate hairs and spherical or trigonal pollen grains, measuring 11-24 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	18	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	9	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (85 : 15) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.66 (red), 0.77 (blue) and 0.88 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.66, 0.92 and 0.96 (all brown).

CONSTITUENTS - Alkaloids and Glycosides.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya, Tikta
Guṇa	:	Laghu, Snigdha, Picchila
Vīrya	:	Śīta
Vipāka	:	Madhura

Karma : Vātahara, Pittahara, Stambhana, Hṛdya, Garbha Sthāpana, Balya, Śramahara

IMPORTANT FORMULATIONS - Triphalādi Taila, Balāśvagandhalākṣādi Taila

THERAPEUTIC USES - Raktadoṣa, Dāha, Hṛdroga, Raktapitta

DOSE - 3-6 g

KUŚA (Root Stock)

Kuśa consists of dried root stock of *Desmostachya bipinnata Stapf.* (Fam. Poaceae); a tall, tufted, perennial grass, 30-150 cm high, found throughout the country in hot and dry places.

SYNONYMS

Sanskrit	:	Yagyabhūṣaṇa, Sūcyagra
Assamese	:	Kush
Bengali	:	Kush
English	:	Saved Gram
Gujrati	:	Dabb
Hindi	:	Kush
Kannada	:	Darbha Hullu
Kashmiri	:	--
Malayalam	:	Darbha, Darbhapullu
Marathi	:	Darbha
Oriya	:	Kusha
Punjabi	:	Kush, Dale
Tamil	:	Darbaipul
Telugu	:	Darbhagaddi
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Drug occurs in 6-20 cm long, 0.3-0.5 cm thick cut pieces, almost cylindrical; internodes smooth, stout, mostly covered with shining sheath, having distinct nodes; brownish-yellow; a few thin, fibrous, ash coloured roots arise at nodes; fracture, short.

b) Microscopic

Root stock shows single layered epidermis, covered with striated cuticle; hypodermis composed of 3-5 layered, circular to polygonal, sclerenchymatous cells; cortex consisting of 5-9 layered, circular parenchymatous cells with small intercellular spaces; a few collateral vascular bundles found scattered in this zone, followed by 5-8 layered, discontinuous sclerenchymatous ring; ground tissue composed of continuous mass of slightly thick-walled, non-lignified, parenchymatous cells; numerous, collateral, vascular bundles found scattered in this zone and each covered by sclerenchymatous sheath; xylem vessels simple pitted; starch grains simple round to oval, with centric hilum, measuring 8-14 μ in dia., and compound having two components, found scattered in hypodermis, cortex and ground tissues.

Powder - Yellowish-brown; shows fragments of circular to polygonal sclerenchymatous cells with distinct lumen and striations; long, pointed fibres; simple pitted xylem vessels; starch grains simple round to oval with centric hilum measuring 8-14 μ. in dia. and compound having two components.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. (366 nm) seven fluorescent zones at Rf. 0.06, 0.15, 0.24, 0.36, 0.64, 0.83 and 0.94 (all blue). On exposure to Iodine vapour twelve spots appear at Rf. 0.06, 0.15, 0.24, 0.36, 0.47, 0.55, 0.64, 0.70, 0.76, 0.83, 0.90 and 0.94 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 105°C eight spots appear at Rf. 0.15, 0.24, 0.36, 0.64, 0.76, 0.83, 0.90 and 0.94

(all grey).

CONSTITUENTS - Terpenes.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Kaphapittahara, Mūtrala

IMPORTANT FORMULATIONS - Karpūrādyarka, Sukumāra Ghṛta, Aśmarīhara Kaṣāya C ūrṇa, Tṛṇapañcamūla Kvātha Cūrṇa, Mūtravirecanīya Kaṣāya Cūrṇa, Stanyajanana Kaṣāya C ūrṇa

THERAPEUTIC USES - Mūtrakṛcchra, Visarpa, Dāha, Aśmarī, Tṛṣṇā, Bastiroga, Pradararoga, Raktapitta

DOSE - 50-100 g of powder for decoction.

LĀṄGALĪ (Tuberous Root)

Lāṅgalī consists of dried tuberous root of *Gloriosa superba* Linn. (Fam. Liliaceae) a climber with leaf tendril and large, solitary or corymbose, showy flowers with perianth segments having wavy margins, greenish at first, later becoming yellow and finally scarlet or crimson coloured, and found wild throughout the tropical regions upto 2,000 m.

SYNONYMS

Sanskrit	:	Kalihārī, Garbhanut, Halinī, Agniśikhā
Assamese	:	--
Bengali	:	Bisalanguli
English	:	Glory Lily
Gujrati	:	Khadiyanag
Hindi	:	Kalihari
Kannada	:	Kolikutumana Gade
Kashmiri	:	--
Malayalam	:	Mathonni
Marathi	:	Karianag
Oriya	:	--
Punjabi	:	Kariyari
Tamil	:	Kizhangu, Kalappai
Telugu	:	Potthidumpa
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Tuberous roots thick, almost cylindrical or slightly laterally flattened, occurring in pieces of 15-30 em long and 2.5 - 3.8 cm thick, often bifurcated with tapering ends, resembling a plough-share, one arm generally more than double the length of the other;

brownish externally and yellowish internally; fracture, short; taste, acrid and bitter.

b) Microscopic

Tuberous root shows single layered epidermis, externally cuticularised, consisting of rectangular cells, followed by ground parenchyma, with scattered small vascular bundles; parenchyma cells large, thin-walled, polygonal to circular, having conspicuous intercellular spaces, most of the cells specially of the outer layers filled with starch grains, simple, round to oblong, or polyhedral, measuring 8-33 μ in dia., showing clear hilum and concentric striations, occasionally compound with 2-3 components, measuring 24-36 μ in dia.; vascular bundles collateral, numerous, scattered throughout ground tissue, consisting of xylem and phloem; each vascular bundle enclosed by sclerenchymatous sheath, xylem composed of vessels, tracheids and parenchyma; vessels having mostly reticulate thickening, smaller ones having spiral thickening, tracheids with reticulate thickening; xylem parenchyma cells usually rectangular; phloem consisting of sieve tubes, companion cells and phloem parenchyma; phloem parenchyma cells very small and thin-walled.

Powder - Brown; shows fragments of parenchyma cells, simple starch grains, round to oblong or polyhedral measuring 8-33 μ dia. showing clear hilum and concentric striations, occasionally compound with 2-3 components, measuring 24-36 μ in dia., sclerenchymatous cells, a few xylem vessels and tracheids.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9

: 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.24 (blue), 0.88 and 0.94 (both black). On exposure to Iodine vapour eight spots appear at Rf. 0.09, 0.16, 0.24, 0.38, 0.59, 0.75, 0.88 and 0.94 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid two spots appear at Rf. 0.88 and 0.94 (both orange).

CONSTITUENTS - Alkaloids and Resins.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya, Kaṭu
Guṇa	:	Sara, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Pittahara, Kaphahara, Garbhapātana

IMPORTANT FORMULATIONS - Nirguṇḍī Taila, Kāsisādī Taila, Mahā Viṣagarbha Taila

THERAPEUTIC USES - Kuṣṭha, Śopha, Arśa, Vraṇa, Śūla, Kṛmi, Bastiśūla, Garbha, Śalya, Vātavyādhi

DOSE - 125-250 mg of purified drug.

LAŚUNA (Bulb)

Laśuna consists of bulb of *Allium sativum* Linn. (Fam. Liliaceae); a perennial bulbous plant, cultivated as an important condiment crop in the country.

SYNONYMS

Sanskrit	:	Rasona, Yavaneṣṭa
Assamese	:	Maharu
Bengali	:	Lasun
English	:	Garlic
Gujrati	:	Lasan, Lassun
Hindi	:	Lahasun
Kannada	:	Bulluci
Kashmiri	:	--
Malayalam	:	Vellulli, Nelluthulli
Marathi	:	Lasun
Oriya	:	--
Punjabi	:	Lasan
Tamil	:	Vellaipoondu
Telugu	:	Vellulli, Tellapya, Tellagadda
Urdu	:	Lahsan, Seer

DESCRIPTION

a) Macroscopic

Drug occurs as entire bulb or isolated cloves (bulblets); bulb sub-globular, 4-6 cm in diameter, consisting of 8-20 cloves, surrounded by 3-5 whitish papery membranous scales attached to a short, disc-like woody stem having numerous, wiry rootlets on the under side; each clove is irregularly ovoid, tapering at upper end with dorsal convex surface, 2-3 cm long, 0.5 - 0.8 cm wide, each surrounded by two very thin papery whitish and brittle scales having 2-3 yellowishgreen folded leaves contained within two white fleshy, modified leaf

bases or scales; odour, peculiarly pungent and disagreeable; taste, acrid gives warmth to the tongue.

b) Microscopic

A clove of bulb shows tri to tetrangular appearance in outline; outer scale consists of an outer epidermis, followed by hypodermal crystal layer, mesophyll made of parenchyma cells and an inner epidermis; both outer and inner epidermis consists of sub rectangular cells; hypodermis consists of compressed, irregular, tangentially elongated cells, each cell having large prismatic crystals of calcium oxalate, while many cells contain small prismatic crystals also, mesophyll several layers of parenchymatous cells having a few vascular tissues with spiral vessels; inner epidermis similar to outer one; inner scale similar to outer scale but outer epidermis composed of sclerenchymatous cells; prismatic crystals in hypodermis slightly smaller.

In surface view cells of outer epidermis elongated, narrow with thin porous wall while those of inner epidermis similar to outer one but non-porous; cells of hypodermal crystals layer ellipsoidal with thick porous walls, each cell having large prismatic crystals of calcium oxalate, many cells also contain small prismatic crystals in addition to bigger ones; inner scale shows markedly sclerenchymatous cells with greatly thickened walls and very narrow lumen; cells of hypodermal crystal layer somewhat smaller with walls more frequently pitted, size of crystals also smaller.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	60	per cent, Appendix	2.2.7.
Volatile Oil	Not less than	0.1	per cent, Appendix	2.2.10.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Isopropanol Acetic acid: Water (3 : 1: 1 : 1) shows under UV (366 nm) two fluorescent zones at Rf. 0.58 and 0.72 (both light blue). On exposure to Iodine vapour nine spots appear at Rf. 0.18, 0.26, 0.34, 0.38, 0.46, 0.58, 0.72, 0.77 and 0.93 (all yellow): On spraying with Ninhydrin reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.26, 0.38, 0.46, 0.58, 0.67, 0.72 and 0.93 (all pink). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.26, 0.38, 0.46, 0,58, 0.67, 0.72 and 0.93 (all gery).

CONSTITUENTS - Volatile Oil containing Allyl Disulphide and Diallyl Disulphide. It also contains Allin, Allicin, Mucilage and Albumin.

PROPERTIES AND ACTION

Rasa : Kaṭu, Madhura

Guṇa : Guru, Snigdha, Tīkṣṇa, Sara, Picchila

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Vātahara, Kaphahara, Pitta dūṣanakara, Raktadoṣahara, Bhagnasandhānakara, Dīpana, Rasāyana, Balya, Hṛdya, Vṛṣya, Varṇya, Medhya, Jantughna, Kaṇṭhya, Asthi Māṃsa Sandhānakara, Cakṣuṣya

IMPORTANT FORMULATIONS - Laśunādi Vaṭī, Laśunādi Ghṛta, Vacā Laśunādi Taila

THERAPEUTIC USES - Jīrṇa, Jvara, Kṛmiroga, Gulma, Kuṣṭha, Arśa, Kāsa, Śvāsa, Pīnasa, Śūla, Karṇaśūla, Vātavyādi, Hikkā, Medoroga, Yoni Vyāpat, Visucikā, Plīhā Vṛddhi, Kṣaya, Viṣama Jvara, Apasmāra, Unmāda, Śvāsa, Śopha, Hṛdroga, Vātaśūla, Trikaśūla, Vraṇa Kṛmi

DOSE - 3 g of the drug.

MAHĀBALĀ (Root)

Mahābalā consists of dried roots of *Sida rhombifolia* Linn. (Fam. Malvaceae), an erect annual or perennial undershrub, 1.5 m high, distributed throughout the country especially in moist regions, ascending to an altitude of 1800 m in the Himalayas.

SYNONYMS

Sanskrit	:	Atibalā, Pītapuṣpi
Assamese	:	--
Bengali	:	Pitabedala, Kheriti
English	:	Country Mallow
Gujrati	:	Mahabala
Hindi	:	Pitabala, Pitabariyar
Kannada	:	Kisangihettutti-gida
Kashmiri	:	--
Malayalam	:	Anakkuruntotti
Marathi	:	Mahbala
Oriya	:	--
Punjabi	:	Khurunti
Tamil	:	Kurunthotti
Telugu	:	Gubatada, Pedda Mutheera Pulagum
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Drug occurs as entire root or cut pieces of varying lengths, 7-8 mm in thickness, with wavy lateral roots comparatively thinner than main roots having numerous rootlets, brownish-yellow, surface, rough due to scars of small rootlets and lenticels; fracture, hard and splintery.

b) Microscopic

Mature root shows cork consisting of 3-10 rows of narrow, rectangular, tangentially elongated, thin-walled, parenchymatous cells, a few containing rosette crystals of calcium oxalate; secondary phloem composed of phloem fibres in wedgeshaped patches with thin-walled parenchyma in between; phloem rays thin-walled, tangentially elongated towards secondary cortex; a few rosette crystals of calcium oxalate found scattered in phloem parenchyma; secondary xylem composed of vessels, fibre, parenchyma and rays; vessels arranged in radial rows, fibres moderately long, thick-walled, lignified with wide lumen and pointed apex; xylem rays 2-3 cells wide, a few containing rosette crystals of calcium oxalate; in Bala (S. *cordifolia* Linn.) 1-3 cells wide with rosette crystals of calcium oxalate; 1 or 2 cells wide with rhomboidal crystals of calcium oxalate in Atibala *(Abutilon indicum* Sw.), and rosette crystals of calcium oxalate present in secondary cortex and absent in xylem rays in Nagabala *(S. veronicaefolia* Lam.).

Powder - Creamish-grey; shows moderately large, thick-walled, lignified fibres, with wide lumen and pointed tips, fragments of cork cells simple, pitted vessels and a few rosette crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (8 : 2) shows under U.V. (366 nm) five fluorescent zones at Rf. 0.08 (blue), 0.35 (blue), 0.46 (blue), 0.78 (blue) and 0.95 (pink). On exposure to Iodine vapour eight spots appear at Rf. 0.08, 0.15, 0.39, 0.50, 0.66, 0.81, 0.89 and 0.99 (all yellow). On spraying with Dragendorff

reagent followed by 5% Methanolic-Sulphurc acid reagent two spots appear at Rf. 0.04 and 0.74 (both orange).

CONSTITUENTS - Alkaloids (Vasicinone and Vasicine).

PROPERTIES AND ACTION

Rasa	:	Madhura
Guṇa	:	Guru, Snigdha, Picchila
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātaghna, Pittaghna, Grāhī, Śukravṛddhikara, Ojovardhaka, Kāntivardhaka, Balya

IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila, Navratnarājamṛgāṅka Rasa

THERAPEUTIC USES - Śukrakṣaya, Kṣata, Kṣaya, Viṣamajvara, Daurbalya, Vātavyādhi, Vātarakta, Raktapitta, Śopha

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

MAÑJIṢṬHĀ (Stem)

Mañjiṣṭhā consists of dried stem of *Rubia cordifolia* Linn. (Fam. Rubiaceae); a perennial herbaceous prickly creeper or climber upto 10m long, found throughout the country ascending to 3750 m.

SYNONYMS

Sanskrit	:	Yojnavallī, Vastrarajinī, Rakta
Assamese	:	Phuvva
Bengali	:	Manjistha, Manjith
English	:	Indian Maddar
Gujrati	:	Manjitha
Hindi	:	Manjitha, Manjit
Kannada	:	Manjustha
Kashmiri	:	--
Malayalam	:	Manjatti
Marathi	:	Manjihtha
Oriya	:	--
Punjabi	:	Manjistha, Manjit
Tamil	:	Manjitte
Telugu	:	Manjishtha
Urdu	:	Majeeth

DESCRIPTION

a) Macroscopic

Stem slender, more or less cylindrical, slightly flattened, wiry, about 0.5 cm thick, brown to purple coloured; surface scabrous, stiff and grooved with longitudinal cracks; prickles present in the immature stem; nodes distinct having two leaf scars, one on either side; fracture, short.

b) Microscopic

Mature stem shows exfoliating cork, ruptured at places, forming dome-shaped structure, consisting of 3-12 or more layered radially arranged, squarish and tangentially elongated, thin-walled cells, appearing polygonal in surface view; secondary cortex 3-5 layered consisting of tangentially elongated, thin-walled cells, some of which contain acicular crystals of calcium oxalate as isolated or in bundles; a few cells contain sandy crystals as black granular masses; secondary phloem, a wide zone of reddish colour, composed of sieve elements and phloem parenchyma, fibres absent; phloem parenchyma smaller towards inner side gradually becoming larger and tangentially elongated towards periphery, a few cells contain sandy crystals of calcium oxalate; secondary xylem forms a continuous cylinder of reddish colour, composed of vessels, tracheids, fibres and xylem parenchyma; vessels numerous, distributed uniformly throughout xylem, larger towards outer side and smaller towards centre; in macerated preparation, vessels show great variation in shape and size having lignified walls and pitted thickening; xylem fibres thick-walled, long and short, longer ones have narrow lumen while shorter ones have wide lumen with pitted thickenings; xylem parenchyma also vary in shape and size having pitted or reticulate thickening; centre occupied by narrow pith consisting of thinwalled, parenchymatous cells, a few cells contain sandy crystals of calcium oxalate.

Powder - Pink; shows numerous fragments of cork, lignified xylem vessels, tracheids, and fibres with pitted and reticulate xylem parenchyma having red coloured contents; acicular and sandy crystals as black granular masses.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid : Water (4: 1 :5) shows in visible light two spots at Rf. 0.92 (grey) and 0.98 (green). Under UV (366 urn) two fluorescent zones are visible at Rf. 0.92 (grey) and 0.98 (pink). On exposure to Iodine vapour six spots appear at Rf. 0.28, 0.37, 0.53, 0.72, 0.92 and 0.98 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C six spots appear at Rf. 0.28, 0.37 (both grey), 0.53 (bluish grey), 0.72 (grey), 0.92 (grey) and 0.98 (violet)

CONSTITUENTS - Glycosides

PROPERTIES AND ACTION

Rasa : Kaṣāya, Tikta, Madhura

Guṇa : Guru

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Kaphapittaśāmaka, Varṇya, Svarya, Viṣa, Śothaghna, Kuṣṭhaghna, Pramehaghna, Vṛṣya, Kṛmighna, Stambhana, Ārtavajanana, Rasāyana, Śoṇitasthāpana

IMPORTANT FORMULATIONS - Aravindāsava, Aśvagandhāriṣṭa, Uśīrāsava, Candanāsava, Bṛhanmanjiṣṭhādi Kvātha, Mañjiṣṭhādi Taila, Khadirādi Guṭikā (Mukha)

THERAPEUTIC USES - Yoni Roga, Akṣi Roga, Śleṣmaja Śotha, Karṇa Roga, Mañjiṣṭhā Meha, Raktātisāra, Kuṣṭha, Visarpa, Prameha, Sarpaviṣa, Bhagna, Arśa, Vyaṅga

DOSE - 2-4 g of the drug.

MARICA (Fruit)

Marica consists of fully mature dried fruit of *Piper nigrum* Linn. (Fam. Piperaceae); a climber, cultivated from Konkan Southwards, especially in North Konkan Kerala, and also in Assam; fruits ripen from December to March, depending upon climatic conditions; fruits harvested from December to April.

SYNONYMS

Sanskrit	:	Vellaja, Kṛṣṇa, Uṣaṇa
Assamese	:	--
Bengali	:	Golmorich, Kalamorich, Morich
English	:	Black Pepper
Gujrati	:	Kalimori
Hindi	:	Kalimirch
Kannada	:	Karimonaru, Menaru
Kashmiri	:	--
Malayalam	:	Kurumulaku
Marathi	:	Kalamiri
Oriya	:	--
Punjabi	:	Galmirich, Kalimirch
Tamil	:	Milagu
Telugu	:	Miriyalu, Marichamu
Urdu	:	Filfil Siyah, Kalimirich

DESCRIPTION

a) Macroscopic

Fruits greyish-black to black, hard, wrinkled, 0.4-0.5 cm in dia.; odour, aromatic; taste, pungent.

b) Microscopic

Fruit consists of a thick pericarp for about one third of fruit and an inner mass of perisperm, enclosing a small embryo; pericarp consists of epicarp, mesocarp and endocarp; epicarp composed of single layered, slightly sinuous, tabular cells forming epidermis, below which, are present 1 or 2 layers of radially elongated, lignified stone cells adjacent to group of cells of parenchyma; mesocarp wide, composed of band of tangentially elongated parenchymatous cells having a few isolated, tangentially elongated oil cells present in outer region and a few fibro-vascular bundles, a single row of oil cells in the inner region of mesocarp; endocarp composed of a row of beakershaped stone cells; testa single layered, yellow coloured, thick-walled sclerenchymatous cells; perisperm contains parenchymatous cells having a few oil globules and packed with abundant, oval to round, simple and compound starch grains measuring 5.5-11.0 μ in dia.; having 2-3 components and a few minute aleurone grains.

Powder - Blackish-grey; shows debris with a characteristic, in groups, more or less isodiametric or slightly elongated stone cells, interspersed with thin-walled, polygonal hypodermal cells; beaker-shaped stone cells from endocarp and abundant polyhedral, elongated cells from peri sperm, packed tightly with masses of minute compound and single, oval to round, starch grains measuring 5.5-11.0 μ in dia.; having 2-3 component and a few aleurone grains and oil globules.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent,	Appendix	2.2.2.
Total Ash	Not more than	5	per cent,	Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent,	Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent,	Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent,	Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (7 :

3) shows in visible light four spots at Rf. 0.05, 0.08 (both light green), 0.27 (light yellow) and 0.52 (yellow). Under UV (366 nm) ten fluorescent zones are visible at Rf. 0.05, 0.08 (both light brown), 0.20 (light blue), 0.46 (blue), 0.52 (greenish yellow), 0.57 (bluish yellow), 0.66 (light blue), 0.74 (light pink), 0.82 and 0.97 (both blue). On exposure to Iodine vapour eleven spots appear at Rf. 0.05, 0.08, 0.14, 0.20, 0.27, 0.34, 0.46, 0.57, 0.66, 0.74 and 0.97 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent nine spots appear at Rf. 0.05 (light-orange), 0.14, 0.20, 0.27 (all orange), 0.46, 0.57 (both yellowish orange), 0.66, 0.74 (both orange) and 0.97 (light orange). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C twelve spots appear at Rf. 0.05, 0.08, 0.20, 0.27, 0.46, 0.52, 0.57, 0.66, 0.74, 0.82, 0.90.and 0.97 (all violet).

T.L.C. OF PIPERINE-

Preparation of the Extract:

Extract 1 g of Pepper powder by heating under reflux for 15 minutes with 10 ml methanol. Filter, evaporate the filtrate so as to reduce it to 2 ml and use for TLC application.

Standard Piperine:

Dilute 5 gm in 5 ml methanol

Adsorbent: Silica gel plate

Solvent System: Toluene: Ethyl acetate (7:3) (saturate the chamber for at least 30 minutes)

Application: Pepper extract : 20 µ }
}-- band form
Piperine : 10 µ }

Running distance: 10 to 12 cms

Drying: Air rying for 15 to 20 min. and then in an oven for 5 min.

Detection: Cool and spray the plate thoroughly with Vanillin-Sulphuric acid reagent and heat at 110^0 C for 5-10 min. under observation. When piperine spots appear lemon yellow, the plate is to be taken out. Over-heating turns yellow spots to violet.

Rf. of Piperine: Approximately 0.5 in case of hand made plates

CONSTITUENTS - Alkaloids (Piperine, Chavicine, Piperidine, Piperetine) and essential Oil.

PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta

Guṇa : Laghu, Rūkṣa, Tīkṣṇa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Śleṣmahara, Pittakara, Kaphavātajit, Vātahara, Chedana, Dīpana, Rucya, Jantunāśana, Medohara, Chedi, Hṛdroga, Vātaroga

IMPORTANT FORMULATIONS - Maricādi Guṭikā, Maricādi Taila, Trikaṭu Cūrṇa

THERAPEUTIC USES - Śvāsa, Śūla, Kṛmiroga, Tvagroga

DOSE - 250 mg - 1 g of the drug in powder form.

MĀṢAPARṆĪ (Whole Plant)

Māṣaparṇī consists of dried whole plant of *Teramnus labialis Spreng*. (Fam. Fabaceae), a very variable climbing or spreading hairy herb, found throughout the country.

SYNONYMS

Sanskrit	:	Mahāsahā, Sūryasani, Kāmboj, Paṇḍutomaśa Pasṇī
Assamese	:	--
Bengali	:	Mashance, Bankalaai, Mashani
English	:	Vogel-Tephrosis
Gujrati	:	Banudad, Janglee Adad
Hindi	:	Mashvan, Banvdad, Mashoni
Kannada	:	Kadu Uddu
Kashmiri	:	--
Malayalam	:	Katu Ulandu
Marathi	:	Ran Udid
Oriya	:	--
Punjabi	:	Jangali Urad
Tamil	:	Kattu-Ulandu
Telugu	:	Karuminum, Mashperni
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Root - Tap root with lateral roots occurs in cylindrical, branched pieces, 3-5 cm long, and upto 1cm in dia., light brown to dark brown, with longitudinal and transverse cracks; lateral roots thin, smooth, moderately woody; fracture, laminated and short.

Stem - Cut pieces 5-8 cm long, upto 0.8 cm in dia, somewhat twisted and branched, or cylindrical, slender, rough due to cracks and longitudinal ridges and furrows, brownishgrey;

fracture, short and fibrous.

Leaf - Trifoliate, leaflet ovate-oblong, 6-12 cm long, base round or acute, light brownish-yellow.

Flower - Lax axillary racemes, 5-15 cm long, flowers red, pink, purple or white, slender, more or less hairy rachis.

Fruit - Pod upto 5 cm long, straight or sometimes slightly recurved, brownish-black to dark brown, having 6-8 or 12 seeds.

Seed - Oblong, cylindrical, slightly rounded at the ends; 2-3 mm long upto 2 mm in dia.; dark brown.

b) Microscopic

Root - Poorly developed cork, 4-10 layered, consisting of tangentially elongated cells with brown walls, exfoliating strips of crushed cork cells occasionally present; secondary cortex consisting of 3-8 rows of tangentially elongated, thin-walled cells; secondary phloem appearing dome-shaped, composed of sieve tubes, companion cells, parenchyma, fibres, and crystal fibres, the whole being traversed by phloem rays that funnel out beyond phloem; phloem parenchyma thin-walled, polygonal; phloem fibres numerous, lignified, thick-walled, septate, occur mostly in groups, among phloem parenchyma; crystal fibres present containing a prismatic crystal of calcium oxalate; cambium not distinct; secondary xylem consisting of vessels, fibres and crystal fibres all traversed by xylem rays; vessels solitary or in groups of 2-3 with pitted thickenings; tracheids present, fibres septate with thick-walls and pointed; xylem parenchyma non-lignified, thick-walled elongated cells; crystal fibres, elongated, thick-walled, divided by transverse partitions into chambers, each chamber containing a prismatic crystal of calcium oxalate; xylem rays, 1 to 6 cells wide, thin-walled radially elongated; prismatic crystals of calcium oxalate, and starch grains present in secondary cortex, phloem fibres, phloem parenchyma and medullary rays; starch grains, numerous, mostly simple, rarely compound, oval to rounded with central hilum measuring 3-14 μ in dia.

Stem - Shows 6-11 layers, thin-walled, rectangular, exfoliated cork cells; secondary cortex consisting of thin-walled, oval to rectangular, parenchymatous cells having numerous groups of cortical fibres, arranged in radial rows; pericycle composed of isolated strands of fibres, occasionally with stone cells between them; secondary phloem composed of usual elements along with secretory cells; secondary xylem composed of usual elements; xylem

fibres long, lignified; vessels simple pitted; ray 1 or 2 cells wide, pith composed of oval to polygonal, thin-walled, parenchymatous cells containing secretory cells.

Leaf -

Midrib - single layered epidermis covered by thick cuticle, and having a few unicellular hairs on both surfaces; this is followed by 4 or 5 layered, thick-walled polygonal, collenchymatous cells on both lower and upper surfaces; 2 or 3 layers of oval to polygonal, thin-walled parenchymatous cells present on both surfaces; 'U' shaped vascular bundles having usual elements.

Lamina - single layered epidermis covered by thick striated cuticle and having a few unicellular hairs on both surfaces; single layered palisade cell; 1 or 2 layers of thinwalled, polygonal parenchymatous cells containing chlorophyll on lower surface, a few small vascular bundles having usual elements scattered in central regions; stomata paracytic on both surfaces; stomatal index 28-34 on lower surfaces and 18-24 on upper surfaces; palisade ratio not more than 5; vein-islet number 6-8; veinlet termination number not more than 4.

Fruit - Single layered, thick-walled, radially elongated, epidermal cells, followed by one row of thick-walled, rounded to rectangular, stone cells of various sizes having narrow, lumen and centric striations, 3 or 4 layers of thin-walled radially elongated, parenchymatous cells and several layers of thick-walled, lignified sclerenchymatous cells of mesocarp.

Seed - Testa containing thick-walled, tangentially elongated, lignified, sclerenchymatous cells, followed by 2 layers of thin-walled, palisade-like cells, palisade internally supported by a single layered bearer cells; cotyledons consist of oval to polygonal, thin walled parenchymatous cells.

Powder - Light yellowish-cream; shows fragments of cork, parenchyma, tracheids, unicellular hairs, thick-walled, elongated, polygonal cells of testa, simple pitted vessel, septate, thick-walled and pointed fibres; prismatic crystals of calcium oxalate, simple, oval to rounded starch grains measuring 3 -14 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) seven fluorescent zones at Rf. 0.05, 0.10, 0.15 (all blue), 0.26 (light blue), 0.49, 0.74 (both blue) and 0.85 (light blue). On exposure to Iodine vapour four spots appear at Rf. 0.05, 0.10, 0.33 and 0.69 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110° C four spots appear at Rf. 0.05, 0.10, 0.33 (all violet) and 0.96 (dark violet).

CONSTITUENTS - Glycosides.

PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātapittaśāmaka, Kaphavardhaka, Grāhī, Balya, Vṛṣya, Śukrala

IMPORTANT FORMULATIONS - Amṛtaprāśa Ghṛta, Aśoka Ghṛta, Vidāryādi Ghṛta, Dhānvantara Ghṛta, Nārāyaṇa Taila, Bṛhat Māṣa Taila, Balā Taila, Mahā Nārāyaṇa Taila

THERAPEUTIC USES - Atīsāra, Pravāhikā, Vātapitta Jvara, Śukrālpata, Raktapitta, Raktavikāra, Dāha, Śotha, Śiraḥśūla

DOSE - 5-10 g of the powder.

MASŪRA (Seed)

Masūra consists of dried seed of *Lens culinaris* Medic. (Fam. Fabaceae), a small, erect, pubescent herb, 15-75 cm high, cultivated throughout north India, particularly in Uttar Pradesh, Madhya Pradesh, Bihar and West Bengal, and to a smaller extent in Punjab. Rajasthan, Maharashtra and Gujarat.

SYNONYMS

Sanskrit	:	Supya, Pittabheṣaja
Assamese	:	--
Bengali	:	Masuri
English	:	Lentil
Gujrati	:	Masura, Masoor, Masur
Hindi	:	Masur
Kannada	:	Masura Bele
Kashmiri	:	--
Malayalam	:	Chanam payar, Vattupparupu
Marathi	:	Masur, Massora
Oriya	:	--
Punjabi	:	Masur, Masara
Tamil	:	Masoor Paruppu
Telugu	:	Masura Pappu, Masooralu
Urdu	:	Masur

DESCRIPTION

a) Macroscopic

Seed lens-shaped, smooth, about 4 mm thick, greyish-brown and faintly mottled, cotyledons pink; taste, characteristic.

b) Microscopic

Seed testa consists of a single layer of epidermis composed of palisade-like cells, columnar and sclerenchymatous, with a tiny projection and shows a light, transparent line; below this, a single layer of hypodermis consisting of beaker or dumbbell shaped cells present; testa followed by cotyledons, consisting of a thin layer of upper and lower epidermis covered with a thin layer of cuticle; epidermis made up of rectangular cells oriented along their long axis; below epidermis, mesophyll consists of thin-walled, rounded or oval shaped, parenchymatous cells, generally filled with simple, round to oval, starch grains many with striations showing a fissured hilum; mostly measuring between 30-40μ in dia.

Powder - Cream coloured; shows black particles due to pieces of testa; fragments of thick-walled, elongated, oval to polygonal cells of testa and a few sclerenchymatous cells in surface view; irregular, wavy palisade-like cells, and simple, round to oval, starch grains upto 40 μ in dia., with striations and a fissured hilum.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	3	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: water (4:1:5) shows on exposure to Iodine vapour six spots at Rf. 0.11, 0.40, 0.44, 0.50,

0.65 and 0.80 (all yellow). On spraying with Ninhydrin reagent and heating the plate for about ten minutes at 110°C seven spots appear at Rf. 0.11, 0.18, 0.24, 0.33, 0.44, 0.50 and 0.65 (all pink).

CONSTITUENTS - Flavonoids and Vitamins.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Saṃgrāhī, Kaphapittaśāmaka, Vātāmayakara, Varṇya, Balya

THERAPEUTIC USES - Atīsāra, Mūtrakṛcchra, Jvara, Raktapitta

DOSE - 10-20 g

MUDGA (Seed)

Mudga consists of dried seeds of *Phaseolus radiatus* Linn. (Fam. Fabaceae); an erect or sub-erect, much branched, 0.5 -1.3 m tall, annual herb, extensively cultivated all over the country as a pulse crop.

SYNONYMS

Sanskrit	:	Mungalya
Assamese	:	--
Bengali	:	Moong
English	:	Green Gram
Gujrati	:	Mug, Mag
Hindi	:	Munga
Kannada	:	Hesara, Hesoruballi
Kashmiri	:	--
Malayalam	:	Cherupayar
Marathi	:	Mung
Oriya	:	Muga, Jaimuga
Punjabi	:	Mungi, Munga
Tamil	:	Pattchai Payaru, Pasi Payaru, Siru Murg
Telugu	:	Pesalu, Pachha Pesalu
Urdu	:	Moong

DESCRIPTION

a) Macroscopic

Seed small, globular, about 0.4 cm long roughly square, smooth with white lateral hilum; usually green but some times yellowish-green; odour, not distinct; taste, slightly sweet

b) Microscopic

Seed coat shows a single layered, radially elongated, palisade-like cells, covered with a striated cuticle and supported internally by a single layered, thinwalled bearer cells, followed by 4-6 layered, thin-walled, tangentially elongated, elliptical, parenchymatous cells; cotyledons consist of oval of polygonal, thin-walled, parenchymatous cells having round to oval, simple, starch grains measuring 8-33 μ in dia. and rarely, oil globules.

Powder - Cream coloured; shows palisade-like cells, oval to polygonal, thin-walled, parenchymatous cells; round to oval, simple, starch grains measuring 8-33 μ in dia. and occasional oil globules.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	4	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under UV (366 nm) four fluorescent zones at Rf. 0.56, 0.65, 0.82 and 0.95 (all blue). On exposure to Iodine vapour seven spots appear at Rf. 0.01, 0.34, 0.56, 0.65, 0.78, 0.86 and 0.95 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate for ten minutes at 105°C seven spots appear at Rf. 0.26 (grey), 0.34 (violet), 0.65 (pink), 0.73 (pink), 0.82 (violet), 0.91 (violet) and 0.95 (pink).

CONSTITUENTS - Saponin, Starch, Albuminoids and Oil.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Kaphahara, Grāhī, Balaprada, Varṇya, Netrya

IMPORTANT FORMULATIONS - Balāhaṭhādi Taila, Marma Guṭikā, Kāyasthyādi Varti

THERAPEUTIC USES - Jvara, Netra Roga, Amlapitta

DOSE - 50-100 g for yusa.

MŪLAKA (Seed)

Mūlaka consists of dried seed of *Raphanus sativus* Linn. (Fam. Brassicaceae); a biennial herb, cultivated throughout India, upto 3000 m in the Himalayas and other hilly regions, for its roots.

SYNONYMS

Sanskrit	:	Śālāmarkaṭaka, Visra, Śāleya, Marusambhava
Assamese	:	Mulo
Bengali	:	Mula
English	:	Radish
Gujrati	:	Mulo
Hindi	:	Muli
Kannada	:	Mullangi, Mugunigadde, Moolangi, Moolaogi
Kashmiri	:	--
Malayalam	:	Mullanki
Marathi	:	Mula
Oriya	:	Mula, Rakhyasmula
Punjabi	:	Moolak, Moolee, Moola
Tamil	:	Mullangi, Mulakam, Mullangu, Millangi
Telugu	:	Mullangi
Urdu	:	Turb, Mooli

DESCRIPTION

a) Macroscopic

Seed reddish-brown, irregularly globose, sometimes flattened, 2-4 mm long and 2 mm wide; surface generally smooth and sometimes wrinkled and grooved at micropylar end; taste, oily.

b) Microscopic

Seed shows testa; consisting of single layer of nearly rectangular cells, covered with thin cuticle, followed by a layer of radially elongated, reddish-brown columnar cells, and integument 2-3 layers of compressed, thin-walled, parenchymatous cells; cotyledons and embryo consist of oval to polygonal, thin-walled, parenchymatous cells containing aleurone grains and oil globules.

Powder - Brownish-yellow; shows fragments of testa with hexagonal, thin-walled epidermis cells in surface view; oval to polygonal, thin-walled, parenchymatous cells of embryo and cotyledon; oil globules and aleurone grains present.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethlacetate (9: 1) shows under U.V. (366 nm) a fluorescent zone at Rf. 0.95 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.17, 0.31, 0.39, 0.70 and 0.95 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.17, 0.31, 0.39 and 0.95 (all violet).

CONSTITUENTS - Fixed Oil and Volatile Oil.

PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Kaṣāya

Guṇa : Laghu, Tīkṣṇa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Viṣahara, Vātaśleṣmahara, Hṛdya, Vahnidīpana, Kaṇṭhya, Grāhī, Kaphavātahara, Garbhāśayasaṅkocaka, Kaphanissāraka, Mūtrala, Pācaka, Vātānulomana, Mṛdurecaka

IMPORTANT FORMULATIONS - Sarṣpādi Lepa

THERAPEUTIC USES - Gulma, Hṛdroga, Kaṇṭha Roga, Sidhmakuṣṭha , Jvara, Śvāsa, Nāsikā Roga, Akṣi Roga, Anārtava

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

MUṆḌĪTIKĀ (Leaf)

Muṇḍīṭikā consists of dried leaf of *Sphaeranthus indicus* Linn. (Fam. Asteraceae); an aromatic, much branched herb, 30-60 cm high found abundantly in damp and shady places in plains all over the country, ascending to an altitude of 1,500 m in the hills.

SYNONYMS

Sanskrit	:	Muṇḍī, Śrāvaṇī, Kadamba, Puṣpikā, Alambusta
Assamese	:	Kamadarus
Bengali	:	Surmuriya, Chhagal Nadi, Mudmudiya
English	:	--
Gujrati	:	Gorakhmundi
Hindi	:	Mundi
Kannada	:	Mundi
Kashmiri	:	--
Malayalam	:	Mirnagnee, Atookamanni, Mirangnee
Marathi	:	Mundi, Baras Bondi
Oriya	:	Buikadam
Punjabi	:	Gorakhmundi
Tamil	:	Kotook, Karandai, Kottakarthai
Telugu	:	Bodasaramu, Bodataramu
Urdu	:	Mundi

DESCRIPTION

a) Macroscopic

Leaf sessile, decurrent, 2-7 cm long, 1-1.5 cm wide, obovate-oblong, narrowed to the base, dentate or serrate, hairy, greenish-brown; odour, slightly aromatic, but disappears on long storage; taste, bitter.

b) Microscopic

Leaf -

Midrib - Shows a single layered epidermis, covered with ordinary trichomes upto 5 cells high and glandular trichomes having unicellular stalk and group of 4-10 cells head, on both surfaces, followed in turn by 4-6 layered collenchyma and 3-4 layered parenchyma cells at both surfaces; vascular bundles 3-4, situated centrally having usual elements, xylem vessels arranged radially.

Lamina - Shows a single layered epidermis having numerous trichomes similar to those of midrib on both surfaces; mesophyll not differentiated into palisade and spongy parenchyma cells; stomata anisocytic present on both surfaces, stomatal index 32-38 on lower surface and 20- 29 on upper surface, stomatal number 47-54 on lower surface and 15-22 on upper surface, vein islet number 20-26.

Powder - Light greenish-brown; shows fragments of parenchyma, glandular hairs, multicellular trichomes, xylem vessels, polygonal, wavy, thin-walled epidermal cells in surface view, stomata, ordinary trichomes upto 5 cells high and glandular trichomes having unicellular stalk and a head of 4-1 0 cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	28	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (9 : 1) shows three spots at Rf. 0.27, 0.72 and 0.90 (all yellowish green) in visible light. Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.27, 0.42 (both blue). 0.54 (orange), 0.72 and 0.90 (both blue). On spraying with 5% Vanillin-Sulphuric acid reagent

and heating the plate at 110°C for ten minutes three spots appear at Rf. 0.27, 0.72 (both grey corresponding to Citral) and 0.96 (blue).

CONSTITUENTS - Essential Oil.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Madhura, Tikta, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātakaphahara, Medhya, Arśadoṣa Vināśaka, Viṣaghna, .

IMPORTANT FORMULATIONS - Navaratnarājamṛgāṅka Rasa, Arka Muṇḍī

THERAPEUTIC USES - Gaṇḍamālā, Apacī, Kuṣṭha, Kṛmi, Pāṇḍu, Ślīpada, Medoroga, Apasmāra, Kāsa, Mūtrakṛcchra, Tvak Roga, Stana Śaithilya, Yonirogā, Āmātisāra, Āmaroga, Vātaroga, Gudaroga, Plīhāroga, Chardi, Āmavāta, Gātradaurgandhya, Sūryāvarta, Ardhāvabhedaka

DOSE - 3-6 g of the drug.

MUSTĀ (Rhizome)

Mustā consists of dried rhizome of *Cyperus rotundus* Linn. (Fam. Cyperaceae); occurring throughout the country, common in waste grounds, gardens and roadsides, upto an elevation of 1800 m.

SYNONYMS

Sanskrit	:	Mustaka, Vārida
Assamese	:	Mutha, Somad Koophee
Bengali	:	Mutha, Musta
English	:	Nut Grass
Gujrati	:	Moth, Nagarmoth
Hindi	:	Motha, Nagarmotha
Kannada	:	Konnari Gadde
Kashmiri	:	--
Malayalam	:	Muthanga, Kari Mustan
Marathi	:	Moth, Nagarmoth, Motha, Bimbal
Oriya	:	--
Punjabi	:	Mutha, Motha
Tamil	:	Korai, Korai-Kizhangu
Telugu	:	Tungamustalu
Urdu	:	Sad Kufi

DESCRIPTION

a) Macroscopic

Drug consists of rhizome and stolon having a number of wiry roots, stolon 10-20 cm long having a number of rhizomes, crowded together on the stolons, rhizomes bluntly conical and vary in size and thickness, crowned with the remains of stem and leaves forming a scaly covering, dark brown or black externally, creamish-yellow internally; odour, pleasant.

b) Microscopic

Rhizome shows single layered epidermis, followed by 2-6 layers, suberised sclerenchymatous cells; epidermis and outer sclerenchymatous layers filled with dark brown content; ground tissue of cortex consists of circular to oval, thin-walled, parenchymatous cells with small intercellular spaces; a few fibro-vascular bundles present in this region; endoderm is distinct and surrounding the stele; wide central zone beneath endodermis, composed of circular to oval, thin-walled, parenchymatous cells with intercellular spaces, numerous collateral, closed, vascular bundles surrounded by bundle sheath, scattered in this region; vessels narrow having simple reticulate, and scalariform thickening and oblique pore; simple round to oval starch grains measuring 6-28 μ in dia., a number of pigmented cells filled with reddish-brown content, present throughout the cortex and stele.

Powder - Creamish-brown; shows reddish-brown cells, reticulate and simple pitted vessels; fibre-like, closely packed sclerified cells, narrow vessels with scalariform thickness and oblique pore from the remnants of leaves simple, round to oval, starch grains, measuring 6-28 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	11	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, Appendix	2.2.10.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) a fluorescent zone at Rf. 0.88 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.44, 0.55 and 0.73 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C three spots appear at Rf. 0.44, 0.55 and 0.73 (all violet).

CONSTITUENTS - Volatile Oil

PROPERTIES AND ACTION

Rasa : Tikta, Kaṭu, Kaṣāya

Guṇa : Laghu, Rūkṣa

Vīrya : Śīta

Vipāka : Kaṭu

Karma : Pittakaphahara, Sthaulyahara, Śothahara, Dīpana, Pācana, Grāhī, Tṛṣṇānigrahaṇa, Kṛmighna, Tvak doṣahara, Jvaraghna, Viṣaghna

IMPORTANT FORMULATIONS - Mustakāriṣṭa, Mustakādi Kvātha, Aśokāriṣṭa, Mustakādi Cūrṇa, Mustakādi, Mustakādi Lehya, Dhānyapañcaka Kvātha Cūrṇa, Pīyūṣavallī Rasa, Gulma Kālānala Rasa, Mahālākṣādi Taila, Śaḍaṅgapānīya

THERAPEUTIC USES - Agnimāndya, Ajīrṇa, Tṛṣṇā, Jvara, Saṃgrahaṇī, Śvāsa, Kāsa, Mūtrakṛcchra, Vamana, Stanyavikāra, Sutikāroga, Atīsāra, Āmavāta, Kṛmiroga

DOSE - 3-6 g (Powder)

20-30 ml (Kwatha)

NĀGAVALLĪ (Leaf)

Nāgavallī consists of leaf of *Piper betle* Linn. (Fam. Piperaceae); a dioecious, perennial creeper, climbing by many short adventitious rootlets, widely cultivated in hotter and damper parts of the country.

SYNONYMS

Sanskrit	:	Tāmbulī
Assamese	:	Pan
Bengali	:	Pan
English	:	Betel Leaf
Gujrati	:	Pan
Hindi	:	Pan
Kannada	:	Veelyadele Ele
Kashmiri	:	--
Malayalam	:	Vettila
Marathi	:	Pan, Nagvel, Vidyachepan
Oriya	:	--
Punjabi	:	Pan
Tamil	:	Vettilai
Telugu	:	Tamulapaku, Tamalapaku
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Leaf varies greatly in size, 7.5-20.0 cm, ovate cordate, entire, glabrous, apex acuminate to acute, lamina membranous, upper surface deep green and lower surface lighter in colour, primary or sub-primary nerves usually 7, sometimes 5-9; odour, aromatic; taste, stightly pungent.

b) Microscopic

Leaf -

Petiole - Single layered epidermis composed of cubical to slightly tangentially elongated cells covered with thick, striated cuticle; epidermal cells elongate to form uni to bicellular, occasionally multicellular hairs; epidermis followed by a discontinuous collenchymatous zone in the form of arcs, and a multilayered parenchymatous zone; vascular bundles arranged in the arcs, phloem surrounds xylem; vascular bundles usually of two sizes larger ones 7 in number and smaller ones 2 in number.

Midrib - Epidermis single layered, composed of colourless cubical cells, covered with wavy cuticle; epidermis followed by 2-3 layers of irregular colourless cells of hypodermis and a few layers of collenchyma, towards lower side collenchyma multilayered; vascular bundle shows phloem surrounding xylem; lower epidermis single layered and covered with wavy cuticle; some epidermal cells elongate to form uni to bicellular-occasionally multicellular hairs.

Lamina - Shows dorsi ventral structure; epidermis single layered, tangentially elongated, covered with thick striated cuticle on both sides; hypodermis 2-3 layered; having chloroplasts, occasionally with secretory cells; mesophyll differentiated into palisade and spongy parenchyma; palisade single layered; spongy parenchyma 3-4 layered composed of irregularly round cells, a few secretory cells also present in this region; hairs a few uni to bicellular, occasionally multicellular, all being uniseriate present on both surfaces; stomata anisocytic palisade ratio not over 4; stomatal index 11-13; vein islet number 2-7.

Powder - Greyish-green; shows polygonal epidermal cells in surface view, simple pitted vessels and a few uni to tricellular hairs, anisocytic type of stomata, palisade and spongy parenchyma cells and simple pitted vessel.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.

Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows in visible light five spots at Rf. 0.11 (green), 0.18 (light green), 0.23 (yellow), 0.34 (grey) and 0.61 (greyish green). Under U.V. (366 nm) seven fluorescent zones are visible at Rf. 0.11, 0.16 (both pink), 0.23 (brown), 0.34 (pink), 0.43 (pink), 0.61 (pink) and 0.76 (grey). On exposure to Iodine vapour seven spots appear at Rf. 0.08, 0.11. 0.18. 0.34, 0.61, 0.76 and 0.88 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.08, 0.11, 0.18 (all the three greenish grey), 0.34 (grey), 0.43 (violet), 0.61 and 0.76 (both light green).

CONSTITUENTS - Essential Oil, Amino Acids, Vitamins and Enzymes.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta, Kaṭu
Guṇa	:	Tīkṣṇa, Sara, Laghu, Viśada
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Rucya, Balya, Śleṣmahara, Mukhadaurgandhyahara, Mukhamalahara, Vātahara, Śramahara, Raktapittakara, Svaryaṃ, Vṛṣya

IMPORTANT FORMULATIONS - Lokanātha Rasa, Puṣpadhanvā Rasa, Bṛhat Sarvajvarahara Lauha, Laghu Sutaśekhara Rasa, Bṛhat Viṣamajvarāntaka Rasa

THERAPEUTIC USES - Kaṇḍū, Hṛllāsa, Agnimāndya, Jvara, Hṛdroga, Svarabheda

DOSE - 10-20 ml of Swarasa.

NĀRIKELA (Endosperm)

Nārikela consists of dried endosperm of *Cocos nucifera* Linn. (Fam. Arecaceae), a tall palm, bearing a crown of large pinnate leaves, cultivated in coastal and deltaic regions of South India.

SYNONYMS

Sanskrit	:	Nārikela, Tṛṇarāja
Assamese	:	Khopra
Bengali	:	Narkel, Narkel
English	:	Coconut Palm
Gujrati	:	Naliar, Nariyel, Shriphal, Koprun
Hindi	:	Nariyal, Gola
Kannada	:	Khobbari, Tengnamara, Temgu, Thengu, Thenginamara
Kashmiri	:	--
Malayalam	:	Nalikeram, Ten, Thengu, Keram
Marathi	:	Naral
Oriya	:	Nariyal
Punjabi	:	Narela, Khopra, Garigola
Tamil	:	Tenkai, Kopparai
Telugu	:	Narikelamu, Tenkay, Kobbari
Urdu	:	Narjil, Narial

DESCRIPTION

a) Macroscopic

Drug available whole as well as in broken pieces of endosperm, whole drug 8 -14 cm in size; ovoid, three angled, outer surface brown, somewhat rough due to shallow, reticulated striations; transversely broken; whole drug shows 0.8-1.2 cm thick, white endosperm and a large central cavity; fracture, short; odour, faint; taste, sweetish and oily.

b) Microscopic

Endosperm shows testa, consisting of irregularly arranged, brown, compact, parenchymatous cells; beneath testa a very wide zone, consisting of outer 2-3 layers, thin-walled, smaller and angular parenchymatous cells, followed by radially elongated, larger and thin-walled parenchymatous cells, containing numerous aleurone grains, raphides, prismatic crystals of calcium oxalate and oil globules.

Powder - White and oily; shows thin-walled. parenchymatous cells, fragments of polyhedral, thin-walled, testa cells in surface view, aleurone grains, oil globules, raphides, a few prismatic crystals of calcium oxalate and vessels.

IDENTITY, PURITY AND STRENGTH

Foreign matter		Nil		Appendix	2.2.2.
Total Ash	Not more than	2.5	per cent, Appendix		2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix		2.2.4.
Alcohol-soluble extractive	Not less than	13	per cent, Appendix		2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix		2.2.7.
Fixed oil	Not less than	59	per cent, Appendix		2.2.8

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (93 : 7) shows under U.V. (366 nrn) two fluorescent zones at Rf. 0.91 and 0.98 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.33, 0.91 and 0.98 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate at 105°C for fifteen minutes three spots appear at Rf. 0.33, 0.91 and 0.98 (all violet).

CONSTITUENTS - Fixed Oil.

PROPERTIES AND ACTION

Rasa : Madhura

Guṇa : Guru, Snigdha

Vīrya : Śīta

Vipāka : Madhura

Karma : Vātahara, Pittahara, Kaphakara, Balya, Vṛṣya, Bṛṃhaṇa, Hṛdya, Bastiśodhaka, Viṣṭambhi

IMPORTANT FORMULATIONS - Nārikela Khaṇḍa, Nārikela Lavaṇa

THERAPEUTIC USES - Dāha, Kṣata, Kṣaya, Raktapitta, Tṛṣṇā, Śoṣa, Śūla

DOSE - 10-20 g of the drug in powder form.

NICULA (Fruit)

Nicula consists of dried fruit of *Barringtonia acutangula* (Linn.) Gaertn. (Fam. Lecythidaceae); a moderate sized, evergreen, glabrous tree, fairly common in sub Himalayan tracts Bihar, Orissa, Bengal, Assam, Central and South India. It prefers moist situations but is not found in mangrove forests.

SYNONYMS

Sanskrit	:	Hijjala, Vidula
Assamese	:	Hindole
Bengali	:	Hijjala
English	:	--
Gujrati	:	Samudraphala
Hindi	:	Hijjala, Samudraphala
Kannada	:	Nerruganegalu, Holegonvamara
Kashmiri	:	--
Malayalam	:	Manjal Kadamba, Manjal Kadam
Marathi	:	Samudraphala
Oriya	:	Kijolo
Punjabi	:	Samuderphal
Tamil	:	Samudrapullarni, Samutrapalam
Telugu	:	Kanapu, Kadaps
Urdu	:	Hijjal

DESCRIPTION

a) Macroscopic

Fruit - A drupe, yellowish-brown, oblong, 2.5-3.3 by 1.00 - 1.3 cm, bluntly quadrangular, broadest in the middle, slightly narrow and truncate at each end, fibrous; no characteristic odour and taste.

Seed - Single, 2-2.5 by 0.7-1.0 cm, wrinkled longitudinally, dark brown in colour.

b) Microscopic

Fruit - Epicarp shows several layers of tangentially elongated, thin-walled parenchymatous cells; mesocarp composed of several layers of loosely arranged, thin-walled parenchymatous cells with intercellular spaces forming cavities; vascular bundles found scattered in this region; endocarp not distinct; a few rosette crystals of calcium oxalate in the form of irregular cluster, present in this region.

Seed - Shows two integuments, endosperm and embryo; outer integument consists of single layered epidermis, 2-3 layered sclereids and 7-10 layered closely arranged cells; vascular bundles also found scattered in this region; inner integument consists of 1-2 layered, crushed cells; endosperm and embryo consists of isodiametric cells having small intercellular spaces; abundant, irregular starch grains, single and compound found scattered in cells of endosperm simple, 4-27 μ in dia., round to oval.

Powder - Whitish-purple; shows a few parenchymatous, brown coloured cells rosettes of calcium oxalate crystals in cluster numerous simple and compound starch grains, measuring 4-27 μ in dia. a few xylem vessels with spiral thickening.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	9	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.56 (blue), 0.81

(black) and 0.94 (blue). On exposure to Iodine vapour eight spots appear at Rf. 0.41, 0.48, 0.56, 0.61, 0.81, 0.87, 0.92 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes eight spots appear at Rf. 0.14 (brown), 0.41, 0.48, 0.56, 0.61 (all violet), 0.87 (blue), 0.92 (violet) and 0.96 (brown).

CONSTITUENTS - Saponins and Sapogenins.

PROPERTIES AND ACTION

Rasa : Tikta, Kaṣāya, Kaṭu

Guṇa : Rūkṣa, Laghu

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Saṃgrāhī, Vraṇaśodhana, Kaphahara, Recaka, Rakśoghna, Viṣaghna, Vāmaka, Vātahara

IMPORTANT FORMULATIONS - Mahā Pañcagavya Ghṛta, Lakṣmī Vilāsa Rasa (Nāradīya), Nyagrodhādi Gaṇa Kvātha

THERAPEUTIC USES - Raktapitta, Āmātisāra, Cakṣusrāva, Galagaṇḍa, Bhūtabādhā, Grahabādhā, Prameha

DOSE - 1-3 g

NĪLĪ (Whole Plant)

Nīlī consists of dried whole plant of *Indigofera tinctoria* Linn. (Fam. Fabaceae); a shrub, 1.2-1.8 m high, found nearly throughout the country and widely cultivated in many parts of the country.

SYNONYMS

Sanskrit	:	Nīlinī, Nīlpuṣpa, Kālkeśī
Assamese	:	Nilbam
Bengali	:	Nil
English	:	Indigo Plant
Gujrati	:	Nil, Gali
Hindi	:	Nili
Kannada	:	Kadu Nili, Nili
Kashmiri	:	--
Malayalam	:	Avuri, Amari
Marathi	:	Nili, Neel
Oriya	:	--
Punjabi	:	Neel
Tamil	:	Avuri
Telugu	:	Nili, Kondannili
Urdu	:	Neel

DESCRIPTION

a) Macroscopic

Root - Tap root having lateral roots, pale yellow to light yellowish-brown, hard, woody, cylindrical, nearly smooth except for a few having scattered lenticels; odour, not distinct; taste, slightly bitter.

Stem - Pieces woody, hard, slender, cylindrical, 0.1 to 1.5 cm in dia., surface, smooth,

lenticels present; yellowish-green to greyish-brown in colour; no characteristic odour and taste.

Leaf - Compound, imparipinnate; leaflets, 1-5 cm long and 0.3-1.2 cm wide, oblong or oblanceolate with short mucronate tip; pale green to greenish-black; no characteristic odour and taste.

Flower - Numerous in nearly sessile spicate racemes, 10.0 cm long; calyx 1.2-1.5 mm long, hairy outside, teeth triangular, acute, as long as tube; corolla pink, papilionaceous, 4 mm long, back of standard petal pubescent, stamen 10, diadelphous; ovary sessile, linear, downy; stigma capitate.

Fruit - Pod nearly cylindrical. straight or slightly curved, apiculate, 2-3.2 cm long and 0.15-0.2 cm in dia., having 8-12 seeds; smooth, brown to dark brown.

Seed - Somewhat quadrangular with truncate ends, 0.2 cm long and 0.1 cm wide, smooth, yellowish-brown to greenish-brown in colour.

b) Microscopic

Root - Shows a narrow zone of cork, consisting of 4-10 layers of tangentially elongated, rectangular, thin-walled cells, with lenticels; secondary cortex a narrow zone, consisting of rectangular to polygonal, thin-walled cells containing rhomboidal to hexagonal crystals of calcaim oxalate; and groups of fibres; secondary phloem composed of usual elements; secondary xylem consisting of xylem parenchyma, vessels, fibres and rays; fibres large aseptate with pointed end; vessels solitary or 2-4 in groups having simple pits; medullary ray 1-4 cells wide; prismatic crystals of calcium oxalate present in secondary cortex, phloem, xylem parenchyma and rays; oil globules present in cortex and phloem parenchyma; starch grains simple, round to oval, measuring 3-11 μ in dia. present in cortex, phloem, xylem parenchyma and rays. .

Stem - Young stem furrowed and ridged in outline; epidermis single layered, 5-10 layers of collenchymatous cells present in ridges; mature stem shows 5-15 layers of tangentially elongated, rectangular, thin-walled cork cells, broken by lenticels, a few upper rectagular cells filled with reddish-brown contents; secondary cortex consists of 5-7 layers of oval to elliptical, thin-walled, parenchymatous cells, pericycle a discontinuous ring of fibres;

secondary phloem and secondary xylem composed of usual elements; xylem traversed by rays; vessels solitary or 2-7 in radial rows, isolated vessels show spiral thickening and simple pits; fibres having narrow lumen and pointed ends; tracheids pitted; crystal fibres 4-12 chambered; each containing lor 2 prismatic crystals of calcium oxalate; pith occupied by isodiametric, thin-walled, parenchymatous cells; a few cells of secondary cortex, phloem and pith contain brown coloured substances; prismatic crystals of calcium oxalate and simple starch grains measuring 3-6 μ in dia. found in secondary cortex, phloem and xylem parenchyma, pith and rays.

Leaf -

Petiole - appears nearly circular in outline having two lateral wings; epidermis single layered, covered externally with thin cuticle and followed internally by single layered collenchymatous hypodermis; unicellular hairs scanty' to moderate with blunt tip; cortex 4-6 layered, consisting of oval to polygonal, elongated, thin-walled chlorenchymatous cells; pericycle scanty, present in the form of continuous or discontinuous ring; vascular bundle collateral and three in number; large one present in centre and two smaller in lateral wings; pith composed of rounded to oval, thin-walled parenchymatous cells; a few prismatic crystals of calcium oxalate present in phloem and pith region.

Midrib - shows a similar structure of epidermis, cuticle and hairs as in petioles;lower and upper epidermis followed by single and 2 or 3 layers of collenchymatous hypodermis respectively; parenchyma 2 or 3 layered, present on both sides; vascular bundle single, collateral, crescent-shaped, present centrally.

Lamina - shows a dorsiventral structure; epidermis, cuticle and hairs as in petiole and midrib; palisade 2 layered; spongy parenchyma 2-4 layered; a few patches of veins scattered between palisade and spongy parenchyma; a few prismatic crystals of calcium oxalate present in mesophyll cells; stomata paracytic and unicellular hairs present on both surface but abundant on lower surface; palisade ratio not more than 4; stomatal index 18-40 on lower surface and 10-16 on upper surface; vein islet number 15-18.

Fruit - Shows single layered epicarp; mesocarp 7-8 layered, more or less elliptical, tangentially, elongated, thin-walled, parenchymatous cells, a few upper cells contain reddish brown content; vascular bundle present in the mesocarp region towards both ends, covered by sclerenchymatous sheath; endocarp present in the form of 3-5 layers of sclerenchymatous cells.

Seed - Shows a single layered, radially elongated, thin-walled, palisade-like cells, covered externally by a thin cuticle and internally, followed by a single layer of bearer cells;

beneath bearer cells 2-4 tangentially elongated elliptical, thin-walled parenchymatous cells present; cotyledons consists of oval to angular, elongated, thin-walled parenchymatous cells.

Powder - Yellowish grey; shows aseptate fibres, vessels with spiral thickening and simple pits; groups of mesophyll cells, unicellular hairs; pieces of hexagonal, straight walled, epidermal cells in surface view; prismatic crystals of calcium oxalate, rarely oil globules, and simple, rounded to oval, starch grains measuring 3-11 μ in dia.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5.2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.0	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	2.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7.5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : glacial Acetic acid: Water (5 : 1: 4) in visible light shows three spots at Rf. 0.38, 0.75 and 0.88 (all grey). On exposure to Iodine vapour seven spots appear at Rf. 0.15, 0.38, 0.50, 0.59, 0.67, 0.75 and 0.88 (all yellow). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate at 110°C for ten minutes nine spots appear at Rf. 0.15, 0.25, 0.38, 0.50, 0.59, 0.67, 0.75, 0.84 and 0.88 (all grey).

CONSTITUENTS - Glycoside (Indican).

PROPERTIES AND ACTION

Rasa : Tikta, Kaṭu

Guṇa	:	Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātahara, Kaphahara, Recanī, Keśya, Viṣaghna, Jantughna

IMPORTANT FORMULATIONS - Nīlikādya Taila, Gorocanādi Vaṭī

THERAPEUTIC USES - Vāta Rakta, Udararoga, Plīhāroga, Kṛmiroga, Moha, Bhrama, Udāvarta, Kaṭivāta, Kāsa, Āmaroga, Viṣodara, Jvara, Kṣaya, Kṛmidanta

DOSE - 10-20 g of the drug for decoction.

NIRGUṆḌĪ (Leaf)

Nirguṇḍī consists of dried leaf of *Vitex negundo* Linn. (Fam. Verbenaceae); a large aromatic shrub or a small tree, upto 4.5 m in height, common throughout the country ascending to an altitude of 1500 m in the outer Himalayas. It is common in waste places around villages, river banks, moist localities and in the deciduous forests.

SYNONYMS

Sanskrit	:	Sinduvāra, Samphālika, Nīla
Assamese	:	Aslak
Bengali	:	Nirgundi, Nishinda
English	:	Five Leaved Chaste tree
Gujrati	:	Nagod
Hindi	:	Nirgundi, Sinduar, Sambhalu
Kannada	:	Lakkigida, Nekkigida
Kashmiri	:	--
Malayalam	:	Indranee, Nirgundi
Marathi	:	Nirgundi
Oriya	:	--
Punjabi	:	Sambhalu, Banna
Tamil	:	Karunochchi, Nocchi
Telugu	:	Nallavavilli, Vavili
Urdu	:	Sambhalu, Panjangusht

DESCRIPTION

a) Macroscopic

Leaves palmately compound, petiole 2.5 - 3.8 cm long; mostly trifoliate, occasionally pentafoliate; in trifoliate leaf, leaflet lanceolate or narrowly lanceolate, middle leaflet 5- 10 cm long and 1.6 -3.2 cm broad, with 1- 1.3 cm long petiolule, remaining two

sub-sessile; in pentafoliate leaf inner three leaflets have petiolule and remaining two sub-sessile; surface glabrous above and tomentose beneath; texture, leathery.

b) Microscopic

Petiole - shows single layered epidermis having a number of unicellular, bicellular and uniseriate multicellular covering trichomes and also glandular trichomes with uni to tricellular stalk and uni to bicellular head; cortex composed of outer collenchymatous tissue and inner 6 - 8 layers of parenchymatous tissue; collenchyma well developed in basal region and gradually decreases in middle and apical regions; pericyclic fibres absent in basal region of petiole and present in the form of a discontinuous ring in apical region surrounding central horse shoe-shaped vascular bundle; a few smaller vascular bundles present ventrally between arms of central vascular bundle and two, or rarely three, bundles situated outside the arms.

Lamina - shows single layered epidermis having mostly unicellular hairs, bi and multicellular and glandular trichomes being rare; hypodermis 1 - 3 layered interrupted at places by 4- 8 palisade layers containing chlorophyll; a large number of veins enclosed by bundle sheath traverse mesophyll; stomata present only on the ventral surface, covered densely with trichomes; vein-islet and vein termination number of leaf are 23-25 and 5-7 respectively.

Powder - shows number of pieces or whole, uni-bi and multicellular covering trichomes, glandular trichomes, palisade tissues with hypodermis, and upper and lower epidermis, xylem vessels with pitted walls.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.18 (blue) and 0.47 (red). On exposure to Iodine vapour four spots appear at Rf. 0.16, 0.47, 0.67 and 0.91 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and on heating the plate for ten minutes at 105° C four spots appear at Rf. 0.07, 0.47, 0.58 and 0.67 (all blue).

CONSTITUENTS - Alkaloids and Essential Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphaśāmaka, Vātaśāmaka, Śophahara, Keśya, Cakṣuṣya, Viṣaghna, Smṛtiprada, Anulomana

IMPORTANT FORMULATIONS - Vātagajāṅkuśa Rasa, Mahā Vāta Vidhvaṃsana Rasa, Yakṛtplīhāri Lauha, Daśamula Taila, Trivikrama Rasa, Nirguṇḍī Taila, Tribhuvanakīrti Rasa, Viṣa Tinduka Taila

THERAPEUTIC USES - Śūla, Śopha, Vātavyādhi, Āmavāta, Kuṣṭha, Kaṇḍū, Kāsa, Pradara, Ādhmāna, Plīhā Roga, Gulma, Aruci, Kṛmi, Vraṇa, Nāḍī Vraṇa, Karṇaśūla, Sūtikā, Jvara

DOSE - 10-20 ml (Swarasa).

PADMAKA (Heart Wood)

Padmaka consists of heart wood of *Prunus cerasoides;* D. Don (Fam. Rosaceae); a middle or large sized tree, found in temperate Himalayan region from Garhwal to Sikkim upto an elevation of 910-1820 m.

SYNONYMS

Sanskrit	:	Padmagandhi, Pitarakta
Assamese	:	Diengsoh-iog-Krems
Bengali	:	Padmakastha
English	:	Biyd Cherry
Gujrati	:	Padmakastha, Padmaka
Hindi	:	Padmakha, Padma Kastha, Paja
Kannada	:	Padmaka
Kashmiri	:	--
Malayalam	:	Pathimukam
Marathi	:	Padmakastha, Padmaka
Oriya	:	--
Punjabi	:	Pajja
Tamil	:	Padmakashdham
Telugu	:	Padmakashtham

DESCRIPTION

a) Macroscopic

Drug available in variable pieces, yellowish-brown to orange, to which some whitish portion of sap wood still attached; heavy, dense, moderately hard and very strong, odour, very faint; no taste.

b) Microscopic

Mature heart wood consisting of vessels, fibres, tracheids and xylem parenchyma traversed by xylem rays; vessels lignified, moderately thick-walled, reticulate thickening, fairly large, with bordered pits having an oval-shaped, lateral perforation at each end, measuring, upto 220 μ in length and upto 68 μ in width; fibres occur mostly in groups, usually found associated with other xylem elements, moderately thick-walled, narrow lumen, pointed at both ends, 55-137 μ long; tracheids usually thick-walled, lignified, elongated cells; xylem parenchyma composed of thick-walled, found associated with vessels and fibres, oval to elongated, polygonal cells; xylem rays uni to multiseriate, uni and biseriate more common, multiseriate, generally 3-6 cells wide, 40-50 cells high; cut materials, when treated with ferric chloride solution turn the yellow pigments blue or black, indicating tannin

Powder - Reddish-brown; shows fragments of abundant groups or single pointed fibres measuring 55-137 μ in length, moderately thick-walled, fairly large vessels with reticulate thickening and bordered pits, thick-walled, lignified tracheid cells, pieces of ray cells and xylem parenchyma cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) a fluorescent zone at Rf. 0.64 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.15, 0.32, 0.42, 0.53, 0.59, 0.64 and 0.76 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C

four spots appear at Rf. 0.15, 0.32, 0.53 and 0.59 (all violet).

CONSTITUENTS - Flavonoids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Garbhasthāpana, Rucya, Vātala

IMPORTANT FORMULATIONS - Khadirādi Guṭikā, Gudūcyādi Kvātha Cūrṇa, Bṛhacchāgalādya Ghṛta, Śatāvaryādi Ghṛta, Gudūcyādi Taila, Uśīrāsava, Candanāsava, Daśamūlāriṣṭa, Mṛtasañjīvanī Surā, Karpūrādyarka

THERAPEUTIC USES - Visphoṭa, Dāha, Kuṣṭha, Raktapitta, Vami, Tṛṣṇā, Bhrama, Visarpa

DOSE - 1-3 g (Cūrna).

PĀṬALĀ (Root)

Pāṭalā consists of dried root of S*tereospermum suaveolens* DC. (Fam. Bignoniaceae); a large deciducus tree upto 18 m high and 1.8 m in girth with a clear bole of about 9 m, found throughout the moist parts of the country.

SYNONYMS

Sanskrit	:	Amoghā, Madhudūtī, Kṛṣṇavṛntā, Tāmrapuṣpī
Assamese	:	Parul
Bengali	:	Parul
English	:	Rose Flower Fragrant
Gujrati	:	Podal
Hindi	:	Padal
Kannada	:	Padramora
Kashmiri	:	--
Malayalam	:	Padiri
Marathi	:	Padal
Oriya	:	Boro, Patulee
Punjabi	:	Padal
Tamil	:	Padari
Telugu	:	Kaligottu, Kokkesa, Podira

DESCRIPTION

a) Macroscopic

Root occurs in about 6-9 cm long, 1-1.5 cm thick cut pieces, cylindrical, externally brown to creamy, rough due to vertical fissures, cracks, ridges and transverse fine lenticels, internally dark brown, lamellation or stratification due to presence of concentric bands of fibres; fracture tough and fibrous; odour, not distinct; taste, bitter.

b) Microscopic

Root cork consists of 25-35 layers of rectangular cells with 3-5 stratified layers, lignification being more prominent where the stratification starts, arranged with 1-3 tangential rows of narrow cells alternating with 3-5 tangential rows of wider cells; cork cambium composed of 1 -2 layers of tangentially elongated cells; secondary cortex arranged more or less radially, becomes polyhedral to isodiameteric in inner region, a few cells getting converted into stone cells which are regular in shape and show projection; secondary phloem wide, forms cerantenchyma between two obliquely running rays; some rays and phloem cells get converted into irregular, polygonal shaped stone cells, measuring 10- 150 μ in width, phloem parenchyma being intact; medullary rays multiseriate, being 3-4 cells wide, and 8-11-15 cells high; fibres tapering, pointed or slightly blunt, with a small peg-like projection at both ends; sieve tube gets collapsed in outer region forming strips of ceratenchyma; a few small microsphenoidal crystals of calcium oxalate present in phloem parenchyma and rays; secondary xylem wide having usual elements; vessels simple, pitted, lignified; fibres large, pointed, aseptate; rays multiseriate, 2- 3 cells wide.

Powder - Dark brown; shows fragments of rectangular cork and phloem parenchyma cells; groups of single, thick- walled, cubical to rectangular, lignified stone cells having striations and wide lumen; a number of microsphenoidal crystals of calcium oxalate, intact and scattered outside.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	20	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 :5) shows in visible light three spots at Rf. 0.62, 0.85 and 0.92 (all light yellow).

Under UV (366 nm) five fluorescent zones are visible at Rf. 0.47, 0.53 (both light blue), 0.62 (bluish pink), 0.74 (blue) and 0.85 (light green). On exposure to Iodine vapour seven spots appear at Rf. 0.14, 0.28, 0.47, 0.53, 0.74, 0.85 and 0.92 (all yellow). On spraying with 5% Methanolic Phosphomolybdic acid reagent and heating the plate for ten minutes at 110°C four spots appear at Rf. 0.47, 0.74, 0.85 and 0.92 (all bluish grey).

CONSTITUENTS - Bitter Substances, Sterols, Glycosides and Glyco-Alkaloids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Anuṣṇa
Vipāka	:	Kaṭu
Karma	:	Tridoṣahara, Rucya

IMPORTANT FORMULATIONS - Amṛtāriṣṭa, Daśamūlāriṣṭa, Bhārṅgī Guḍa, Indukānta Ghṛta, Dhānvantara Taila, Daśamūla Kvātha Cūrṇa

THERAPEUTIC USES - Śvāsa, Śotha, Arśa, Chardi, Hikkā, Tṛṣṇā, Amlapitta, Rakta Vikāra, Mūtravikāra, Agnidagdha, Vraṇa Rujā, Visphoṭa, Medoroga

DOSE - 5-10 g (Powder).

25-50 ml (Decoction).

PHALGU (Fruit)

Phalgu consists of dried fruits of *Ficus hispida* Linn. f. (Fam. Moraceae); a moderate sized tree or. shrub, distributed throughout the outer Himalayan range from Chenab eastwards to Bengal, Central and South India and Andaman Islands.

SYNONYMS

Sanskrit	:	Kākodumbur, Malayu, Malpu
Assamese	:	Khoskadumar, Tanvardi, Teenbarree
Bengali	:	Kakdumur, Kathdumur, Kakadumbar
English	:	Wild Fig, Devil Fig
Gujrati	:	Tedumbaro, Dhedadambaro, Dhedhumbro
Hindi	:	Konea-dumbar, Kathumar
Kannada	:	Kadaatti, Arjeeru Hamu, Anjeeru, Onagida, Hanna, Adane
Kashmiri	:	--
Malayalam	:	Peyatti, Kattatti, Erumanakku, Parakasimi
Marathi	:	Rambal, Kalodumbar, Bhuiumbar
Oriya	:	Dimiri, Ani Dambura
Punjabi	:	Rumbal
Tamil	:	Peyatti
Telugu	:	Brahma medi, Kakimedi
Urdu	:	Kath Gular

DESCRIPTION

a) Macroscopic

Dried syconus fruit, ovoid with a central circular hole and short stalk, 1-2 cm in dia., wrinkled; greyish-brown; seeds less than 1 mm in dia. and yellowish-brown in colour, odour and taste not characteristic.

b) Microscopic

Fruit shows a sinlge layered epidermis, covered with thick cuticle having a few unicellular trichomes, epidermis, followed by 4-6 layers of hexagonal to polygonal, collenchymatous cells, a few cells contain rosette crystals of calcium oxalate; mesocarp composed of large, oval to polygonal, thick-walled parenchymatous cells, a few vascular vessels showing spiral thickening.

Powder - Greyish-brown; shows groups of oval to polygonal, thin-walled cells of mesocarp and endosperm, fragments of polyhedral, thick-walled epidermal cells in surface view, spiral vessels and abundant unicellular trichomes.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	13	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract of the drug on Silica gel 'G' plate using n-Butanol : Acetic acid: water (4:1:5) shows under U.V. (366 nm) two fluorescent zones at Rf 0.36 and 0.92 (both blue). On exposure to Iodine vapour four spots appear at Rf. 0.20, 0.36, 0.41 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 105°C two spots appear at Rf. 0.20 (grey) and 0.92 (brown).

CONSTITUENTS - Tannins and Saponins

PROPERTIES AND ACTION

Rasa : Madhura, Amla, Kaṭu, Tikta, Kaṣāya

Guṇa : Snigdha, Guru

Vīrya : Śīta

Vipāka : Madhura

Karma : Vātahara, Pittahara, Kaphahara, Māṃsakara, Śukrakara, Mala Stambhana, Tṛptikāraka, Grāhī, Bṛṃhaṇa, Viṣṭambhī

IMPORTANT FORMULATIONS - Citrakādi Taila

THERAPEUTIC USES - Vraṇa, Śveta Kuṣtha, Pāṇḍu, Arśa, Kāmalā, Atīsāra, Dāha, Kṣata, Viṣaroga, Tvagroga, Raktavikāra, Kaṇḍū, Kuṣṭha, Śopha, Raktapitta, Vātapittajaroga

DOSE - 10-20 g

PHALGU (Root)

Phalgu consists of dried root of *Ficus hispida* Linn. f. (Fam. Moraceae); a moderate sized tree or shrub, distributed throughout the outer Himalayan range from Chenab eastwards to Bengal, Central and South India and Andaman Islands.

SYNONYMS

Sanskrit	:	Malpu, Kākodumbur, Malāyu
Assamese	:	Khoskadumar, Tanvardi, Teenbarree
Bengali	:	Kakadumbar, Kakdumur, Kathdumur
English	:	Devil Fig, Wild Fig
Gujrati	:	Dhedhumbro, Tedumbaro, Dhedambaro
Hindi	:	Kathumar, Konea-dumbar
Kannada	:	Adane, Anjeeru, Arjeeru Hamu, Hanna, Onagida, Kadatti
Kashmiri	:	--
Malayalam	:	Erumanakku, Kattatti, Parakasimi, Peyatti
Marathi	:	Bhuiumbar, Kalodumbar, Rambal
Oriya	:	Ani Dambura, Dimiri
Punjabi	:	Rumbal
Tamil	:	Peyatti
Telugu	:	Brahma medi, Kakimedi
Urdu	:	Kath Gular

DESCRIPTION

a) Macroscopic

Roots 4 -17 cm long, 1.0-2.5 cm thick, almost cylindrical, occasionally somewhat compressed at places, external surface brown to dark brown with deep, elliptical cracks and tangentially arranged rows of lenticels; fracture, splintery.

b) Microscopic

Root shows 5-10 layers of cork, consisting of thin-walled, compressed cells, outer layers exfoliating; secondary cortex a wide zone consisting of irregularly arranged, tangentially elongated, thin-walled, parenchymatous cells, some of which contain rosette crystals of calcium oxalate and dark red coloured contents; secondary phloem consisting of usual elements, comprising of thin-walled cells; cellulosic phloem fibres found scattered throughout secondary phloem in singles and in groups of 2-3; a few phloem parenchyma and phloem ray cells contain rosette crystals of calcium oxalate; secondary xylem situated centrally, consisting of usual elements, all being lignified; xylem vessels numerous, equally distributed throughout secondary xylem region, in singles as well as in groups of 2-6, xylem rays numerous, straight and 1-5 cells wide.

Powder - Yellowish-brown; shows cellulosic phloem fibres, xylem vessels in broken pieces with pitted thickenings and rosette crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	6	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) on exposure to Iodine vapour shows six spots at Rf. 0.05, 0.15, 0.30, 0.34, 0.92 and 0.98 (all yellow). On spraying with Dragendorff reagent followed by 5% aqueous Sodium Nitrite solution four spots appear at Rf. 0.30, 0.34, 0.92 and 0.98 (all light brown).

CONSTITUENTS - Alkaloids.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Guru, Śīta
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Kaphahara, Malastambhaka

IMPORTANT FORMULATIONS - Mahā Pañcagavya Ghṛta

THERAPEUTIC USES - Śvitra, Kaṇḍū, Kuṣṭha, Vraṇa, Raktapitta, Śopha, Pāṇḍu, Raktavikāra, Kāmalā, Arśa

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

PRAPUNNĀḌA (Seed)

Prapunnāḍa consists of dried seed of *Cassia tora* Linn. (Fam. Fabaceae); a herbaceous annual occurring as a weed throughout the country in plains, ascending 1500 m in the Central Himalayas.

SYNONYMS

Sanskrit	:	Eḍagaja, Dadrughna
Assamese	:	Kulb
Bengali	:	Chavuka, Chakunda, Panevar
English	:	Ring Worm Plant, Fetid Cassia
Gujrati	:	Kovaraya
Hindi	:	Pavand
Kannada	:	Tagache
Kashmiri	:	--
Malayalam	:	Tagaraa
Marathi	:	Tankala
Oriya	:	--
Punjabi	:	Panwal, Chakunda, Chakwad
Tamil	:	Vshittgarai
Telugu	:	Tagiris
Urdu	:	Panwar

DESCRIPTION

a) Macroscopic

Seed hard, 1 cm long, 3-4 mm thick, oblong or rhombohedral, both ends appear as if cut off obliquely, greenish-brown to brownish-black, smooth and shiny; odourless; taste, bitter.

b) Microscopic

Seed shows seed coat consisting of longitudinally elongated cells, covered with thick, smooth cuticle, followed by palisade layer composed of closely packed, radially arranged, non-lignified, thickened columnar cells, and by a single layer of dumb-bell shaped, thick-walled, parenchymatous cells; a wide zone of thick-walled, parenchymatous cells forming inner layer of testa present, differentiated into outer 8 - 10 layers of tangentially elongated, parenchymatous cells and a single layer of broad cells which are squarish in shape; a few vascular bundles scattered in this zone; embryo consists of radicle, plumule and two cotyledons; epidermis of cotyledon consists of a single layer, externally covered with cuticle, followed by two layers of palisade-like cells of mesophyll; mesophyll of ventral side composed of rectangular to polygonal cells filled with round to oval starch grain, measuring 8-12 μ in dia., a few vascular bundles and a few rosette crystals of calciuhrolllalate upto 49 μ in dia.; scattered in this region.

Powder - Light brown; shows fragments of testa, parenchymatous cells, very small, numerom: simple, round to oval, starch grains measuring 8-12 μ in dia., and a few rosette crystals of calcium oxalate upto 49 μ in diameter.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	7	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	14	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light three spots at Rf 0.33, 0.47 and 0.57 (all light yellow). Under UV (366 nm) three fluorescent zones are visible at Rf. 0.33 (blue), 0.47 (light pink) and 0.57 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.27, 0.33, 0.47,0.57, 0,62, 0.71 and 0.82 (all yellow).

CONSTITUENTS - Anthraquinones, Fixed Oil

PROPERTIES AND ACTION

Rasa : Kaṭu

Guṇa : Laghu, Rūkṣa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Kaphavātaśāmaka, Kṛmighna, Recana, Lekhana, Kuṣṭhaghna, Viṣaghna, Tvak Varṇaprasādakaram, Tvacya

IMPORTANT FORMULATIONS - Nimbādi Cūrṇa, Kāsīsādi Ghṛta, Mahā Viṣagarbha Taila, Bṛhanmaricādya Taila

THERAPEUTIC USES - Kaphavātajanya Vikāra, Kuṣṭha, Vraṇa Vikāra, Dadru, Pakṣāghāta, Vibandha, Gulma, Kṛmi, Pāmā, Kaṇḍū, Śvāsa, Kāsa

DOSE - 1-3 g of powder.

RAKTACANDANA (Heart Wood)

Raktacandana consists of heart wood of *Pterocarpus santalinus* Linn. f. (Fam. Fabaceae); a medium sized, deciduous tree upto 10-11 m high and 1.5 m in girth, mostly found in Andhra Pradesh and neighbouring area of Chennai and Karnataka at an altitude of 150-900 m.

SYNONYMS

Sanskrit	:	Raktāṅga, Kṣudracandana, Raktasāra
Assamese	:	Sandale, Sandal Ahmar
Bengali	:	Raktachandana
English	:	Red Sanders, Red Sandal Wood
Gujrati	:	Ratanjali, Lalchandan
Hindi	:	Raktachandanam, Lalchandana
Kannada	:	Raktha Chandanam
Kashmiri	:	--
Malayalam	:	Rakta Chandanam
Marathi	:	Rakta Chandana
Oriya	:	--
Punjabi	:	Lal Chandan
Tamil	:	Sanchandanam
Telugu	:	Erra Chandanamu
Urdu	:	Sandal Surkh

DESCRIPTION

a) Macroscopic

Drug occurs as irregular pieces, deep blood-red to dark purplish-red or almost black, hard, but can be easily split, odourless; taste, slightly astringent.

b) Microscopic

Heart wood shows alternating bands of darker and lighter zones; vessels large, mostly isolated and connected by fine, bright red rays, consisting of xylem parenchyma; prismatic crystals of calcium oxalate occur in a few cells; red colouring matter present in a number of cells of vessels and other cells; fibres abundant; xylem rays mostly uniseriate.

Powder - Red or purplish-red; shows a number of fibres, vessels and xylem parenchyma cells and prismatic crystals of calcium oxalate.

Identification -

Fluorescence test on aqueous and alcoholic extracts :-

i) 5 g. powder extracted in 100 ml of water and filtered shows in day light - pale yellow to brownish-red colour; under U.V. light (366 nm) emerald green, and under U.V. light (254 nm) light green.

ii) 5 g. powder extracted in 100 ml of alcohol and filtered shows in day light brownish - redcolour; under U.V. light (366 nm) reddish -brown, and under U.V. light (254) yellowish-green colour.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate

(9:1) shows in visible light a spot at Rf. 0.37 (light pink). Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.07 (blue), 0.13 (grey), 0.3e (blue), 0.37 (grey), and 0.57 (blue). On exposure to Iodine vapour eight spots appear at Rf. 0.07, 0.13, 0.16, 0.26, 0.37, 0.43, 0.74 and 0.80 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.04 (violet), 0.07, 0.13 (both light violet), 0.37, 0.43 (both violet), 0.74 and 0.80 (both light violet).

CONSTITUENTS - Glycosides, Colouring Matter.

PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Guru, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara, Netraroga, Viṣaghna, Vṛṣya

IMPORTANT FORMULATIONS - Candana Balā Lakṣādi Taila, Candanādi Lauha

THERAPEUTIC USES - Chardi, Tṛṣṇā, Raktadoṣahara, Jvara, Vraṇa

DOSE - 3-6 g of the drug (powder).

RAKTAPUNARNAVA (Root)

Raktapunarnavāconsists of dried root of *Boerhaavia diffusa* Linn. (Fam. Nyctaginaceae); a trailing herb with stout root stock and many diffused, slender, prostrate or ascending branches, occurring thought the plains of India.

SYNONYMS

Sanskrit	:	Śothaghnī, Rakta Puspā
Assamese	:	Ronga Punarnabha
Bengali	:	Rakta Punarnava
English	:	Hog Weed
Gujrati	:	Saturdi
Hindi	:	Gadapurna, Lalpunarnava
Kannada	:	Kommeberu
Kashmiri	:	--
Malayalam	:	Chuvanna Tazhutama
Marathi	:	Rakta Punarnava
Oriya	:	Laalapuiruni
Punjabi	:	Iteit (Lal), Khattan
Tamil	:	Mookarattai (Shihappu)
Telugu	:	Atikamamidi, Erragalijeru
Urdu	:	Surkh Punarnava

DESCRIPTION

a) Macroscopic

Root well developed, fairly long, somewhat tortuous, cylindrical, 0.2 - 1.5 cm in dia.; yellowish-brown to brown; surface, rough due to minute longitudinal striations and root scars; fracture, short; odour, not distinct; taste, slightly bitter.

b) Microscopic

Mature root shows anomalous growth; cork composed of thin-walled, tangentially elongated cells in the outer few layers; cork cambium 1-2 layers of thin-walled cells; secondary cortex consists of 2-3 layers of parenchymatous cells, followed by cortex composed of 5-12 layers of thin-walled, oval to polygonal cells; several concentric bands of xylem tissue, alternating with zone of parenchymatous tissue, present below cortical region; number of bands vary according to thickness of root and consist of vessels, tracheids and fibres; vessels mostly found in groups of 2-8 in radial rows, having simple pits and reticulate thickening; tracheids, thick-walled with simple pits; fibres aseptate, elongated, thick-walled with pointed ends; phloem occurs as hemispherical or crescent patches outside each group of xylem vessels and composed of sieve elements and parenchyma; a broad zone of parenchymatous tissue, in between two successive rings of xylem elements, composed of thin-walled, more or less rectangular cells arranged in radial rows; central region of root occupied by primary vascular bundles; numerous raphides in single or in group present in cortical region and in parenchymatous and xylem tissue; starch grains simple and compound, having 2-4 components, found in abundance in most of the cells of cortex and xylem elements; simple starch grains mostly round in shape, measuring 2.75-11 μ in dia.

Powder - Light yellow; shows vessels with reticulate thickening or simple pits, fibres, fragments of cork cells, raphides of calcium oxalate and simple, rounded, starch grains, measuring 2.75 - 11 μ in dia., and compound starch grains having 2-4 components.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.8	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (8

: 2) shows under UV (366 nm) six fluorescent zones at Rf. 0.11, 0.38 (both blue), 0.70, 0.84 (both light blue), 0.90 (light pink) and 0.94 (light blue). On exposure to Iodine vapour seven spots appear at Rf. 0.05, 0.11, 0.28, 0.38, 0.43, 0.84 and 0.94 (all yellow). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent two spots appear at Rf. 0.08 and 0.94 (both orange).

CONSTITUENTS - Alkaloid, Hentriacontane, β-Sitosterol, Ursolic Acid.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya, Kaṭu, Madhura
Guṇa	:	Laghu, Rūkṣa, Śīta, Sara
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Śophahara, Kaphaghna, Dīpana, Vātakara, Pittahara

IMPORTANT FORMULATIONS - Kumāryāsava, Dādhika Ghṛta, Dhānvantara Ghṛta, Punarnavādyariṣṭa

THERAPEUTIC USES - Śopha, Pāṇḍu, Hṛdroga, Kāsa, Arśa, Vraṇa, Urahkṣataśūla, Śotha

DOSE - 1-3 g of powder.

10-20 ml (Fresh Juice).

RĀMAŚITALIKĀ (Whole Plant)

Rāmaśītalikā consists dried whole plant of *Amaranthus tricolor* Linn.; Syn. *A. gangeticus* Linn.; *A. melancholicus* Linn. *A. polygamus* Linn. Hook. F., *A. tristis* Linn.; (Fam. Amaranthaceae), an erect, diffuse, stout, annual herb, found throughout the country.

SYNONYMS

Sanskrit	:	Māriṣarakta, Ārāmaśītalikā
Assamese	:	--
Bengali	:	Lal Shak
English	:	--
Gujrati	:	Tandaljo (Lal)
Hindi	:	Lal Marsa
Kannada	:	Dantu, Harave Soppu, Dantina Soppu, Chikkarive
Kashmiri	:	--
Malayalam	:	Aramaseetalam
Marathi	:	Mash
Oriya	:	--
Punjabi	:	Lal Marsa Sag
Tamil	:	Mulaikkeerai
Telugu	:	Erra Totakura

DESCRIPTION

a) Macroscopic

Root -Tap root, cylindrical, yellowish, 0.3-0.5 cm thick, with a few secondary roots and numerous rootlets.

Stem - Stem cylindrical with longitudinal ridges and furrows, branched, light greenish-yellow, 0.2-0.4 cm thick; fracture, short.

Leaf - Leaf simple, 5-12 cm long, 2.5-7 cm wide, very variable in shape, rhomboid-ovate, lanceolate or deltoid-ovate, obtuse, petiolate, membranous.

Flower - Flowers clustered in the axils and forming a long terminal, more or less interrupted spike; bracteole 3 mm long, lanceolate, membranous, perianth 4 mm long; sepals 3, white with pinkish tinge, stamens three, anthers dorsifixed.

Seed - Seed 1.5 mm in dia., biconvex, smooth, shiny black.

b) Microscopic

Root - Shows cork consisting of 3-6 rows of thin-walled cells, a few outer layers exfoliating; secondary cortex consisting of 6-11 rows of tangentially elongated, tabular, thin-walled parenchymatous cells, a few of them containing microsphenoidal crystals of calcium oxalate; secondary phloem arranged in continuous ring, consisting of thin-walled cells; phloem parenchyma cells containing microsphenoidal crystals of calcium oxalate; secondary xylem arranged in the form of a ring, beneath which there are scattered vascular bundles consisting of xylem and phloem; vascular bundles, situated in the centre are comparatively larger; ground tissue consisting of thin-walled, parenchymatous cells, a few cells containing microsphenoidal crystals of calcium oxalate.

Stem - Shows many thick-walled, oval to polygonal, collenchymatous cells present in the ridges seen in outline; epidermis single layered with tabular cells under a thick cuticle; cortex differentiated into 3-9 layered, thick-walled, tangentially elongated, chlorenchyma cells having a few microsphenoidal crystals of calcium oxalate; vascular bundles collateral arranged in a concentric band consisting of phloem and xylem elements; inside the band, in the ground tissue a number of conjoint vascular bundles found scattered; ground tissue consisting of oval or round, thin-walled, parenchymatous cells, these cells are smaller toward periphery and larger towards centre, a few of these cells contain microsphenoidal crystals of calcium oxalate.

Leaf-

Petiole - Shows two notches which are lateral in position, epidermis single layer, followed by, 1 or 2 layers ventrally and 1 to 7 layers dorsally of collenchyma; rest of the cortex consisting of thin-walled parenchymatous cells, a few of them containing microsphenoidal crystals of calcium oxalate; vascular bundles arc-shaped in three separate patches, elongated in the notches central one nearly circular, each consisting of xylem and phloem.

Midrib - Shows single layered epidermis on both surfaces, followed by 1-2 layered collenchyma; rest of the cortex consisting of thin-walled, parenchymatous cells a few of them containing rnicrosphenoidal crystals of calcium oxalate; vascular bundles 4 in number in basal region and single in number towards apical region.

Lamina - Shows single layered epidermis on both surfaces; upper epidermal cells, thin-walled, oval to polygonal, with a few uni-to bicellular pointed hairs, sinuous walls and a few stomata in surface view; lower epidermal cells composed of thin-walled cells oval to polygonal, having a number of rosette crystals of calcium oxalate and a few microsphenoidal crystals of calcium oxalate; walls sinuous, stomata both anomocytic and anisocytic type; palisade parenchyma 2 or 3 layered; spongy parenchyma 3 or 4 layered consisting of circular, irregularly arranged cells

Powder -Light green; shows lignified vessels with spiral thickening, rosette and microsphenoidal crystals of calcium oxalate, fragments of irregular, sinuous, polyhedral, thin-walled, parenchymatous epidermal cells and palisade cells, anomocytic and anisocytic type of stomata.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	17	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2.6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	17	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9: 1) shows -under U.V. (366nm) four fluorescent zones at Rf. 0.05, 0.17, 0.34 and 0.40 (all pink). On exposure to Iodine vapour five spots appear at Rf. 0.17, 0.34, 0.40, 0.56 and 0.98 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.17, 0.56 and 0.98 (all violet).

CONSTITUENTS - Fatty Oils, Sitosterol, Calcium and Magnesium.

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta
Guṇa	:	Kiñcit Guru, Rūkṣa, Sara
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara

IMPORTANT FORMULATIONS - Candrakalā Rasa

THERAPEUTIC USES - Dāha, Śoṣa, Visphoṭa, Vraṇa

DOSE - 10-20 ml of the drug in juice form.

RĀSNĀ (Leal)

Rāsnā consists of dried leaf of *Pluchea lanceolata* Oliver & Hiern.(Fam. Asteraceae); an annual, ashy and pubescent, undershrub having spreading roots extending to several metres; it grows abundantly in sandy soils in upper Gangetic plain and Rajasthan. It flowers during cold season.

SYNONYMS

Sanskrit	:	Suvahā, Sugandhā, Yuktā
Assamese	:	Rasnapat
Bengali	:	Rasna
English	:	--
Gujrati	:	--
Hindi	:	Rayasan, Rayasana, Rasna
Kannada	:	Rasna, Dumme-Rasna
Kashmiri	:	--
Malayalam	:	--
Marathi	:	Rasna, Rayasana
Oriya	:	--
Punjabi	:	Reshae
Tamil	:	--
Telugu	:	Sanna Rashtramu
Urdu	:	Rauasan, Rasna

DESCRIPTION

a) Macroscopic

Leaves simple, 3-5 cm long, 0.6-2 cm broad; sessile, obtuse, lanceolate to ovate-lanceolate; margin entire or toothed around the apex, unequal at base; both surfaces pubescent, distinct small hairs more prominent near veins; texture, brittle, papery; odour,

characteristic; taste, astringent and slightly bitter.

b) Microscopic

Leaf-

Midrib - shows single layered epidermis covered by thick, striated cuticle; collenchyma 2-5 layered towards xylem, 1-3 layered towards phloem; beneath collenchyma 2-5 layers of parenchyma present on both sides; central portion occupied by a large vascular bundle, xylem facing towards upper and phloem towards lower epidermis; vascular bundle surrounded by sclerenchymatous sheath appearing as a cap above and below; vascular bundle consists of wide phloem, a thin cambium and xylem; phloem consists of phloem parenchyma and a few phloem fibres; xylem consists of tracheids, vessels and xylem parenchyma; vessels arranged radially; parenchyma and palisade cells of leaf contain oil globules, scattered rosette crystals of calcium oxalate are both in lamina and midrib.
Lamina - shows isobilateral structure with palisade occurring in upper and lower mesophyll regions; epidermal cells tangentially elongated, covered by thick, striated cuticle; uniseriate, unbranched covering trichomes 2-3 cells long, present on both surfaces, basal cell short and slightly swollen, apical cells long; stomata, anisocytic and anomocytic present on both surfaces but more on lower surface; palisade tissue 2 or 3 layered on both sides, composed of radially elongated, thin-walled cells; spongy parenchyma composed of thin-walled, circular to elliptical, parenchymatous cells containing abundant chloroplasts with prominent intercellular spaces; a number of small veins, surrounded by a sclerenchymatous sheath present in mesophyll; vascular tissue much reduced and represented by a few phloem and xylem elements; average value of stomatal index on upper surface 14-24 and on lower surface 20-24; palisade ratio not more than 5; average value of vein islet number 27.

Powder - Light green; shows fragments of parenchyma, palisade cells, pointed 2-5 celled trichomes, a few oil globules and rosette crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	22	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	7	per cent, Appendix	2.2.4.

Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	23	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows in visible light three spots at Rf. 0.37, 0.71 and 0.82 (all grey). Under U.V. (366 nm) three fluorescent zones are visible at Rf. 0.27, 0.71 and 0.82 (all dark brown). On exposure to Iodine vapour seven spots appear at . Rf. 0.08, 0.37, 0.62, 0.67, 0.71, 0.82 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.08 (greyish brown), 0.17 (violet), 0.37 (brown), 0.62 (violet), 0.67, 0.71, 0.82 (all greyish brown) and 0.92 (violet).

CONSTITUENTS - Flavonoids - Quercetin and Isorhamnetin

PROPERTIES AND ACTION

Rasa	:	Tikta
Guṇa	:	Guru
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātahara, Āmapācana

IMPORTANT FORMULATIONS - Daśamūlāriṣṭa, Devadārvāriṣṭa, Kārpāsāsthyādi Taila, Rāsnādi Kvātha Cūrṇa, Rāsnairaṇḍādi Kvātha Cūrṇa

THERAPEUTIC USES - Śotha, Vātavyādhi, Śvāsa, Kāsa, Jvara, Udararoga, Sidhma, Āḍhyavāta, Āmavāta, Vātarakta

DOSE - 25-50 g (Decoction).

SAHACARA (Whole Plant)

Sahacara consists of dried whole plant of *Barleria prionitis* Linn.(Fam. Acanthaceae); a bushy, prickly undershrub, 0.6-1.5 m high, found throughout hotter parts of the country and also cultivated as a hedge plant.

SYNONYMS

Sanskrit	:	Kuranṭaka, Koranḍa, Keranḍaka
Assamese	:	Shinti
Bengali	:	--
English	:	--
Gujrati	:	Kanta-Saerio, Kantasalio
Hindi	:	Sahacara
Kannada	:	Sahacara
Kashmiri	:	--
Malayalam	:	Kirimkurunji, Karim Kurunni
Marathi	:	Koranta, Koranti
Oriya	:	Dasakeranda
Punjabi	:	Sahacar
Tamil	:	Sammulli
Telugu	:	Mulu Gorinta Chettu
Urdu	:	Pila Bansa, Piya Bansa

DESCRIPTION

a) Macroscopic

Root - Well developed, upto 1 cm thick at the top, cylindrical and tapering, bearing lateral branches and numerous rootlets; surface rough due to numerous dot-like lenticels and root scars of fallen roots; external surface greyish-brown, bark thin with smooth internal surface; wood cream coloured; fracture, hard and laminated; odour and taste not characteristic.

Stem - Erect, 1-8 mm thick, terete, hard, glabrous, nodes swollen, branching at nodes, young stem grey, slightly four angled, usually with 3-4 divaricate spines at axil of leaf; mature stem cylindrical with longitudinally arranged or scattered dot-like lenticels; externally greyish to light brown; a few mature stem slightly hollow.

Leaf - Dorsiventral, variable in size,6-9.5 cm long, 2.5 - 3.5 cm wide, simple, elliptic, acuminate, entire, acute, reticulate, unicostate, glabrous above, glabrous or pubescent beneath; petiole short.

Flower - Sessile, often solitary in the lower axils.. becoming spicate above; bracts foliaceous, 16 by 4.5 mm, oblong or lanceolate, acute, bristle-tipped, nearly glabrous; bracteoles 1.3 cm long, narrowly linear, subulate (almost spinous), bristle-tipped; calyx, divided almost to the base, one of the outer sepals rather more than 1.3 cm long, the opposite sepal rather less than 1.3 cm long, 3.4 mm broad, both oblong-lanceolate, mucronate; the 2 inner sepals 1.5 mm wide and as long as the shorter of the outer ones, linear lanceolate, mucronate; corona, 3.2-4.5 cm long, yellow, slightly pubescent outside, glabrous inside, somewhat 2 lipped; upper lip 2 cm long or more, deeply 4 lobed, the lobes oblong-obovate, round; lower lip oblong-obovate, round, entire; tube 1.9 - 2.2 cm long; stamens 2 fertile and 2 staminodes; filaments of the fertile stamens exserted beyond the corona tube, those of the staminode very short; ovary superior of two fused carpels; style, simple, usually long with two stigma.

Fruit - Capsules, 2-2.5 cm long, ovoid with a long tapering solid beak; 2 seeded.

Seed- Compressed, 0.8 cm in diameter and clothed with silky appressed hairs.

b) Microscopic

Root - Mature root shows cork of 6-25 layers of thin-walled, tangentially elongated cells; cork cambium single layered; secondary cortex composed of large, tangentially elongated, parenchymatous cells with small intercellular spaces; secondary phloem consists of sieve tubes, companion cells, phloem parenchyma, and traversed by phloem rays, phloem fibres found scattered throughout phloem region in single and groups, single fibres elongatea, thick-waned with narrow lumen; secondary xylem wide, vessels, tracheids, parenchyma, xylem fibres present; vessels, pitted, with transverse to oblique articulation; tracheids slightly broader in middle with tapering ends having pitted walls; xylem fibres

thick-waned, lignified and pitted; xylem parenchyma rectangular with lignified walls; xylem rays uni to biseriate, uniseriate rays more common.

Stem - Cork 6-24 or more layers of rectangular and radially arranged cells; secondary cortex composed of thin-waned, tangentially elongated, 8-15 layers of parenchymatous cells, filled with brown contents; secondary phloem narrow, consisting of heterogenous type of cells; phloem fibres found scattered uniformly throughout phloem region in singles or in groups; fibres moderate in length, lignified with pointed tips; secondary xylem consists of vessels, tracheids, fibres, xylem parenchyma traversed by xylem rays; vessels numerous, vary in size, distributed throughout xylem region vessels having taillike projections at one or both ends and transverse to oblique perforations with spiral or pitted thickenings; tracheids pitted having pointed tips; xylem parenchyma mostly rectangular, thick-waned, lignified with simple pits; xylem rays usually uniseriate, occasionally biseriate; pith isodiametric of parenchymatous cells most of which contain single or group of acicular crystals of calcium oxalate, measuring 19-28 μ in length and 3 μ in width.

Leaf -

Petiole - A single layered upper and lower epidermis covered externally with a thick cuticle, a few epidermal cells elongate to form unicellular hairs,cystolith develops in some epidermal cells; 2-6 layers of collenchymatous cells present in both upper and lower epidermis; parenchyma 3-8 layered in upper surface and 7-10 layered in lower surface towards proximal end and 5-7 layered at distal end, circular to polygonal and thin-walled; some contain raphides of calcium oxalate; vascular bundle semilunar, situated centrally in parenchymatous ground tissue; xylem vessels arranged in radial rows, protoxylem towards centre; two smaller vascular bundles present on either sides of central vascular bundle.

Midrib - Single layered epidermis on both surfaces covered externally with thick cuticle; collenchyma 2-5 layered on both surfaces, followed by 3-6 layers, thin-walled, parenchymatous cells; vascular bundle single, crescent-shaped having usual elements.

Lamina Single layered epidermis covered with thick cuticle on both surfaces, glandular trichomes present on both surfaces, while the non-glandular, unicellular, elongated with pointed tips, present only on lower surface; palisade single layered; spongy parenchyma thin-walled, irregular in shape; stomata diacytic and present on both surfaces but more abundant on lower surface; a few veins present in this region.

Powder - Green; shows fragments of cork, xylem vessels with spiral and pitted thickening, acicular crystals of calcium oxalate, measuring 19-28 μ in length and 3 μ in width, fibres, fragments of lamina of leaf with palisade and mesophyll cells; glandular and non-glandular

hairs, epidermal cells with diacytic stomata.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	10	per cent, Appendix	2.2.7.

ASSAY

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1:5) shows four spots at Rf. 0.57, 0.77, 0.91 and 0.94 (all light yellow) in the visible light. Under U.V. (366 nm) four fluorescent zones are visible at Rf. 0.57, 0.77, 0.91 (all blue) and 0.94 (black). On exposure to Iodine vapour six spots appear at Rf. 0.18, 0.43, 0.57, 0.77, 0.88 and 0.94 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105° C for ten minutes five spots appear at Rf. 0.57 (yellow), 0.77, 0.88 (both pink), 0.84 and 0.94 (both violet).

CONSTITUENTS - Alkaloids, β-Sitosterol, Potassium.

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Amla
Guṇa	:	Snigdha
Vīrya	:	Uṣṇa

Vipāka : Kaṭu

Karma : Kaphahara, Keśya, Kāsa, Rañjana, Viṣahara

IMPORTANT FORMULATIONS - Sahacarādi Taila, Nīlikādya Taila, Aṣṭavarga Kvātha Cūrṇa, Rāsnairaṇḍādi Kvātha Cūrṇa

THERAPEUTIC USES - Kuṣṭha, Kaṇḍū, Vātarakta, Palita

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

SAHADEVI (Whole Plant)

Sahadevi consists of dried whole plant of *Vernonia cinerea* Lees. (Fam. Asteraceae); an erect, rarely decumbent, branched herb, 12-75 cm high, found throughout India ascending to an altitude of 1800 m.

SYNONYMS

Sanskrit	:	Uttamkanyaka, Daṇḍotpalā
Assamese	:	Schdevi
Bengali	:	Kuksim
English	:	Purple Fleabane, Fleabane
Gujrati	:	Sadoree, Sadodee
Hindi	:	Sahadevi
Kannada	:	Sahadevee, Okarchendhi
Kashmiri	:	--
Malayalam	:	Poovan Kuruntala, Mukkuthaipo
Marathi	:	Sadodee, Sahdevee
Oriya	:	--
Punjabi	:	Sehdei
Tamil	:	Naichotte Poonde
Telugu	:	Garita Kammi, Sehadevi
Urdu	:	Pan

DESCRIPTION

a) Macroscopic

Root - 5-12 cm long, 1-7 mm thick, oblique and gradually tapering, bearing a few rootlets; external surface, dirty brown; fracture, short.

Stem - Glabrous, cylindrical, hairy, slightly branched; 10-17 cm long, 1-8 mm thick, grooved and ribbed; basal region of branches greenish-brown, apical region dark green,

bearing a number of flowers; fracture, short.

Leaf - Simple, dark-green, smooth, alternate, opposite, exstipulate, 2.5-5 cm long, 1.8-3.6 cm broad, elliptical, lanceolate, obtuse or acutely toothed; shape and size variable; petiole short; odour, slightly characteristic.

b) Microscopic

Root - Mature root shows 4-5 layered cork, consisting of tabular, tangentially elongated, thick-walled cells filled with reddish-brown contents; secondary cortex consists of a wide zone of thin-walled, parenchymatous cells having a few resin ducts; secondary phloem, a narrow zone, composed of sieve elements and phloem parenchyma, traversed by phloem rays; xylem well-developed, composed of vessels, tracheids, fibres and xylem parenchyma, traversed by 1-5 seriate xylem rays; xylem vessels usually solitary or 2-4 in groups with reticulate thickening; fibres aseptate and pointed.

Stem - Mature stem shows several bulges at places and consists of a single layered epidermis, externally covered with a striated cuticle; a number of epidermal cells elongate to form multicellular covering and T-shaped trichomes with 2-6 celled stalk; cortex 3-5 layers of thin-walled, tangentially elongated parenchymatous cells, a few filled with reddishbrown content, bulges show a few layers of collenchyma between epidermis and parenzhymatous cortex; endodermis single layered, composed of barrel-shaped cells; pericycle occurs in the form of groups of pericyclic fibres; phloem consists of strands of sieve tubes, companion cells and phloem parenchyma; xylem consists of vessel, parenchyma and fibres; xylem vessls show reticulate thickening; parenchyma in abundance and paratracheal; fibres thick-walled, aseptate, short, with pointed ends; medullary rays 2-11 cells wide; central portion occupied by pith composed of hexagonal to polygonal, thin-walled parenchymatous cells; a few simple starch grains present in cortical cells; cluster crystals of calcium oxalate occasionally found in pith.

Leaf -

Petiole - shows a somewhat circular outline with two lateral projections one on each side; epidermis on both surfaces, covered externally with striated cuticle and have both type of trichomes as described in case of stem, followed by 2-3 layers of collenchyma on upper and lower side; stele composed of three collateral vascular bundles located in centre, central one larger and lateral two smaller; ground tissue composed of thin-walled parenchymatous cells, a few having oil globules and rosette crystals of calcium oxalate.

Midrib - shows similar structure as described in petiole except for 1 or 2 layers of collenchymatous cells below both epidermis and a single vascular bundle in centre; oil globules and rosette crystals of calcium oxalate present in a few cells of ground tissue.

Lamina - shows dorsiventral structure; epidermis single layered on either surface, composed of thin-walled, tangentially elongated cells, covered externally with striated cuticle; trichomes similar to those of stem; palisade single layered; spongy parenchyma 4-5 layered, loosely arranged cells; vascular bundles embedded in spongy parenchyma; rosette crystals of calcium oxalate and oil globules present in this region; anomocytic stomata present on both surfaces.

Powder - Greenish-brown; shows reticulate vessels, thick-walled fibres, a few rosette crystals of calcium oxalate, multicullular covering and T -shaped trichomes with 2-6 celled stalk, and epidermal cells irregular in shape in surface view, showing anomocytic stomata.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (95 : 5) shows on exposure to Iodine vapour two spots at Rf. 0.55 and 0.96 (both yellowish brown), On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.40, 0.55 and 0.96 (all violet).

CONSTITUENTS - Saponins, Sapogenins, Flavonoids.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṭu
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmaka, Śothahara, Śvaraghna, Nidrākara

IMPORTANT FORMULATIONS - Candrakalā Rasa, Almottādi Kaṣāyam (S.Y.)

THERAPEUTIC USES - Jvara, Viṣamajvara, Sidhma, Visphoṭa, Bhūtabādhā, Grahabādhā, Sphoṭaka, Pradara, Ślīpada

DOSE - 10-20 ml (Swarasa).

5-10 g (Powder for external use only).

ŚAILEYA (Lichen)

Śaileya consists of the whole thallus of *Parmelia perlata* (Huds.) Ach. (Fam. Parmeliaceae), a perennial lichen found on rocks or dead wood in temperate Himalayas.

SYNONYMS

Sanskrit	:	Śītaśiva, Śilāpuṣpa
Assamese	:	--
Bengali	:	Shailaj
English	:	Stone Flower, Rock Moss
Gujrati	:	Patthar Phool, Chhadilo
Hindi	:	Charela, Chharila, Chhadila
Kannada	:	Shilapushpa, Kalluhoo
Kashmiri	:	--
Malayalam	:	Sheleyam, Kalppuvu
Marathi	:	Dagad phool
Oriya	:	--
Punjabi	:	Ausneh, Chhadila
Tamil	:	Kalpashee
Telugu	:	Ratipuvvu
Urdu	:	Chhadila

DESCRIPTION

a) Macroscopic

Thallus consists of a flattened, foliose structure with a more or less deeply incised upper surface, yellowish-white on top and black on the lower surface, leathery to touch; delicate rhizoids arise from lower surface; odour and taste not distinct; bud-like bodies known as soredia are also present on the upper surface of the thallus.

b) Microscopic

Thallus shows upper cortex consisting of compact hyphae of fungus, followed by gonidial layers with algal cells; medulla consisting of loosely arranged mass of fungal hyphal tissue; lower cortex black, consisting of compact mass of fungal hyphae; a few asci with ascospores embedded in the upper portion of the thallus; thallus on soaking in water gives orange colour.

Powder - Brown, shows fungal hyphae, gonidia, compact mass of cortex and spores, and algal cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 : 5) shows in visible light four spots at Rf. 0.11, 0.28, 0.40, 0.91. (all grey). Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.11(dark blue), 0.28 (dark blue), 0.40, 0.61 (both blue), 0.83 (dirty yellow) and 0.91 (light yellow). On exposure to Iodine vapour six appear at Rf. 0.11, 0.28, 0.40, 0.61, 0.83 and 0.91 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and on heating the plate for ten minutes at 105°C six spots appear at Rf. 0.11, 0.28, 0.40, 0.61, 0.83 and 0.91 (all grey)

CONSTITUENTS - Lichen acids - Atranorin and Lecanoric acid.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu, Snigdha
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Hṛdya, Kaphapitthara, Rucya, Stambhaka, Pittahara

IMPORTANT FORMULATIONS - Vāsācandanādi Taila, Jīrakādi Modaka, Saubhāgya Śuṇṭhī, Candanādi Taila, Dhānvantara Taila, Nārāyaṇa Taila, Mahā Nārāyaṇa Taila, Tārkṣya Guḍa, Āgarvadhya Taila, Śaileyādi Taila, Mṛtasañjīvanī Surā, Añjana Vaṭī

THERAPEUTIC USES - Kaṇḍū, Kuṣṭha, Aśmarī, Dāha, Viṣa, Hṛllāsa, Tṛṣṇā, Vraṇa, Hṛdaya Roga, Rakta Vikāra, Śvāsa, Jvara, Mūtrakṛcchra, Mūtrāghāta, Śiraḥśūla

DOSE - 1-3 g

ŚĀKA (Heart Wood)

Śāka consists of dried heart wood of *Tectona grandis* Linn. f. (Fam Verbenaceae); a large deciduous tree found in peninsular region and Madhya Pradesh extending to parts of Rajasthan, Southern Uttar Pradesh and Orissa, and also in plantations.

SYNONYMS

Sanskrit	:	Bhūmisaha, Dwāradāru, Kharacchada
Assamese	:	Chingjagu Sagun
Bengali	:	Segunagachh
English	:	Indian Teak
Gujrati	:	Sagwan, Sag, Saga
Hindi	:	Sagwan, Sagauna, Sagu
Kannada	:	Tegu, Sagawani, Thega
Kashmiri	:	--
Malayalam	:	Thekku
Marathi	:	Sagwan
Oriya	:	Saguana, Sagan, Sagun
Punjabi	:	Sagwan
Tamil	:	Tekku
Telugu	:	Teku, Pedda
Urdu	:	Sagwan

DESCRIPTION

a) Macroscopic

Drug available in pieces of varying length and thickness, moderately hard, ring porous, texture, coarse, light brown to golden brown in colour; odour, characteristic.

b) Microscopic

Heart wood shows well developed xylem, consisting of vessels, parenchyma, fibres and medullary rays; vessels solitary or 2-4 in groups, arranged in radial rows, a few having tyloses; medullary rays multiseriate, thin-walled, oval to elongated, 2-4 celled wide.

Powder - Light brown; shows simple pitted vessels, a few with tyloses, aseptate fibres with pointed ends and parenchymatous cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1.5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9: 1) shows in visible light five spots at Rf. 0.08 (pink), 0.31 (pink), 0.37 (pink) 0.81 (light yellow), and 0.92 (light yellow). Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.08, 0.31, 0.71, 0.81 and 0.92 (all grey). On exposure to Iodine vapour ten spots appear at Rf. 0.03, 0.05, 0.08, 0.31, 0.37, 0.48, 0.64, 0.71, 0.81 and 0.92 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C seven spots appear at Rf. 0.03, 0.05, 0.08, 0.31, 0.48, 0.71 and 0.92 (all violet).

CONSTITUENTS - Resin, Essential Oil, Fatty Oil and Tectoquinone

PROPERTIES AND ACTION

Rasa : Kaṣāya

Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Pittahara, Kaphahara, Raktaprasādana, Garbhasthairyakara

IMPORTANT FORMULATIONS - Ayaskṛti

THERAPEUTIC USES - Kuṣṭha, Raktapitta, Mūtraroga, Pāṇḍu, Prameha, Medoroga, Dāha, Śrama, Tṛṣṇā, Kṛmiroga, Garbhasrāva, Garbhapātana

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

30 - 60 g of the drug for decoction.

ŚĀKHOṬAKA (Stem Bark)

Śākhoṭaka consists of stem bark of *Streblus asper* Lour. (Fam. Moraceae); an evergreen, rigid gnarled tree upto 15 m high and 1.5 m in girth, having a bole of 4-7 m distributed in the Himalayas from Himachal Pradesh to West Bengal and in hills and plains of Assam and Tripura, ascending to an altitude of 450 m; also occurs both in the peninsular India upto 600 m, especially in drier parts, and in Andamans.

SYNONYMS

Sanskrit	:	Kharacchada, Śākhoṭa, Pītaphalaka, Bhūtāvāsa
Assamese	:	--
Bengali	:	Sheoda
English	:	Sand Paper Mulberry
Gujrati	:	Sahoda
Hindi	:	Sahora, Sihoda, Sihar
Kannada	:	Mittlamara
Kashmiri	:	--
Malayalam	:	Pirayan, Pirai
Marathi	:	Sahod, Karvatee
Oriya	:	Sahod
Punjabi	:	Shebda
Tamil	:	Pirayan pirai
Telugu	:	Berrenka, Barninka
Urdu	:	Sehoda

DESCRIPTION

a) Macroscopic

Mature stem bark occurs in channelled pieces; thickness varies from 0.3-1 cm; outer surface light grey to silvery brown with faint ridges and a number of lenticels making the

surface quite rough; inner surface smooth and brownish in colour; fracture, tough, brittle on the outer portion and fibrous in the inner portion; no taste and odour.

b) Microscopic

Shows a cork consisting of 4-10 layers of thin-walled, rectangular and tangentially arranged cells; cork cambium single layered; secondary cortex Consists of 3-4 layers of thin-walled, somewhat rectangular or circular to polygonal cells; a number of stone cells present either in singles or in groups in tangential bands; stone cells of two types, one having thick-walled and narrow lumen while the other having comparatively thinner wall and wider lumen; they vary in shape, being rectangular, oval, circular to conical, each with simple pits on their walls and radiating canals; secondary phloem consists of sieve elements, parenchyma, phloem fibres and stone cells, traversed by phloem rays; phloem parenchyma thin-walled, circular to oval in shape, phloem fibres moderately thick-walled and lignified with wide lumen, occurring in singles or in groups and radially arranged; stone cells similar to those present in cortical region, occur throughout the phloem; phloem rays thin-walled, rectangular and radially elongated in transverse section, a few ray cells also converted into stone cells; prismatic crystals of calcium oxalate occur throughout the tissues of bark.

Powder - Light-grey; shows, phloem fibres, thick and thin-walled stone cells and a large number of oblique, rectangular, prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	15	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	12	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:

1) shows under UV (366 nm) six fluorescent zones at Rf. 0.11, 0.18 (both light blue), 0.28 (pink), 0.36 (blue), 0.41 (pink) and 0.93 (blue). On exposure to Iodine vapour eight spots appear at Rf. 0.11, 0.28, 0.41, 0.52, 0.60, 0.76, 0.86 and 0.93 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.11, 0.28 (both light brown), 0.36, 0.41, 0.52, 0.76 (all light violet) and 0.93 (dark brown).

CONSTITUENTS - Glycosides, Saponins and Sapogenins.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Rūkṣa, Laghu
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātaśleṣmahara, Medohara, Śothahara

IMPORTANT FORMULATIONS - Bṛhanmanjiṣṭhādi Kvātha Cūrṇa

THERAPEUTIC USES - Raktapitta, Arśa,Ślīpada, Apacī, Prameha, Kuṣṭha, Gaṇḍamālā

DOSE - 1-3 g (Powder).

10-20 g (for decoction).

ŚĀLAPARṆĪ (Root)

Śālaparṇī consists of dried root of *Desmodium gangeticum D*C. (Fam. Fabaceae), a nearly erect under shrub, 0.6 -1.2 m high, growing wild almost throughout India in the plains and Western Ghats, and upto 1500 m in the north upto Sikkim.

SYNONYMS

Sanskrit	:	Sthirā, Vidārigandhā, Aṃśumatī
Assamese	:	--
Bengali	:	Salparni
English	:	--
Gujrati	:	Salwan
Hindi	:	Sarivan, Salaparni
Kannada	:	Murelchonne
Kashmiri	:	--
Malayalam	:	Moovila
Marathi	:	Salparni, Salwan
Oriya	:	Saloporni
Punjabi	:	Shalpurni
Tamil	:	Moovilai
Telugu	:	Nakkotokaponna, Kolaponna, Kolakuponna

DESCRIPTION

a) Macroscopic

Tap root, poorly developed, but lateral roots 15-30 cm long, and 0.1-0.8 cm thick, uniformly cylindrical with a number of branches; surface smooth bearing a number of transverse, light brown lenticels, bacterial nodules frequently present; light yellow; fracture fibrous; odour not characteristic; taste, sweetish and mucilaginous.

b) Microscopic

Mature root shows cork, 3-7 layers of thin-walled, tangentially elongated cells, having a few prismatic crystals of calcium oxalate; cork cambium single layered; secondary cortex 4-10 layers of thin-walled, tangentially elongated cells having a few isolated cortical fibres; secondary phloem composed of parenchyma, sieve tubes, companion cells and fibres, traversed by phloem rays; sieve tubes collapsed in outer region, but intact in inner region; phloem fibres slightly elongated, lignified; phloem rays uni to multiseriate, 1-4 cells wide and 4-15 cells high; outer phloem region having occasionally prismatic crystals of calcium oxalate; cambium 2-3 layers; secondary xylem having 1-2 growth rings, consisting of vessels, tracheids, xylem parenchyma, and xylem fibres, traversed by xylem rays; vessels, lignified, large, narrow, with both reticulate thickening or bordered pits; xylem parenchyma with rectangular or slightly elongated cells, resembling those of phloem parenchyma in shape but larger in size and xylem fibres resemble those of phloem fibres in shape but larger in size; xylem rays thick-walled possessing simple pits, 1-5 cells wide and 4-12 cells high; simple, round to oval starch grains measuring 7-25 μ in dia. and prismatic crystals of calcium oxalate present in secondary phloem and secondary xylem.

Powder -Light brown; shows fragments of rectangular cork cells, vessels having reticulate thickening and bordered pits, xylem fibres, ray cells, prismatic crystals of calcium oxalate and simple round to oval starch grains, measuring 7-25 μ in dia.

IDENTITY, PURITY AND STRENGTH

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

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9: 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.40, 0.85 and 0.96 (all

blue). On exposure to Iodine vapour three spots appear at Rf. 0.40, 0.85 and 0.96 (all yellow).

CONSTITUENTS - Alkaloids.

PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Guru
Vīrya	:	Uṣṇa
Vipāka	:	Madhura
Karma	:	Tridoṣahara, Balya, Aṅgamardapraśamana, Vṛṣya, Sukhaprasavakara, Sarvadoṣahara, Vātadoṣajit, Rasāyanī, Bhramahara, Viṣahara, Santāpanāśinī

IMPORTANT FORMULATIONS - Daśamūlāriṣṭa, Indukānta Ghṛta, Amṛtaprāśa Ghṛta, Daśamūlaṣaṭpalaka Ghṛta, Dhānvantara Taila, Nārāyaṇa Taila, Mahā Viṣagarbha Taila, Mahā Nārāyaṇa Taila

THERAPEUTIC USES - Jvara, Meha, Arśa, Chardi, Śopha, Śvāsa, Kāsahara, Kṛmi, Rājayakṣmā, Netra Roga, Hṛdaya Roga, Raktagata Vāta, Vāta Ardhvābhedaka, Mūḍha Garbha

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

10-20 g for decoction.

ŚĀLĪ (Fruit)

Śālī consists of dried fruit of *Oryza sativa* Linn.(Fam. Poaceae); an annual herb, cultivated throughout India.

SYNONYMS

Sanskrit	:	Taṇḍulama, Dhānya
Assamese	:	--
Bengali	:	Dhan, Chaval, Chanval
English	:	Rice, Paddy
Gujrati	:	Bhat, Chorya, Chokha
Hindi	:	Chaval, Dhan
Kannada	:	Akkiege, Nellu
Kashmiri	:	--
Malayalam	:	Ari
Marathi	:	Tandul, Sali Bhat
Oriya	:	--
Punjabi	:	--
Tamil	:	Arshee, Nellu, Arisi
Telugu	:	Dhanyamu, Vadlu, Biyyamu

DESCRIPTION

a) Macroscopic

Fruit small, one seeded, caryopsis, about 0.6-1 cm long and 0.2-0.3 cm wide, oblong to ovoid, somewhat angular, blunt, sometimes pointed; surface rough due to minutes trichomes, faintly longitudinal ridges and furrows, mostly 6 rows, somewhat compressed , flattened and tightly enclosed by lemma and palea; yellowish-brown; seed, smooth upto 0.6 cm long, oval to oblong, slightly flattened; blunt, oblique, slightly angled in embryo region; light creamy to white; odour not characteristic; taste, sweet.

b) Microscopic

Fruit shows wavy irregular outline; pericarp and testa fused together; pericarp consists of single layered, thick, lignified sclerenchymatous outer epidermis with clear pits, covered by a few thick, blunt, sometimes pointed trichomes and 2-3 layered circular to oval fibre, followed by 3-5 layered, tangentially elongated, thick-walled, tabular parenchymatous cells, having a few scattered fibro vascular. bundles and single layered, thin, elongated, slightly wavy inner epidermal cells; testa consists of thinwalled, elongated, 2-3 layered parenchymatous cells with a interrupted tube cells followed by single layered, oval to rectangular, parenchymatous layer containing aleurone grains; endosperm albuminous, consisting of wide, thin-walled, elongated to polygonal, parenchymatous cells packed with numerous, minute, single polyhedral starch grains, having, hilum without concentric striations, measuring 3-12 μ in dia., compound starch grains 2-150 components; empryo small, lying in a groove at one end of the endosperm, separated by a layer of epithelium; empryo consists of a shieldshaped cotyledon known as scutellum.

Powder - Light cream; fragments of elongated thick-walled, lignified sclerenchymatous cells, endosperms cells filled with starch grains, parenchymatous cells of endosperm filled with granules, small pieces of blunt trichomes; minute, single, polyhedral with starch granules having hilum without concentric striations, measuring 3-12 μ in dia., and compound starch granules with 2-150 components.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) eight fluorescent zones at Rf. 0.11, 0.15, 0.17 (all blue),

0.21 (green), 0.27 (blue), 0.30 (blue), 0.35 (green) and 0.94 (blue). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for about ten minutes at 110°C three spots appear at Rf. 0.21,0.30 and 0.94 (all blue).

CONSTITUENTS - Carbohydrate -Starch.

PROPERTIES AND ACTION

Rasa : Madhura, Anurasa-Kaṣāya, Kaṣāya

Guṇa : Snigdha, Laghu

Vīrya : Śīta

Vipāka : Madhura

Karma : Svalpa Vātakara, Svalpa Kapha Kara, Pittahara, Hṛdya, Rucikara, Vṛṣya, Mūtrala, Bṛṃhaṇa, Viṣaghna, Baddhavarcasaka, Svarya

IMPORTANT FORMULATIONS - Laśunādi Ghṛta, Dādhika Ghṛta, Taṇḍulodakam

THERAPEUTIC USES - Jvara, Tṛṣṇā, Vraṇa, Atīsāra, Bālātisāra, Pradara

DOSE - 100 ml Tandulodaka.

ŚĀLMALI (Stem Bark)

Śālmalī consists of the mature stem bark of *Bombax ceiba* Linn. Syn. *B. malabaricum* DC., *Salmalia malabarica Schott.* & Endl. (Fam. Bombacaceae), a deciduous tree attaining a height upto 40 m and a girth upto 6 m or more and distributed throughout the hotter parts of the country upto 1500 m or more.

SYNONYMS

Sanskrit	:	Moca, Picchila, Raktapuṣpa, Kaṇṭakādhya, Tūlinī
Assamese	:	Semul
Bengali	:	Shimul, Simul
English	:	Silk-Cotton Tree
Gujrati	:	Shemalo
Hindi	:	Semal, Semar
Kannada	:	Kempuburunga
Kashmiri	:	---
Malayalam	:	Mullilavu
Marathi	:	Sanvar, Katesavar
Oriya	:	--
Punjabi	:	Simble
Tamil	:	Elavam
Telugu	:	Buruga
Urdu	:	Sembhal

DESCRIPTION

a) Macroscopic

Bark 0.5-1 cm thick, pale-ashy to silvery-grey externally, brownish internally, external surface rough with vertical and transverse cracks, mucilaginous on chewing; fracture, fibrous.

b) Microscopic

Stem bark shows 10-15 layered, transversely elongated, radially arranged, thin-walled, cork cells with a few outer layers having brown coloured contents; rhytidoma present at certain places interrupting the cork; secondary cortex con- sists of moderately thick-walled, parenchymatous cells containing orange brown contents; stone cells in singles or in groups, thick-walled, oval to irregular, and tangential bands of stone cells having striations with narrow lumen, measuring 13-33 μ in dia., occur throughout the secondary cortex; secondary phloem consists of usual elements traversed by phloem rays, elements in the outer region form tangential bands of ceratenchyma; a number of concentric bands of fibres alternating with groups of sieve elements also present; fibres lignified having narrow lumen and pointed tips; phloem rays numerous and wavy, 1-6 seriate, cells being radially elongated and moderately thick-walled; rosette crystals of calcium oxalate scattered throughout the secondary cortex, phloem parenchyma and ray cells; mucilage canals and tannin cells present in the parenchymatous cells of cortex.

Powder - Reddish-brown; shows fragments of cork cells, parenchymatous cells, single or groups of thick-walled, oval to irregular, stone cells having striations with narrow lumen, measuring 13-33 μ in dia., rosette crystals of calcium oxalate, phloem fibres and numerous reddish-brown coloured masses and tannin cells.

IDENTITY, PURITY AND STRENGTH

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

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under U.V. (366 nm) one fluorescent zone at Rf. 0.59 (blue). On exposure to

Iodine vapour four spots appear at Rf. 0.11, 0.44, 0.59 and 0.92 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.44, 0.59 and 0.92 (all violet).

CONSTITUENTS - Saponins, Tannins and Gums

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Laghu, Snigdha, Picchila
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Śothahara, Dāhapraśamana, Pittahara, Vātahara, Kaphavardhaka

THERAPEUTIC USES - Raktapitta, Vraṇa, Dāha, Yuvānapiḍikā

DOSE - 5-10 g (Powder).

ŚAṆA (Seed)

Śaṇa consists of dried seed of *Crotolaria juncea* Linn. (Fam. Fabaceae), an erect shrubby annual, cultivated nearly throughout the country, and also found wild as an escape.

SYNONYMS

Sanskrit	:	Śaṇa, Malya Puṣpa
Assamese	:	Ausa, Suila
Bengali	:	Shanpat
English	:	Sunnhemp
Gujrati	:	Sun, Hemp
Hindi	:	Sunn, San
Kannada	:	Senabu
Kashmiri	:	--
Malayalam	:	Chanampayaru, Pulivanji
Marathi	:	Sanavu
Oriya	:	Champal Beeja
Punjabi	:	Sann
Tamil	:	Sanal
Telugu	:	Giliginta
Urdu	:	San

DESCRIPTION

a) Macroscopic

Seed 0.5-0.7 cm long, 0.3-0.4 cm wide, flat and compressed, asymmetrically reniform; surface, glossy; colour, olive- green to grey; taste, mucilaginous.

b) Microscopic

Seed shows testa, consisting of palisade like macrosclereids, covered externally by smooth, thick cuticle, followed by single layer of lignified flask shaped cells with intercellular spaces; the tissue beneath, consisting of tangentially elongated, thin-walled, crushed parenchymatous cells; endosperm consisting of an aleurone layer containing aleurone grains and associated parenchymatous cells; cotyledons two, consisting of many layered, thin-walled, compactly arranged parenchymatous cells containing abundant aleurone grains.

Powder - Greyish-yellow; shows polygonal, slightly thick-walled cells of the testa in surface view, beaker or flask shaped cells, palisade like macrosclereids, oval to polygonal, thin walled parenchymatous cells and aleurone grains.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5.5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9: 1) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.05 (blue), 0.32 (faint sky blue) and 0.94 (sky blue). On exposure to Iodine vapour eight spots appear at Rf. 0.05, 0.20, 0.26, 0.39, 0.67, 0.74, 0.94 and 0.98 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for about ten minutes at 105°C eight spots appear at Rf. 0.05, 0.20, 0.26, 0.39, 0.67, 0.74 (all grey), 0.94 and 0.98 (both blue).

CONSTITUENTS - A bitter principle 'Corchorin'

PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Amla, Kaṣāya

Guṇa : Rūkṣa, Tīkṣṇa

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Vātahara, Kaphahara, Pittahara, Garbha Anulomaka, Vāntikṛt, Rakta Pravartaka

IMPORTANT FORMULATIONS - Sarsapādi Pralepa, Daśamūlādya Ghṛta, Muktādya Cūrṇa, Kulatthādya Ghṛta

THERAPEUTIC USES - Agnimāndya, Jvara, Hṛdroga, Mukharoga, Raktadoṣa, Carma Roga, Timira, Aṅgamarda, Garbhasrāvakara

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

ŚARA (Root)

Śāra consists of dried roots of *Saccharum bengalense* Retz. Syn. *S. sara* Roxb.; *S. munja* Roxb. (Fam. Poaceae); an erect grass attaining a height of 5.5 m, found mainly in Punjab, Uttar Pradesh, Bihar, Bengal and Orissa.

SYNONYMS

Sanskrit	:	Bhadrā, Mūnjā
Assamese	:	--
Bengali	:	Sara
English	:	--
Gujrati	:	Sarkat
Hindi	:	Sarkand, Moonja
Kannada	:	Munji Hullu, Hodake Hullu
Kashmiri	:	--
Malayalam	:	Ama, Amaveru, Sara, Munjappullu
Marathi	:	Munja, Trikande
Oriya	:	Sara
Punjabi	:	Moonja, Sarkanda
Tamil	:	Munjipul, Munjappullu
Telugu	:	Munja
Urdu	:	Munja, Sarkanda

DESCRIPTION

a) Macroscopic

Roots numerous, arising from a common root stock, cylindrical, 5-30 cm long, 0.1-0.5 cm in dia., pale straw coloured with attached rootlets, bark papery; fracture splintery.

b) Microscopic

Root shows single layered epidermis consisting of cubicular to rectangular, thin-walled cells; hypodermis single layered composed of parenchymatous cells; beneath hypodermis continuous ring of 2-5 layered, thick-walled, lignified, sclerenchymatous cells found scattered; cortex consisting of oval to round, thinwalled parenchymatous cells, those of inner layers becoming smaller in size and rectangular in shape; endoderm is single layered forming a ring around stele, consisting of tangentially elongated cells; pericycle single layered composed of thinwalled cells; xylem and phloem form equal number of bundles, arranged alternately in rings consisting of usual elements; metaxylem elements much bigger than protoxylem; pith distinct consisting of thin-walled, polygonal, parenchymatous cells having intercellular spaces.

Powder - Light greyish-brown; shows lignified, thick-walled, sclerenchymatous cells, and vessels with reticulate thickenings.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	4	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3.5	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic Acid: Water (4:1:5) shows in visible light two spots at Rf. 0.69 and 0.97 (both grey). Under UV (366 nm) five blue fluorescent zones appear at Rf. 0.10, 0.19, 0.35, 0.69 and 0.97. On exposure to Iodine vapour eight spots appear at Rf. 0.05, 0.10, 0.19, 0.35, 0.44, 0.69, 0.80 and 0.97 (all yellowish brown). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate at 110°C for ten minutes eight spots appear at Rf. 0.10, 0.19,0.35,0.61 (all grey), 0.80 (violet), 0.92 (grey), 0.95 and 0.97 (both violet).

CONSTITUENTS - Sugars.

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Anuṣṇa
Vipāka	:	Madhura
Karma	:	Kaphahara, Tṛṭ doṣahara, Balya, Vṛṣya, Cakṣuṣya, Dāhahara, Tṛṣṇāhara

IMPORTANT FORMULATIONS - Tṛṇapañcamūla Kvātha Cūrṇa, Brāhma Rasāyana, Sukumāra Ghṛta

THERAPEUTIC USES - Dāha, Akṣiroga, Tṛṣṇā, Visarpa, Mūtrakṛcchra, Bastiśūla, Mūrcchā, Bhrama

DOSE - 20 -50 g of Kvatha Curna for decoction.

6 -10 g (Powder).

SARALA (Heart Wood)

Sarala consists of dried heart wood of *Pinus roxburghii Sargent* (Fam. Pinaceae), a large tree upto 30 m high and 2.5 m in girth, growing on the Himalayas from 600 m to l830m.

SYNONYMS

Sanskrit	:	Surdhiasuka, Pīta Vṛkṣa
Assamese	:	--
Bengali	:	Tarper Telargaach, Sarala Gach
English	:	Long Leaved Pine
Gujrati	:	Saral
Hindi	:	Cheed
Kannada	:	Saral
Kashmiri	:	--
Malayalam	:	Saral, Saralam
Marathi	:	Saral
Oriya	:	--
Punjabi	:	Cheel
Tamil	:	Saral, Shirsal
Telugu	:	Saral
Urdu	:	Cheel, Sanobar

DESCRIPTION

a) Macroscopic

Drug available as chips of heart wood, yellowish-brown when fresh and becoming brown on exposure; surface, smooth; fracture, short; resin canal strands and growth rings seen on fractured surface; taste, not distinct; odour, resinous and aromatic.

b) Microscopic

Wood non-porous; medullary rays and schizogenous resin ducts present, alternating bands of autumn wood and spring wood present; tracheids of spring wood, large, polygonal in shape and thinner than autumn tracheids; autumn tracheids small and nearly squarish in shape with several bordered pits arranged uniseriately on the radial walls of tracheids; medullary rays mostly uniseriate and upto 6 cells high, biseriate rays, upto 20 cells high, but only occasionally seen; schizogenous resin ducts fairly abundant in autumn wood and spring wood; each duct associated with some thin walled, cellulosic parenchyma.

Powder - Yellowish-brown; shows numerous tracheids and pieces of medullary rays, and few resin debris.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (8 : 2) shows under UV (366 nm) four fluorescent zones at Rf. 0.14 (yellow), 0.28, 0.48 and 0.55 (all sky blue). On exposure to Iodine vapour five spots appear at Rf. 0.14, 0.19, 0.24,0.28 and 0.61 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and on heating the plate at 105°C for ten minutes three spots appear at Rf. 0.28, 0.61 and 0.92 (all violet).

CONSTITUENTS - Oleo-resin and Flavonoids.

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Kaṭu
Guṇa	:	Laghu, Snigdha, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmaka, Vraṇaśodhaka, Svedahara

IMPORTANT FORMULATIONS - Karpūrādyarka, Rajanyādi Cūrṇa, Sudarśana Cūrṇa

THERAPEUTIC USES - Karṇaroga, Kaṇṭha Roga, Akṣiroga, Dāha, Mūrcchā, Vraṇa, Kāsa, Svarabhraṃśa, Yūkā

DOSE - 1-3 g in powder form.

SARALA (Root)

Sarala consists of dried root of *Pinus roxburghii Sargent.* (Fam. Pinaceae); a large tree upto 30 m high and 2.5 m in girth, growing on the Himalayas from 600m to 1830m.

SYNONYMS

Sanskrit	:	Pīta Vṛkṣa, Surabhidāruka
Assamese	:	--
Bengali	:	Tarpin Telargaach, Sarala Gaach
English	:	Long Leaved Pine
Gujrati	:	Sarala
Hindi	:	Cheel
Kannada	:	Sarala
Kashmiri	:	--
Malayalam	:	Saralam, Sarala
Marathi	:	Sarala
Oriya	:	--
Punjabi	:	Cheel
Tamil	:	Shirsal, Sarala
Telugu	:	Sarala
Urdu	:	Cheer, Sanobar

DESCRIPTION

a) Macroscopic

Root well-developed, 3-3.5 cm thick, hard, woody, cylindrical; reddishbrown; surface rough due to longitudinal and transverse striations; fracture, hard; no smell and taste.

b) Microscopic

Mature root shows 10-15 layers of thin-walled, tangentially elongated cork cells filled with tannin; secondary cortex consists of a wide zone of thin-walled, rectangular to polygonal elongated cells mostly filled with starch grains, and of embedded resin canals; phloem a narrow strand composed of sieve tubes, parenchyma and phloem rays; tannin and starch grains also present in this region; xylem composed of tracheids, medullary rays and embedded resin ducts; tracheids thickwalled, with bordered pits; xylem rays 1-2 cells wide and filled with starch grains; simple, round to oval, rarely elongated starch grains, measuring 11-25 μ in dia.

Powder - Reddish-brown; shows fragments of cork cells, tracheids with bordered pits, resin canals, simple round to oval, starch grains measuring 11-25 μ in dia. and fragment of phloem and xylem rays filled with starch grains.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.3	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	3	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9:1) shows under U.V. (366 nm) three fluorescent zones at Rf. 0.75, 0.88 and 0.96 (all blue). On exposure to Iodine vapour five spots appear at Rf. 0.17, 0.53, 0.75, 0.88 and 0.96 (all yellow). On spryaing with 5% Methanolic-Sulphuric acid reagent and heating the plate at 105°C for ten minutes three spots appear at Rf. 0.75, 0.88 and 0.96 (all grey).

CONSTITUENTS - Resins - Oleo-resin.

PROPERTIES AND ACTION

Rasa	:	Madhura, Tikta, Kaṭu
Guṇa	:	Laghu, Snigdha, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphavātaśāmaka, Vraṇaśodhaka, Svedahara

IMPORTANT FORMULATIONS - Karpūrādyarka, Rajanyādi Cūrṇa, Sudarśana Cūrṇa

THERAPEUTIC USES - Karṇa Roga, Kaṇṭha Roga, Akṣi Roga, Dāha, Vraṇa, Kāsa, Svarabhraṃśa

DOSE - 1-3 g in powder form.

SARṢAPA (Seed)

Sarṣapa consists of dried seed of *Brassica campestris* Linn. (Fam. Brassicaceae), an erect, stout, simple or branched, glaucous, annual herb, 50 to 60 cm tall with amplexicaul leaves, commonly cultivated in Bengal, Bihar, D.P. and Punjab, and also found occasionally as an escape in waste places and fields.

SYNONYMS

Sanskrit	:	Kaṭusneha, Siddhārtha
Assamese	:	--
Bengali	:	Sarisa
English	:	Mustard
Gujrati	:	Sarasad, Rai
Hindi	:	Saraso
Kannada	:	Sasuve, Sasuvae, Sasive
Kashmiri	:	--
Malayalam	:	Katuka
Marathi	:	Mohari
Oriya	:	--
Punjabi	:	Sarayo, Sarson
Tamil	:	Kadugu
Telugu	:	Avalu
Urdu	:	Sarson

DESCRIPTION

a) Macroscopic

Seeds small, slightly oblong, pale or reddish-brown, bright, smooth, 1.2- 1.5 mm in dia.; under magnifying glass it is seen to be minutely reticulated; taste, bitter and sharp.

b) Microscopic

Seed shows single layered colourless testa followed by 3-5 layered, non-lignified, hexagonal, thick-walled cells filled with yellowish-brown contents; embryo and endosperm consists of hexagonal, thin-walled parenchymatous cells containing oil globules.

Powder - Yellow in colour with brown particles and oily, slightly bitter and sharp in taste; shows frequently thick-walled, fragments of reddish-brown cells of hypodermis, yellowish hyaline masses.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.
Fixed Oil	Not less than	35	per cent, Appendix	2.2.8

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) two fluorescent zones at Rf. O. 12 and 0.59 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.12, 0.59 and 0.70 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for ten minutes at 105^{0} C three spots appear at Rf. 0.12, 0.59 and 0.70 (all violet).

CONSTITUENTS - Fixed Oil.

PROPERTIES AND ACTION

Rasa	:	Kaṭu, Tikta
Guṇa	:	Tīkṣṇa, Snigdha
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Kaphahara, Vātahara, Pittakara, Dīpana, Vidāha, Hṛdya

IMPORTANT FORMULATIONS - Mahā Yogarāja Guggulu, Kārpāsāsthyādi Taila, Kuṅkumādi Taila, Prabhañjana Vimardana Taila, Vajraka Taila

THERAPEUTIC USES - Kaṇḍū, Kuṣṭha, Koṣṭhakṛmi, Grahabādhā

DOSE - 0.5-1 g in paste form.

ŚATAPATRIKĀ (Flower)

Śatapatrikā consists of dried flower of *Rosa centifolia* Linn. (Fam. Rosaceae); a small erect shrub, 1-1.8 m high, cultivated in gardens.

SYNONYMS

Sanskrit	:	Devataruṇī, Karṇikā
Assamese	:	Varde Ahamar
Bengali	:	Golap
English	:	Rose
Gujrati	:	Moshamee Gulab
Hindi	:	Gulab
Kannada	:	Rojahu
Kashmiri	:	-
Malayalam	:	Rosappoovu
Marathi	:	Gulab
Oriya	:	--
Punjabi	:	Gulab
Tamil	:	Rojapoo
Telugu	:	Rojapuvvu, Gulabi
Urdu	:	Gulab, Ward

DESCRIPTION

a) Macroscopic

Flower stalked, pinkish-yellow, consists of sepals, petals and stamens attached to pedicel with thalamus at the base; stalk 0.6-3.5 cm long, light green, slender, covered with numerous prickles and hairs; thalamus 1.0-1.8 cm long, light greenishbrown, covered with numerous prickles and hairs; sepal 5, free, 1.3-2.4 cm long, unequal, leaf-like, upper part

creamish-green and light yellowish-green on lower part, having glandular hairs; petals numerous, pinkish-yellow, 1.5-4.2 cm long, 1.3-2.5 cm wide, smooth obovate to sub-cordate; stamens numerous, free, unequal, dorsifixed, dark-brown; filament 0.3-0.5 cm long; carpels many free, ovary inferior; styles lateral, hairy, free; stigma terminal; taste, astringent; odour, aromatic.

b) Microscopic

Sepal - Shows single layered epidermis on both surfaces; numerous long, unicellular hairs present on upper surface, a few glandular hairs on lower surface; both epidermises followed by a wide zone of mesophyll consisting of round to oval, thin-walled, parenchymatous cells; a number of vascular bundles found scattered in this region.

Petal - Shows lower epidermis papillose and without cuticle; upper epidermis single layered with thin striated cuticle, followed by mesophyll consisting of oval to polygonal, elliptical, thin-walled, parenchymatous cells; a number of vascular bundles found scattered in this zone.

Powder - Light-brown in colour; fragments of petal of epidermis consisting of thinwalled, sinuous cells extended to form papillae; xylem vessel with spiral thickenings long, pointed, uniseriate, unicellular hair and stalked capitate glandular hairs; abundant, smooth, spherical pollen grains, measuring 27- 41 μ in dia., containing clear intine and exine with three distinct pores.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	15	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	24	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' using n-Butanol : Acetic acid: Water (5:1:4) shows in visible light six spots at Rf. 0.42 (violet), 0.50 (pink), 0.66, 0.82, 0.87 and 0.92 (all yellow). Under U.V. (366 nm) five fluorescent zones are visible at Rf. 0.42 (blue), 0.50 (pink), 0.82, 0.87 and 0.92 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.42 (grey), 0.50 (pinkish grey), 0.66, 0.82, 0.87 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.19 (greyish black), 0.32 (greyish black), 0.42, 0.50 (both violet), 0.66, 0.82, 0.87 and 0.92 (all brown).

CONSTITUENTS - Essential Oil

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya
Guṇa	:	Laghu
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Vātahara, Pittahara, Kaphahara, Śukrakara, Netrya, Dīpana, Hṛdya, Varṇya

IMPORTANT FORMULATIONS - Vasanta Kusumākara Rasa, Taruṇārka (Gulabjala), Pravāla Piṣṭi, Muktā Piṣṭi, Jaharamoharā Piṣṭi, Tṛṇakāntamaṇi Piṣṭi

THERAPEUTIC USES - Kuṣṭha, Dāha, Mukhasphoṭa, Raktapitta, Raktavikāra

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

ŚIṂŚAPĀ (Heart Wood)

Śiṃśapā consists of dried heart wood of *Dalbergia sissoo* Roxb. (Fam. Fabaceae), a medium sized, deciduous tree, found in western Himalayas upto 1220 m altitude and from Sikkim to upper Assam, and extensively planted throughout the country.

SYNONYMS

Sanskrit	:	Kṛsaṇa Sāra, Śyāmā
Assamese	:	--
Bengali	:	Shishu
English	:	Sissoo Tree
Gujrati	:	Sisam
Hindi	:	Seesam
Kannada	:	Eragundimavu, Bindi
Kashmiri	:	--
Malayalam	:	Irupoola
Marathi	:	Sisu, Shisav
Oriya	:	Sisu, Sinsapa
Punjabi	:	Sheesham
Tamil	:	Irupoolai
Telugu	:	Irugudu, Virugudu, Sissoo
Urdu	:	Sheesham

DESCRIPTION

a) Macroscopic

Drug consists of pieces of wood of variable lengths and widths, brown, very hard and strong; close-grained, annual ring not distinct, rays fine, pores uniformly distributed joined by wavy concentric bands; fracture hard and tough.

b) Microscopic

Heart wood shows well developed xylem, consisting of usual elements, vessels simple pitted, solitary or 2-3 in groups, arranged in radial rings, a few contain reddish-brown content; parenchyma thick walled and paratracheal; medullary rays 1-3 cells wide; fibres abundant in numbers and present in groups alternating with the bands of xylem parenchyma.

Powder - Brown; under microscope shows fibres, tracheids and parenchymatous cells.

IDENTITY, PURITY AND STRENGTH -

Identification -

Fluorescence test on aqueous and alcoholic extracts

i) 5 g. extracted in 100 ml of water and filtered shows in day light - light-brown colour; under U.V. light (366 nm) greenish-brown, and under U.V. light (254 run) yellowish-green.

ii) 5 g. extracted in 100 ml of alcohol and filtered shows in day light - darkbrown colour; under U.V. light (366 nm) dark-brown, and under U.V. light (254) dark-brown.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	2	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	1	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract 01} Silica gel 'G' plate using Toluene: Ethylacetate (7: 3) in visible light shows nine spots at Rf. 0.14, 0.19, 0.27 (all grey), 0.52 (yellow), 0.56, 0.62, 0.70, 0.75 and 0.86 (all grey. Under UV (366 nm) five fluorescent zones appear at Rf.

0.19 (yellowish blue), 0.27, 0.42 (both light blue), 0.52 and 0.70 (both blue). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate for ten minutes at 110°C eleven spots appear at Rf. 0.19(orange), 0.27, 0.30 (both grey), 0.36 (yellowish grey), 0.47 (grey), 0.52 (green), 0.56 (grey), 0.62 (light green), 0.70 (grey), 0.86 (geen) and 0.88 (grey).

CONSTITUENTS - Fixed Oil, Essential Oil, Tannins and Flavonoids.

PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Kaṣāya

Guṇa : Guru, Picchila

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Vātahara, Pittahara, Kaphahara, Medohara, Kaphaviśoṣaṇa, Medoviśoṣaṇa, Śukradoṣahara, Varṇya, Rucikara, Garbhapātinī Saiya , Śoṣahariṇī, Pipana

IMPORTANT FORMULATIONS - Ayaskṛti, Nārasiṃiha Ghṛta, Mahākhadira Ghṛta

THERAPEUTIC USES - Kuṣṭha, Kṛmi, Dāha, Śvitra, Vraṇa, Mūtraśarkarā, Basti Roga, Hikkā, Prameha, Arśa, Jvara, Gulma, Aśmarī, Atīsāra, Rakta Vikāra, Śoṣa, Śopha, Pāṇḍu, Chardi, Pīnasa, Duṣṭavraṇa, Vasāmeha, Sarvajvara

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

10 -20 g for decoction.

ŚIṂŚAPĀ (Stem Bark)

Śiṃśapā consists of dried stem bark of *Dalbergia sissoo* Roxb. (Fam. Fabaceae); a medium sized, deciduous tree, found in Western Himalayas upto 1220 m altitude, and from Sikkim to upper Assam, and extensively planted throughout the country.

SYNONYMS

Sanskrit	:	Śyāmā, Kṛsaṇa Sāra
Assamese	:	--
Bengali	:	Shishu
English	:	Sissoo Tree
Gujrati	:	Sisam
Hindi	:	Seesam
Kannada	:	Bindi, Eragundimavu
Kashmiri	:	--
Malayalam	:	Irupoola
Marathi	:	Shisav, Sisu
Oriya	:	Sinsapa, Sisu
Punjabi	:	Sheesham
Tamil	:	Irupoolai
Telugu	:	Irugudu, Sissoo, Virugudu
Urdu	:	Sheesham

DESCRIPTION

a) Macroscopic

Bark 3-5 cm long, curved or flat, fibrous, cut pieces; external surface rough with shallow, broad longitudinal fissures, exfoliating in irregular, woody strips and scales; pale yellow to dark reddish-brown; fracture, fibrous.

b) Microscopic

Mature stem bark consists of 6-25 or more rows of rectangular, thin-walled, radially arranged cork cells, a few outer layers exfoliating; secondary cortex wide consisting of round or oval, thin-walled, parenchymatous cells, a number of groups of sclerenchymatous cells, found scattered throughout secondary cortex, a few cortical cells contain prismatic crystals of calcium oxalate; secondary phloem very wide consisting of usual elements of thin-walled cells and tangential strips of phloem fibres; collapsed, thin-walled, parenchymatous cells present in tangential strips throughout the secondary phloem; most of phloem fibres and parenchyma cells contain prismatic crystals of calcium oxalate; phloem rays short, uni to triseriate, consisting of radially elongated, thin-walled, parenchymatous. cells.

Powder - Light brown; shows thin-walled parenchymatous cells, phloem fibres, fragments of cork cells and prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	14	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	7	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) five fluorescent zones at Rf. 0.28, 0.59, 0.71, 0.78 and 0.93 (all blue). On exposure to Iodine vapour six spots appear at Rf. 0.34, 0.51, 0.59, 0.71. 0.75 and 0.78 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for fifteen minutes at 105° C six spots appear at Rf. 0.34, 0.51, 0.59, 0.71, 0.75, 0.78 (all violet).

CONSTITUENTS - Flavonoids.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Kaṭu, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Tridoṣahara, Vraṇaśodhana, Garbhapātakara, Balya, Rucikara, Medohara, Vāmaka

IMPORTANT FORMULATIONS - Nārasiṃhaghṛta Rasāyana

THERAPEUTIC USES - Kuṣṭha, Śvitra, Kṛmi, Bastiroga, Dusṭa, Vraṇa, Dāha, Kaṇḍū, Hikkā, Śopha, Visarpa, Pīnasa

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

50-100 ml of the drug for decoction.

ŚIRĪṢA (Stem Bark)

Śirīṣa consists of stem bark of *Albizzia lebbeck Benth*. (Fam. Fabaceae), a large tree, common throughout the country, ascending to 1200 m on the Himalayas.

SYNONYMS

Sanskrit	:	Bhaṇḍi, Śītapuṣpa, Śukapriya, Mṛdupuṣpa
Assamese	:	--
Bengali	:	Sirish, Siris
English	:	Siris Tree, Lebbeck Tree
Gujrati	:	Shirish
Hindi	:	Siris, Shiris
Kannada	:	Bagey, Bage Mara, Hombage
Kashmiri	:	--
Malayalam	:	Vaka, Nenmenivaka
Marathi	:	Siris
Oriya	:	Sersuan, Sirisha
Punjabi	:	Sirish, Sareehn
Tamil	:	Vakai
Telugu	:	Dirisena
Urdu	:	Siris

DESCRIPTION

a) Macroscopic

Bark 1.5 - 2.5 cm thick, external surface dark brown, rough due to longitudinal fissures and transverse cracks, rhytidoma forming major part of bark and peeling off in flakes exposing buff coloured surface, middle bark brown, inner bark much fibrous. light yellow to grey; fracture, laminated in outer region and fibrous in inner region; taste, very astringent.

b) Microscopic

Mature bark about 2 cm thick, shows dead tissue of rhytidoma; cork consists of a few layers of thin-walled, transversely elongated and radially arranged cells; secondary cortex wide, composed of radially elongated to squarish, moderately thickwalled cells containing orange to reddish-brown contents; a few of the cells contain prismatic crystals of calcium oxalate; stone cells, variable in shape and size, present in singles or in groups throughout the region; secondary phloem consists of sieve elements, phloem parenchyma, phloem fibres and crystal fibres, traversed by phloem rays; prismatic crystals of calcium oxalate present in most of the phloem parenchyma cells; tangential bands of ceratenchyma present in middle and outer phloem region; phloem fibres. elongated, thick-walled, lignified, present in many concentric strips, mostly enclosed by crystals sheath throughout the middle and inner regions of phloem; crystal fibres having a number of septa, each chamber containing a single prismatic crystal of calcium oxalate; phloem rays numerous, radially elongated, somewhat wavy in outer phloem region and bi to multiseriate in the inner phloem region. being 2 - 5 cells wide and 7 - 25 cells high.

Powder - Greyish-brown; shows large number of stone cells, prismatic crystals of calcium oxalate, crystal fibres and phloem fibres.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	12	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	6	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9: 1) shows under UV (366 nm) a fluorescent zone at Rf. 0.63 (blue). On exposure to Iodine vapour two spots appear at Rf. 0.07 and 0.21 (both yellow). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate at 105°C for ten minutes

two spots appear at Rf. 0.07 and 0.21 (both light blue).

CONSTITUENTS - Saponins and Tannins.

PROPERTIES AND ACTION

Rasa	:	Tikta, Kaṣāya, Madhura, Kaṭu
Guṇa	:	Laghu
Vīrya	:	Anuṣṇa
Vipāka	:	Kaṭu
Karma	:	Viṣaghna, Tvagdoṣa, Tridoṣahara, Śothahara, Varṇya

IMPORTANT FORMULATIONS - Vajraka Taila, Daśānga Lepa, Ayaskṛti, Devadārvāriṣṭa, Bṛhanmaricādya Taila

THERAPEUTIC USES - Pāmā, Kuṣṭha, Kaṇḍū, Visarpa, Kāsa, Vraṇa, Śotha, Śvāsa, Mūṣaka Visa, Śīta Pitta, Raktaduṣṭi, Pīnasa, Viṣamajvara, Pratisyāya, Sarpadaṃśa, (Casake), Viṣaduṣṭi, Suryāvarta, Ardhāvabhedaka, Kṛmiroga, Netrābhiṣyanda

DOSE - 25-50 g (Kwatha)
3-6 g (Curna).

STHAUṆEYA (Leaf)

Sthauṇeya consists of dried leaf of *Taxus baccata* Linn. (Fam. Taxaceae); an evergreen conifer, about 6.5 m high, distributed in the temperate Himalayas at altitudes between 1800-3300 m and in the hills of Meghalaya and Manipur at an altitude of 1500m.

SYNONYMS

Sanskrit	:	Śukapuṣpa, Vikarṇa
Assamese	:	--
Bengali	:	Birmi, Bhirmie, Talish Patra, Bhada Getela
English	:	Himalayan Yew
Gujrati	:	Gethela Barmi
Hindi	:	Thuner, Talispatra Bhed
Kannada	:	Sthauneyak
Kashmiri	:	--
Malayalam	:	Thuriangam, Tuniyankam
Marathi	:	Sthauney Barmi
Oriya	:	Talisabhed, Chalisa Patra
Punjabi	:	Birmi
Tamil	:	Talisapatri-Bhedam
Telugu	:	Taleesa Patri Bhedamu
Urdu	:	Birmi, Zarnab

DESCRIPTION

a) Macroscopic

Drug occurs as whole or broken leaf pieces, entire leaf flattended, linear with recurved margins, 1.3-4.0 cm long and 0.1-0.3 cm wide, tip sharp pointed and prickly, entire. thick, brown above, but paler below; petiole, very short; odour. pleasant; taste, acrid, bitter and disagreeable.

b) Microscopic

Leaf-

Lamina - shows dorsi ventral structure, margin slightly turned downward; upper epidermis single layered covered with thick, striated cuticle; lower epidermis single layered with papillate projection; sunken stomata present only on lower surface, overhung by subsidiary cells; palisade two layered; spongy parenchyma 3-5 layered. thin-walled, oval or irregular in shape, containing reddish-brown contents; vascular bundle single, present in the midrib within an endodermis.

Powder - Brown; shows fragments of reddish-brown spongy parenchyma cells and very rarely xylem tracheids, polygonal epidermal cells with striated cuticle and a few sunken stomata in surface view.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	6	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	16	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 : 1 : 5) shows under UV (366 nm) three fluorescent zones at Rf. 0.67 (pink), 0.95 (grey) and 0.98 (pink). Under visible light shows three spots at Rf. 0.91 (pink), 0.95 (pink) and 0.98 (greenish yellow). On exposure to Iodine vapour seven spots appear at Rf. 0.08, 0.29, 0.60, 0.70, 0.82, 0.91 and 0.95 (all yellow).

CONSTITUENTS - Alkaloids - Taxine, Ephedrine, Glycoside, Tannins, Resins, Reducing Sugars and Formic Acid.

PROPERTIES AND ACTION

Rasa : Kaṭu, Tikta, Madhura

Guṇa : Snigdha, Guru

Vīrya : Śīta

Vipāka : Madhura

Karma : Medhya, Śukravardhaka, Kaphahara, Vātahara, Pittaśāmaka, Jantughna, Varṇa Prasādana, Lomasañjanana

IMPORTANT FORMULATIONS - Mahā Nārāyaṇa Taila, Balā Taila

THERAPEUTIC USES - Rakta Vikāra, Tṛṣṇā, Tila Kālaka, Dāha, Kuṣṭha, Kṛmiroga, Piḍikā, Arbuda (Karkaṭa)

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

SŪRAṆA (Corm)

Sūraṇa consists of dried corm of *Amorphophallus campanulatus* (Roxb.) Blume. (Fam. Araceae); a stout, herbaceous plant, cultivated throughout the plains of the country.

SYNONYMS

Sanskrit	:	Arśoghna, Kandala
Assamese	:	--
Bengali	:	Ole
English	:	Elephant Foot
Gujrati	:	Sooran
Hindi	:	Suranakanda, Zamikanda
Kannada	:	Suranagadde
Kashmiri	:	--
Malayalam	:	Chena, Kattuchena, Kattuchenai, Cena Karana
Marathi	:	Jungli Suran, Suran
Oriya	:	Olooakanda, Suran
Punjabi	:	Gimikanda
Tamil	:	Karunai Kizhangu
Telugu	:	Mancai Kanda Durada Gadda
Urdu	:	Zamin-qand, Zamikand

DESCRIPTION

a) Macroscopic

Drug occurs as cut pieces of different shapes and sizes; external surface of cork blackish-brown, rough due to numerous scars and a few adventitious roots, internal portion creamish white; fracture, short; taste, acrid.

b) Microscopic

Corm shows a wide zone of cork consisting of 5-25 tangentially elongated, rectangular, thin-walled cells, a few inner layers containing rosette crystals of calcium oxalate, and plenty of simple and compound starch grains; ground tissue very wide consisting of thin-walled, parenchymatous cells; a few cells containing both rosette and acicular crystals of calcium oxalate; starch grains both simple and compound, spherical in shape consisting of 2-4 components, measuring 3-31 μ in diameter; vascular bundles poorly developed, scattered in ground tissue; vessels arranged in groups of 2-3, having spiral thickenings; a few parenchyma cells of ground tissue containing yellowish cell contents.

Powder - Creamish-grey; shows abundant simple and compound starch grains, measuring 3-31 μ in dia., fragments of cork cells, a few rosette and acicular crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

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

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Benzene: Ethylacetate (9: 1) on exposure to Iodine vapour shows for four spots at Rf. 0.09, 0.66, 0.74 and 0.85 (all yellow). On spraying with 5% Methanolic-Phosphomolybdic acid and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.09, 0.66, 0.74 and 0.85 (all grey).

CONSTITUENTS - Betulinic Acid, β-Sitosterol, Stigmasterol, Lupeol, Triacontane, Glucose, Galactose, Rhamnose and Xylose.

PROPERTIES AND ACTION

Rasa : Kaṭu, Kaṣāya

Guṇa : Laghu, Rūkṣa, Viśada

Vīrya : Uṣṇa

Vipāka : Kaṭu

Karma : Vātakara, Pittakara, Kaphahara, Dīpana, Viṣṭambhī, Rucya, Gudakīlahṛt, Raktapittakara, Dadrukara, Kuṣṭhakara

IMPORTANT FORMULATIONS - Sūraṇāvaleha, Sūraṇavaṭaka, Sāmudrādya Cūrṇa

THERAPEUTIC USES - Arśa, Plīhāgulma, Śvāsa, Kāsa, Āṣthīlā

DOSE - 2-10 g of the drug in powder form.

ŚVETACANDANA (Heart Wood)

Śvetacandana consists of dried heart wood of *Santalum album* Linn. (Fam. Santalaceae), an evergreen, semi parasitic tree, 8 to 18 m in height and 2 to 4 m in girth, widely distributed in the country, commonly found in the dry regions of peninsular India from Vindhya mountains southwards, especially in Karnataka and Tamilnadu; it is cultivated for its aromatic wood and oil.

SYNONYMS

Sanskrit	:	Śrīkhaṇḍa, Śvetacandana
Assamese	:	Sandale Avyaj
Bengali	:	Chandan
English	:	Sandal Wood
Gujrati	:	Sukhad
Hindi	:	Chandan, Safed Chandan
Kannada	:	Shrigandhamara, Shrigandha, Chand
Kashmiri	:	--
Malayalam	:	Chandanam
Marathi	:	Chandan
Oriya	:	--
Punjabi	:	Chandan
Tamil	:	Chandana maram, Sandanam, Ingam
Telugu	:	Gandhapu Chekka, Manchi Gandham, Tella Chandanam , Sriga
Urdu	:	Sandal Safed

DESCRIPTION

a) Macroscopic

Yellowish-brown to pale-reddish orange, heavy, dense, hard but split easily; transversely smooth surface shows alternating light and dark concentric zones with

numerous pores, traversed by very fine medullary rays; odour, persistently aromatic; taste, slightly bitter.

b) Microscopic

Wood consists of tracheids, vessels, fibres, xylem parenchyma and traversed by medullary rays; vessels numerous scattered singly throughout the region, rarely two together, barrel-shaped, pitted and with transverse to oblique pen oration with tail-like projections, at one or both ends; a few tracheids elongated with tapering ends and possess bordered pits on their walls; fibres many, lignified with pointed tips; xylem parenchyma mostly rectangular, a few of them contain prismatic crystals of calcium oxalate; xylem rays numerous, run straight, uni to triseriate, mostly biseriate, thick-walled, radially elongated having golden yellow to brownish contents and contain a few prismatic crystals of calcium oxalate.

Powder - Light-brown and aromatic; shows pitted vessels with tails, isolated or associated with fibres, fragments of fibres, square to rectangular-shaped parenchyma, prismatic crystals of calcium oxalate, and numerous oil globules.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	1	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.2	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	8	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	1	per cent, Appendix	2.2.7.
Volatile Oil	Not less than	1.5	per cent, Appendix	2.2.10.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (93 : 7) shows on exposure to Iodine vapour six spots at Rf 0.05, 0.10, 0.27 (all yellowish brown), 0.60 (dark brown), 0.82 and 0.91 (both yellowish brown). On spraying with Anisaldehyde-Sulphuric acid reagent- and heating the plate for about ten minutes at 1I0ḍC

six spots appear at Rf. 0.05, 0.10, 0.27 (all bluish violet), 0.60 (violet). 0.82 and 0.91 (both bluish violet).

CONSTITUENTS - Volatile oil (α- and β- Santalol)

PROPERTIES AND ACTION

Rasa : Tikta, Madhura

Guṇa : Laghu, Rūkṣa

Vīrya : Śīta

Vipāka : Kaṭu

Karma : Pittahara, Kaphahara, Durgandhahara, Dāhapraśamana, Varṇya, Hṛdya, Tṛṣṇāhara, Vṛṣya, Kṛmighna, Viṣaghna

IMPORTANT FORMULATIONS - Ayaskṛti, Aśvagandhādyariṣṭa, Sārivādyāsava, Arimedādi Taila, Balādhātryādi Taila, Marma Guṭikā, Candanāsava, Candanādi Cūrṇa, Candanādi Taila

THERAPEUTIC USES - Śoṣa, Dāha, Raktapitta, Raktārśa, Hikkā, Vamana, Raktātisāra, Pradara, Śukrameha, Netra Roga, Mūtrāghāta, Bhrama, Raktavikāra, Kṛmiroga

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

ŚYONĀKA (Root)

Śyonāka consists of dried root of *Oroxylum indicum* Vent. (Fam. Bignoniaceae); a small tree, distributed throughout the country, chiefly in evergreen forest upto 600 m.

SYNONYMS

Sanskrit	:	Dīrghavṛnta, Kaṭvaṅga, Pṛthsuimba
Assamese	:	Kering
Bengali	:	Sonagachh
English	:	--
Gujrati	:	Tentoo
Hindi	:	Sonapatha, Shyonak, Tentoo
Kannada	:	Tigudu
Kashmiri	:	--
Malayalam	:	Palagripayanni
Marathi	:	Tentoo
Oriya	:	Pamponiya
Punjabi	:	Tatpaling, Talvarphali
Tamil	:	Peruvagai
Telugu	:	Dundilumu, Gumpena, Pampini
Urdu	:	Sonapatha

DESCRIPTION

a) Macroscopic

Drug available in cut pieces, having secondary roots, greyish-brown to light brown, cut surface brownish-cream, cylindrical, ribbed at few places, 5-16 cm long, 1-3 cm thick, external surface rough due to longitudinal and transverse cracks, fracture, short; taste, slightly sweet.

b) Microscopic

Root mature root shows 10-30 or more layers of tangentially elongated, radially arranged cork cells filled with reddish-brown content; secondary cortex composed of oval to polygonal, parenchymatous cells; stone cells, thick-walled, lignified of various shapes and sizes with narrow lumen, distinct pits and striations; secondary phloem composed of sieve tubes, parenchyma, fibres and groups of stone cells; groups of fibres traversed by 2-8 cells wide phloem rays; secondary xylem consists of usual elements; xylem vessels of various sizes, occur in singles and groups of 2-5 cells arranged radially having reticulate thickening; xylem rays 2-4 cells wide; fibres having wide lumen and pointed tips, and tracheids present.

Powder - Brownish-cream; shows groups of stone cells, fragments of cork, phloern fibres with wide lumen and pointed tips and reticulate vessels and tracheids.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	42	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4: 1 : 5) shows under UV (366 nm) a fluorescent zone at Rf. 0.10 (blue). On exposure to Iodine vapour six spots appear at Rf. 0.10, 0.30, 0.58, 0.70, 0.85 and 0.95 (all yellow). On spraying with 5% Methanolic-Sulphuric acid and heating the plate for ten minutes at 105°C five spots appear at Rf. 0.25, 0.58, 0.70, 0.85 and 0.95 (all grey).

CONSTITUENTS - Flavonoids and Tannins.

PROPERTIES AND ACTION

Rasa	:	Kaṣāya, Tikta
Guṇa	:	Laghu, Rūkṣa
Vīrya	:	Śīta
Vipāka	:	Kaṭu
Karma	:	Kaphapittaśāmaka, Dīpana, Grāhī

IMPORTANT FORMULATIONS - Amṛtāriṣṭa, Dantyādyariṣṭa, Daśamūlāriṣṭa, Nārāyaṇa Taila, Dhānvantara Ghṛta, Brāhma Rasāyana, Daśamūla Kvātha Cūrṇa, Cyavanaprāśa Avaleha, -

THERAPEUTIC USES - Vātātisāra, Kāsa, Aruci, Basti Roga, Āmavāta, Udara Roga, Ūrustambha, Vātavyādhi, Karṇa Roga, Śotha

DOSE - 5-10 g in powder form.

25-50 g in decoction.

TĀLA (Inflorescence)

Tāla consists of dried male inflorescence of *Borassus flabellifer* Linn. (Fam. Araceae); a tall, stout, dioecious palm tree having a height of 11.8-30 m and girth 1-2 m, bearing a terminal crown of 30-40 large fan like leaves, 90 cm - 1.6 m in width, cultivated and also found wild throughout India in the Peninsular coastal areas and in fields.

SYNONYMS

Sanskrit	:	Lekhyapatra
Assamese	:	--
Bengali	:	Tala
English	:	Palmyra Palm
Gujrati	:	Tada, Tad
Hindi	:	Tal
Kannada	:	Talimera, Oleyagida, Nelatalea Talimara
Kashmiri	:	--
Malayalam	:	Panavirala
Marathi	:	Tada, Toad
Oriya	:	--
Punjabi	:	Tad
Tamil	:	Panaimaram, Panai
Telugu	:	Tadi, Tati
Urdu	:	Taad

DESCRIPTION

a) Macroscopic

Drug available in transversely cut pieces of inflorescence, measuring upto 1 cm thick and 2.5 - 3 cm in dia., transversely cut surface shows a central axis with a number of male flowers arranged around it, external surface yellowish-grey and rough due to scales; flower

unisexual, actinomorphic, sessile, arranged in a close spiral on the infloresence axis, 3-4 mm long, reddish-brown in colour; perianth consists of 6 sepals, tough, persistent, free, valvate; stamen 6, in two whorls of three each, 1-1.5 mm long, yellowish in colour; filament free, united at base into a ring; anther linear and basifixed; no smell and taste.

b) Microscopic

Powder -Reddish-brown; shows fragments of thin-walled, slightly wavy, large, oval to polygonal parenchymatous cells of perianth epidermis in surface view; numerous, simple, yellowish-orange, spherical-shaped pollen grains, measuring 16-44 μ in dia., with distinct exine and intine; large brown pieces of thick-walled, single layered pollen sac, 34 layered, endothelial cells having a few small pollen grains.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	7.5	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4 : 1 : 5) shows under UV (366 nm) a blue fluorescent zone at Rf. 0.93. On spraying with 5% Methanolic-Sulphuric acid and heating the plate for ten minutes at 110°C four spots appear at Rf. 0.44, 0.61, 0.73 (all light brown) and 0.93 (brown).

CONSTITUENTS - Kernels contain Galactomannan (Polysacchride)

PROPERTIES AND ACTION

Rasa : Madhura

Guṇa : Śīta, Guru, Snigdha

Vīrya : Śīta

Vipāka : Madhura

Karma : Śukrala, Bṛṃhaṇa, Vṛṣya, Tarpaka, Śirovirecaka, Vastiśuddhikara, Medhākara, Vātahara, Pittahara, Vraṇanāśaka, Kṛmighna

IMPORTANT FORMULATIONS - Avittolādi Bhasma (Kṣāra), Panaviralādi Bhasma (Tāla Puspodbhava Kṣāra), Guḍa Pippalī

THERAPEUTIC USES - Raktapitta, Uraḥkṣata, Śvāsa, Dāha, Kṛmi, Mūtrakṛcchra, Śophaghna, Vandhyākara

DOSE - 1-3 g

TRIVṚT (Root)

Trivṛt consists of dried root of *Operculina turpethum* (Linn.) Silva Manso Syn. *Ipomoea turpethum* R. Br. (Fam. Convolvulaceae); a large perennial twiner with milky juice and fleshy roots, found growing wild nearly throughout the country, ascending to 900 m, also occasionally grown in gardens; the roots being fleshy, care is taken in drying as they decay easily; roots therefore cut into pieces and the cut portions are exposed to sun for a day or so, after which it is finally dried in shade.

SYNONYMS

Sanskrit	:	Śyāmā, Tribhaṇḍī
Assamese	:	--
Bengali	:	Teudi, Tvuri, Dhdhakalami
English	:	Terpeth Root, Indian Jalap
Gujrati	:	Kala Nasottara
Hindi	:	Nishothra
Kannada	:	Vili Tigade
Kashmiri	:	--
Malayalam	:	Trikolpokanna
Marathi	:	Nisottar
Oriya	:	Dudholomo
Punjabi	:	Nisoth
Tamil	:	Karum Sivadai
Telugu	:	Tella, Tegada
Urdu	:	Turbud, Nishoth

DESCRIPTION

a) Macroscopic

Roots occur in pieces, 1.5-15 cm long, 1-5 cm dia., usually unbranched, cylindrical,

elongated, bearing thin rootlets; thicker pieces, occasionally split and show central wood portion; surface dull grey, reddish-grey to light brown, showing deep furrows or longitudinal wrinkles giving a rope-like or columnar appearance; transversely cut surface shows thick, whitish bark and light yellow centre; fracture in bark, short; in wood, fibrous; odour, indistinct; taste, slightly acrid and nauseating when kept in mouth for some time

b) Microscopic

Mature root shows thin cork, consisting of3-5 rows of brown cells; secondary cortex 4-6 layered, composed of tangential elongated, thin-walled cells; some of the cortical cells become thick-walled appearing as isolated, oval to subrectangular sclerenchymatous cells having wide lumen; secretory cavities surrounded by subsidiary cells and resin canals found scattered in secondary cortex; secondary phloem, a wide zone, consisting of sieve elements and phloem parenchyma; vascular bundles arranged in a continuous and a discontinuous ring, traversed by uni and biseriate medullary rays; numerous resin cells also seen in phloem in longitudinal rows; xylem shows 3-5 radiating arms; small patches of intraxylary phloem often formed; xylem vessels in singles or 2-3 in groups, having simple pits on their walls; calcium oxalate crystals as prisms and rosettes found scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells; starch grains, both simple .and compound, simple ones elliptical to spherical with central cleft hilum, compound grains consisting of 2-4 components, size vary from 5-44 μ in dia., found scattered in cortex, phloem parenchyma, xylem parenchyma and medullary ray cells.

Powder - Greyish to light brown; shows parenchymatous cells, cellulosic fibres with pointed tips, vessels with simple pits, simple and compound starch grains elliptical to spherical with central cleft, measuring 5-44 μ in dia., having 2-4 components, rosette and prismatic crystals of calcium oxalate.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	10	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	8	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene : Ethylacetate (9:1) shows under UV (366 nm) three fluorescent zones at Rf. 0.08, 0.21 (both light blue) and 0.58 (blue). On exposure to Iodine vapour seven spots appear at Rf. 0.21, 0.41, 0.49, 0.58, 0.71, 0.90 and 0.97 (all yellow). On spraying with VanillinSulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.21, 0.41, 0.49 (all light violet), 0.58, 0.70, 0.90 and 0.97 (all violet).

CONSTITUENTS - Resinous Glycosides.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṭu, Tikta, Kaṣāya
Guṇa	:	Rūkṣa, Laghu, Tīkṣṇa
Vīrya	:	Uṣṇa
Vipāka	:	Kaṭu
Karma	:	Vātala, Virecana, Kaphapittahara, Sukhavirecaka, Pittahara, Jvarahara

IMPORTANT FORMULATIONS - Hṛdyavirecana Leha, Aśvagandhāriṣṭa, Avipattikara Cūrṇa, Māṇibhadra Guḍa

THERAPEUTIC USES - Malabandha, Gulma, Udara Roga, Jvara, Śopha, Pāṇḍu, Plīhā, Vraṇa, Kṛmi, Kuṣṭha, Kaṇḍū

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

TUMBINĪ (Fresh Fruit)

Tumbinī consists of fresh fruit (devoid of stalk) of *Lagenaria siceraria* (Mol.) StandI. Syn. *L. leucantha* Rusby., *L. vulgaris Ser.* (Fam. Cucurbitaceae); a large, pubescent, climbing or trailing herb, cultivated throughout the country.

SYNONYMS

Sanskrit	:	Alābu, Tumbī
Assamese	:	--
Bengali	:	Laus, Loki
English	:	Bottle Gour:d
Gujrati	:	Dudi, Tumbadi
Hindi	:	Lauki, Ghia
Kannada	:	Isugumbala, Tumbi
Kashmiri	:	--
Malayalam	:	Chorakka, Churan, Choraikka, Piccura, Tumburini, Cura, Tumburu
Marathi	:	Phopla
Oriya	:	--
Punjabi	:	Tumbi, Dani
Tamil	:	Shorakkai, Surai, Suraikkai
Telugu	:	Sorakaya, Anapakaya
Urdu	:	Ghiya, Lauki

DESCRIPTION

a) Macroscopic

Fruit a pepo, 30 - 60 cm long, bottle, mace or club-shaped, hard when ripe; external surface, smooth; pale green in colour.

b) Microscopic

IDENTITY, PURITY AND STRENGTH

Foreign matter			Nil	Appendix	2.2.2.
Total Ash	Not more than	12	per cent, Appendix		2.2.3.
Acid-insoluble ash	Not more than	0.6	per cent, Appendix		2.2.4.
Alcohol-soluble extractive	Not less than	10	per cent, Appendix		2.2.6.
Water-soluble extractive	Not less than	25	per cent, Appendix		2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (85 : 15) shows under UV (366 nm) three fluorescent zones at Rf. 0.13 (light blue), 0.66 (pink) and 0.88 (light pink). On exposure to Iodine vapour three spots appear at Rf. 0.13, 0.33 and 0.57 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C two spots appear at Rf. 0.13 and 0.57 (both light brown).

CONSTITUENTS - Saponin and Fatty Oil

PROPERTIES AND ACTION

Rasa : Madhura

Guṇa : Snigdha

Vīrya : Śīta

Vipāka : Madhura

Karma : Pittahara, Kaphahara, Bhedaka, Rucikara, Hṛdya, Vṛṣya

IMPORTANT FORMULATIONS - Mahā Viṣagarbha Taila

THERAPEUTIC USES - Jvara, Kāsa, Śvāsa, Viṣa Roga, Śopha, Vraṇa, Śūla

DOSE - 10-20 ml of fresh drug in juice form.

UDUMBARA (Fruit)

Udumbara consists of dried fruit of *Ficus glomerata* Roxb. Syn. *F. racemosa* Linn. (Fam. Moraceae); a large deciduous tree distributed throughout ever green forests in India, upto an elevation of I800 m, in moist localities and bank of streams, and also often planted in villages for shade and its edible fruits.

SYNONYMS

Sanskrit	:	Jantuphala, Hemadugdhā
Assamese	:	Jambhaij, Jamij
Bengali	:	Jogmadumur
English	:	Cluster Fig
Gujrati	:	Umardo
Hindi	:	Gullar, Gular, Umar
Kannada	:	Athimaro
Kashmiri	:	--
Malayalam	:	Atti
Marathi	:	Umbar
Oriya	:	Dumburi, Dumuri
Punjabi	:	Gullar, Umbra, Rumbn
Tamil	:	Atti
Telugu	:	Atti, Medi
Urdu	:	Goolar, Gular

DESCRIPTION

a) Macroscopic

Dried syconus fruit, sub-globose with persistent peduncle; 1.0 -2.3 cm long, 0.7 - 1.8 cm in dia., brownish-grey, wrinkled ostiole in apex region, inner hollow receptacle, a few insect debris also found in inner walls of syconus; odour, not distinct; taste, astringent or

acrid in unripe fruit.

b) Microscopic

Fruit shows single layered epidermis covered with thick -cuticle having numerous unicellular hooked hairs and reddish-brown content; epidermis followed by 5-8 layers oval to polygonal, collenchymatous cells and oval to polygonal, thinwalled parenchymatous cells respectively; a few rosette crystals of calcium oxalate and reddish content found in collenchymatous cells; vascular traces, laticiferous cavities and pitted, round to oval lignified stone cells, with wide lumen present in parenchymatous zone.

Powder - Brown; shows unicellular hooked hairs, epidermal cells and stone cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	1	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	3	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	15	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) eight flourescent zones at Rf. 0.05 (light blue), 0.14 (blue), 0.24 (light blue), 0.38 (light blue), 0.45 (light blue), 0.55 (blue), 0.93 (blue) and 0.96 (blue). On exposure to Iodine vapour nine spots appear at Rf. 0.05, 0.24, 0.38, 0.45, 0.51, 0.55, 0.65, 0.93 and 0.96 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for ten minutes at 110°C nine spots appear at Rf. 0.05, 0.24,0.38,0.45, 0.51,0.55,0.63,0.93 and 0.96 (all grey).

CONSTITUENTS - β- Sitosterol, Lupeol Acetate and Carbohydrates

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Rūkṣa, Guru
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Pittahara, Kaphahara, Varṇya Vraṇa Ropaṇa, Vraṇa Śodhana, Bhagna Sandhānaka, Raktadoṣahara

IMPORTANT FORMULATIONS - Marma Guṭikā

THERAPEUTIC USES - Raktapitta, Mūrcchā, Dāha, Tṛṣṇā, Pradara, Granthi Roga

DOSE - 10-15 g of the drug in powder form.

UŚĪRA (Root)

Uśira consists of dried fragrant fibrous roots of *Vetiveria zizanioides* (Linn.) Nash (Fam. Poaceae); a densely tufted grass, found throughout the plains and lower hills of the country, especially on the banks of rivers and rich marshy soil, ascending to an altitude of 1200 m.

SYNONYMS

Sanskrit	:	Vīraṇa, Āḍhaya, Sevya
Assamese	:	Usir, Virina
Bengali	:	Venarramula, Khaskhas
English	:	Cuscus Grass
Gujrati	:	Sugandhi Valo, Valo
Hindi	:	Khasa, Gandar, Bena, Khas
Kannada	:	Mudivala, Baladaberu, Lamanch, Bala Deberu
Kashmiri	:	--
Malayalam	:	Ramaceam, Vetiver, Lamajja, Ramacham
Marathi	:	Bala, Vala
Oriya	:	Ushira, Benachera
Punjabi	:	Panni, Khas
Tamil	:	Vetiver, Vilamichaver
Telugu	:	Vetivelu, Vettiveru
Urdu	:	Khas

DESCRIPTION

a) Macroscopic

Clusters of wiry roots upto 2 mm in diameter, minute, longitudinally grooved; colour varies from cream, grey or light yellow to brown; fracture, short and splintery; odour, strong aromatic; taste, slightly bitter.

b) Microscopic

Root shows an epidermis consisting of tangentially elongated cells having brownish content, followed by a layer of hypodermis, consisting of thin-walled cells, similar to epidermis; cortex consisting of 2-3 layers of thick-walled, lignified sclerenchymatous cells towards periphery and aerenchymatous cells towards centre; endoderm is, single layered of barrel-shaped cells with highly thickened inner walls; pericycle many layered with thick-walled, sclerenchymatous cells enclosing radial vascular bundles arranged in a ring; simple, round to oval, starch grains measuring 8-12 μ in diameter present in aerenchyma, pericycle and pith cells.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	9	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	6	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	4	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	5	per cent, Appendix	2.2.7.
Volatile oil	Not less than	1	per cent, Appendix	2.2.10.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid: Water (4:1 :5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.49 and 0.72 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.28, 0.75 and 0.94 (all yellow). On spraying with 5% Methanolic Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.19, 0.33, 0.73 and 0.94 (all grey).

CONSTITUENTS - Essential Oil.

PROPERTIES AND ACTION

Rasa	:	Tikta, Madhura
Guṇa	:	Laghu, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Vātaghna, Dehaklāntihara, Pittaghna, Pācana, Stambhana, Kaphapittahṛt

IMPORTANT FORMULATIONS - Uśīrāsava, Yogarāja Guggulu, Ṣaḍaṅga Kvātha Cūrṇa

THERAPEUTIC USES - Jvara, Tṛṣṇā, Mūtrakṛcchra, Vraṇa

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

UTPALA (Flower)

Utpala consists of dried flower of *Nymphaea stellata* Willd. (Fam. Nymphaceae); an aquatic herb, generally found in tanks and ponds throughout the warmer parts of the country.

SYNONYMS

Sanskrit	:	Kumuda, Nīlotpal
Assamese	:	--
Bengali	:	Kumud, Sundi
English	:	Indian Blue Water Fily
Gujrati	:	Poyanu
Hindi	:	Neel Kamal, Kumudinee
Kannada	:	Neeltare
Kashmiri	:	--
Malayalam	:	Ambal Poovu
Marathi	:	Kamoda, Neel Kamal
Oriya	:	--
Punjabi	:	Neel Kamal, Kamalini
Tamil	:	Alli, Ambal
Telugu	:	Allitamara, Kaluvapoovu
Urdu	:	Neelofar

DESCRIPTION

a) Macroscopic

Drug occurs mostly in broken form of varying sizes of dried pieces of flowers and buds, dark brown, attached with a pedicel of 0.5-1.0 cm long when present; sepals-5 - 6 cm long, 1.5 - 2.0 cm wide, oblong, lanceolate, tip acute or subacute, free, adnate to base of disc; petals - 3.5 - 4.5 cm long 2.0-2.5 cm wide, linear-oblong or lanceolate, yellowish-brown; stamen- 6 to indefinite, free, adnate to fleshy thalamus; filaments-dilated at base; anther - with lingual appendages, introrse, dithecous; gynoecium 3 to indefinite, enclosed

by thalamus; style short; ovary unilocular.

b) Microscopic

Sepal - Single layered epidermis on either side, unicellular hairs present on upper epidermis; both epidermis followed by 4-6 layers of collenchymatous cells with angular thickenings; central region occupied by 4-5 layers of elongated, thin-walled, spongy parenchymatous cells; large stellate air canals and vascular tissues present in this region; tanniniferous content present in collenchymatous cells.

Petal -Epidermis on either side, followed by 2-3 layers of collenchymatous cells, central region composed of 3-4 layers, elongated spongy parenchyma; stellate air canals and vascular stellate tissues present in this region; tanniniferous contents also found scattered in petals.

Stamen - Single layered upper and lower epidermis, followed by 2-3 layers, rounded to oval, large parenchymatous cells; 3-4 layers elongated parenchymatous cells present in centre; stellate air canals present in this region; anther shows 4 splitting pollen chambers attached with parenchymatous connective tissues, vascular tissues and stellate idioblasts present in this region, endothecium consisting of single layered columnar cells, stromium in both the chambers and a few rounded 22 - 27 μ in dia., pollen grains having thick smooth, exine and a thin intine.

Powder - Brown; shows groups of parenchymatous cells, stellate air canals, uniseriate hairs, yellowish-brown rounded pollen grains, measuring 22 - 27 μ in dia., having 'thick, smooth, exine and thin intine.

IDENTITY, PURITY AND STRENGTH

Foreign matter	Not more than	2	per cent, Appendix	2.2.2.
Total Ash	Not more than	8	per cent, Appendix	2.2.3.
Acid-insoluble ash	Not more than	0.5	per cent, Appendix	2.2.4.
Alcohol-soluble extractive	Not less than	5	per cent, Appendix	2.2.6.
Water-soluble extractive	Not less than	22	per cent, Appendix	2.2.7.

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Ethylacetate : Formic acid (5 : 4 : 1) shows in visible light three spots at Rf. 0.59, 0.68 and 0.81 (all bluish grey). On spraying with 10% Ferric Chloride solution (aqueous) two spots appear at Rf. 0.68 and 0.81 (both blue and correspond to that of Tannic acid).

CONSTITUENTS - Tannins.

PROPERTIES AND ACTION

Rasa	:	Madhura, Kaṣāya
Guṇa	:	Picchila, Snigdha
Vīrya	:	Śīta
Vipāka	:	Madhura
Karma	:	Rucya, Rasāyana, Keśya, Dehapauṣṭikara, Medhya, Dāha, Dārḍhyakara, Pittanāśaka, Raktaprasādaka

IMPORTANT FORMULATIONS - Aśokāriṣṭa, Aravindāsava, Uśīrāsava, Candanāsava, Kalyāṇaka Ghṛta, Samaṅgādi Cūrṇa, Kanaka Taila, Jātyādi Taila, Tuṅgadrumādi Taila, Mañjiṣṭhādi Taila, Candanādi Lauha, Triphalā Ghṛta

THERAPEUTIC USES - Pipāsā, Dāha, Raktapitta, Chardi, Mūrcchā, Hṛdroga, Mūtrakṛcchra, Jvarātisāra

DOSE - 3-6 g of the drug.