

PHARMACOGNOSY OF AYURVEDIC DRUGS
KERALA

BY

Prof. K. NARAYANA AIYER M. A.

and

M. KOLAMMAL M. Sc.

(U. G. C. Book Bank)



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DEPARTMENT OF PHARMACOGNOSY
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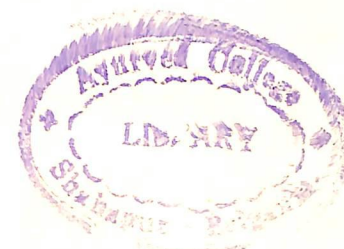
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NOTE:

The ayurvedic notes were prepared by Sri. Konniyur N. Kesava Pillai, Physician and Retired Lecturer and Sri. Balakrishna Warier, Physician and Lecturer, Ayurveda College, Trivandrum under the supervision of Sri. M. N. Kesava Pillai, Director of Indigenous Systems of Medicine, Kerala and Sri. K.K. Nambiar, Principal, Ayurveda College, Trivandrum respectively. The illustrations were prepared by Sri. T. K. Padmanabha Iyer and Sri. K. Kunhirama Warier, Artists in this Department.



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Gloriosa superba Linn.

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LIST OF ABBREVIATIONS

bf.	bast fibre	phd.	phelloderm
bt.	bast	ph. f.	phloem fibre
cam.	cambium	pi.	pith
c. c. c. }	cell with coloured	pn.	phellogen
cl. c. cc. }	contents	pr. xy.	primary xylem
cl. c. ra.	cell with raphide	rhy.	rhytidome
	bundle	rn.	rind
cl. c.ctl.	cell with crystals	rs. crl.	rosette crystal
ch. pl.	chloroplast	rsn.	resin
ck.	cork	rt. hr.	root hair
co.	cortex	s.	starch
crl. crls.	crystal - crystals	sp.	space
crm.	ceratenchyma	scl.	sclerenchyma
cy.	cavity	scl.	scleroid
en. end.	endodermis	scr. cl.	Secretory cell or
ex. d.	exodermis		secretory reservoir or
gl. t.	glandular hair or		cavity
	trichome	st. cl.	stone cell
in. sp.	intercellular space	stl.	stele
in. xy. ph.	inexylary phloem	sto.	stomata
lx. t.	latex tube	sv. t.	sieve tube
lt. - lt. x.	latex	v.	vessel
ly. cy.	lysigenous cavity	v. b.	vascular bundle
mr. mdr.	medullary ray	v. c. ty.	vessel with tyloses
mu. cy.	mucilage cavity	wd.	wood
obl. ph.	obliterated phloem	w. f.	wood fibre
ogl. ol. gl.	oil globule	xy. par. }	xylem parenchyma
ph.	phloem	xp., }	
ph. i.	primary phloem	xy.	xylem

VIŠNUKRANTI

Source plant :	<i>Evolvulus alsinoides</i> Linn.
Synonym :	<i>Evolvulus hirsutus</i> Lamk.
Family :	Convolvulaceae.

Sanskrit text

Descriptive synonyms

आस्फोता गिरिकर्णी स्याद्विष्णुक्रान्तापराजिता । (अमरः)

Āsphotā girikarṇī syādvīṣṇukrāntāparajitā |
(Amarah)

विष्णुक्रान्ता नीलपुष्पी सतीना छर्दिका तथा ।

शुक्लपुष्पा भूमिलग्ना ह्रस्वा सा शुक्लपुष्पिका ॥

सूक्ष्मपत्रान्तरा ज्ञेया सर्पाक्षी रक्तपुष्पिका । (धन्वन्तरिनिघण्टु)

Viṣṇukrānta nilapuṣpī satina chardikā tathā |
Suklapuṣpā bhūmilagnā hrasvā sā śaṅkhapuṣpikā ||
Sūkṣmapatrāntarā jñeyā sarpākṣhī raktapuṣpikā |
(Dhanvantari nighaṇṭu)

Asphota - with blossomed flowers all round; *Girikarṇī* - leaf resembling that of the young one of a rat or mouse; *Viṣṇukrānta* - possessed of the energy or potency bestowed by Viṣṇu.

These synonyms are not of any help in the correct identification of the botanical source.

Properties and uses

विष्णुक्रान्ती ज्वरहरा वृष्या चेतोविकारजित् । (हृदयप्रिया)

Viṣṇukrāntī jvaraharā vṛṣyā cetovikārajit |
(Hṛdayapriya)

The drug is considered a specific for all kinds of fevers. It is *vṛṣya* or aphrodisian. It is considered a powerful stimulant to the brain and to tone up the intellectual powers. Its flowers according to Yogāmṛtum are an effective sedative for uterine bleedings and its root according to Sargdhara is very effective for gastric and duodenal ulcers.

* Two varieties; one with blue flowers and the other with white flowers are distinguished. Both of them possess similar virtues but the white flowered is preferred when available.

EVOLVULUS ALSINOIDES Linn.

Synonym: *Evolvulus hirsutus* Lamk.

Family: Convolvulaceae.

Sanskrit: — Viṣṇukrānta, Nīlapuṣpa, Jaya, Pārijāta
Viṣṇugaundhi

Malayālam — Viṣṇukrānti

Tamil — Viṣṇukrānti

Hindi — Viṣṇukranta

Distribution and habitat.

The plant is found wild in all the plains districts in most parts of India being recorded as occurring in Konkan, Deccan, Madras, Sind, Bengal, Kerala etc. It grows on open ground, by roadsides, grassy lands and other waste places. It is not known to be cultivated.

Habit and general features:

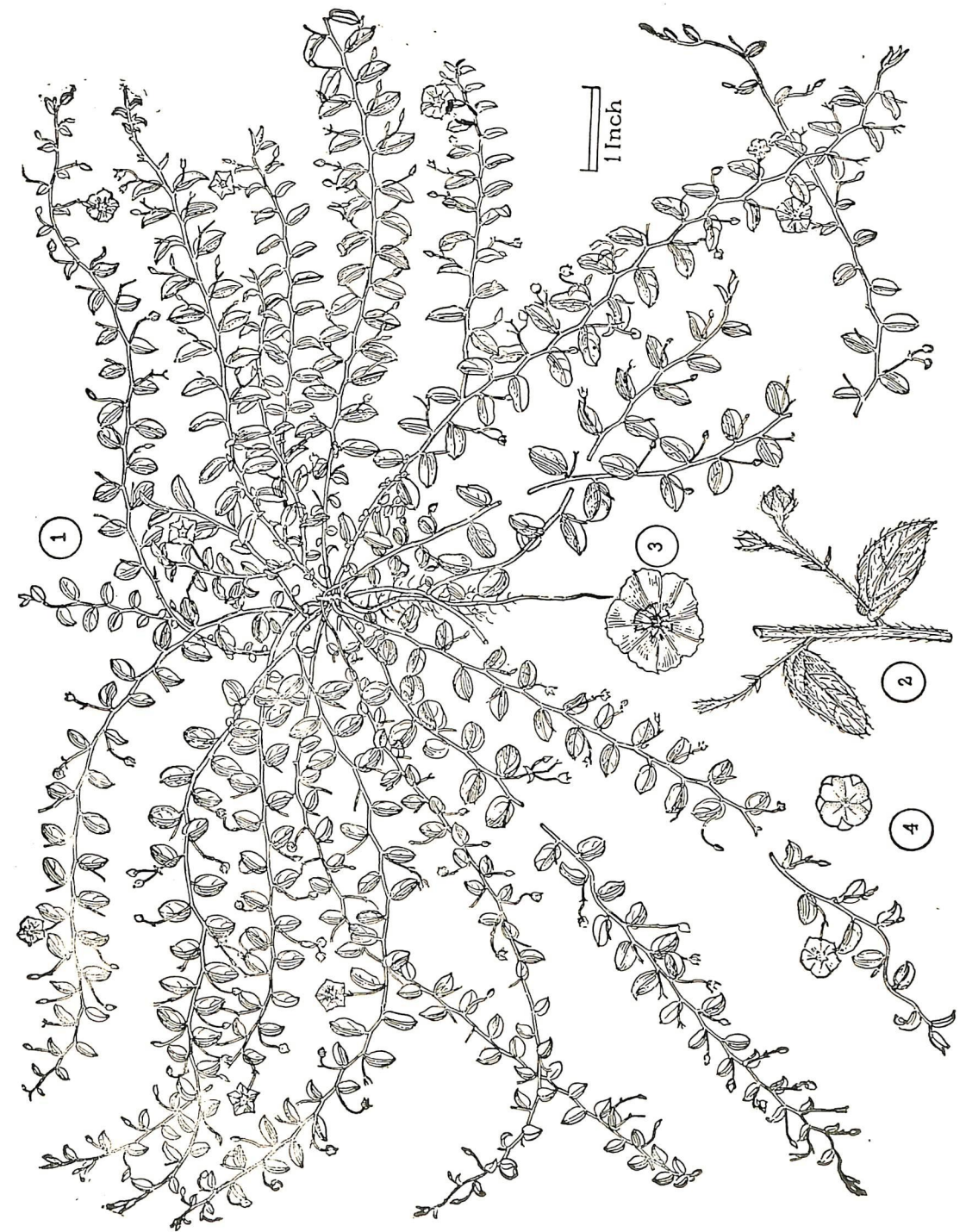
Evolvulus alsinoides Linn. is a comparatively small procumbent diffuse perennial herb with scarcely any stem but having a woody root stock from which arise many spreading or prostrate very slender, round wiry, caespitose branches sometimes more than 30 cm. long, not rooting at the nodes, bearing simple, alternate bifarious subsessile rounded oblong, ovate or elongate leaves usually less than or about 12mm. in length, and small, but beautiful mostly solitary axillary blue flowers on jointed peduncles and four seeded capsular drooping fruits. Both the branches and leaves especially when young, are covered with long soft adpressed white hairs; the degree of hairyness however is variable. The length of the branches and size of the plant varies under different climatic conditions.

The plant is in flower most part of the year.

External morphology.

Leaves: simple, alternate exstipulate, small 12 to 18 mm. by 4 to 8 mm., mostly less than 12 mm. long, subsessile, bifarious or distichous, variable in shape being lanceolate, elliptic oblong, oblong-ovate or even suborbicular, entire, obtuse, strongly apiculate

Plate II



Evolvulus alsinoides Linn.

1. The entire plant

2. A portion enlarged

3. Front view of the flower

4. Front view of a fruit

usually acute at base, often densely hairy on both sides with appressed silky hairs.

Flowers: simple, blue, or rarely pink or white, about 6 to 8mm. in diameter mostly solitary on one to three flowered axillary filiform peduncles about as long as the leaf, jointed near the middle where two small opposite lanceolate bracteoles are present. The peduncles are erect while in blossom but afterwards drooping. *Calyx* - densely silky, of five free subequal lanceolate very acute hairy sepals about 4 mm. long, not enlarging in fruit. *Corolla* - rotate, or sometimes funnel shaped, regular bright blue about 5 mm. long and 8 mm. in diameter, *tube* - very short with the limb plicate and almost entire. *Stamens* - five, free, epipetalous, crowding the mouth of the short tube: *filaments* filiform *anthers* ovate or oblong. *Ovary* - bicarpellary, ovate, two or rarely one celled, containing four ovules; *styles* two, distinct from the base, each again two cleft three fourths of its length into linear or subclavate branches ending in simple stigmas, stigmatic on the inner face.

Fruit: A globose, 4 valved drooping capsule with thin pericarp. Seeds - 4 or 2. rarely solitary glabrous; *embryo* with twice folded cotyledons and a terete much incurved radicle.

Part used: The entire plant is used in medicine.

MUSALI

Source plant: *Curculigo orchiodes* Gaertn.

Family: Amaryllidaceae.

Sanskrit text

Descriptive synonyms.

मुसली तालमूली च सुवहा तालमूलिका ।

गोधापदी हेमपुष्पी भूताली दीर्घकन्दिका ॥ (राजनिघण्टुः)

Musali tāmūli ca suvahā tāmūlikā |

Godhāpadī hemapuṣpī bhūtālī dīrghakandikā ||

(Rājanighaṇṭu)

Tāmūli, *Tāmūlika* and *Tālapatrika* are terms suggesting that the roots and leaves of the plant bear resemblance to those of *Tāli*, the Palmyra palm. *Bhūtālī* means a ground palm, that is without an erect aerial stem. The Malayalam and Tamil names of this plant also convey this sense that it is a miniature tāli palm growing close to the ground. *Varāhi* may indicate that the tuberous underground portion of the plant is dug up by the boar for eating. *Hemapuṣpi* means with yellow flowers. *Dirghakandika* with elongate tuberous underground stems. *Mūsaka pucchakarasipha* - roots resemble the tail of a rat

Part used-the *kandam* or underground stem.

Properties and uses.

मुसली मधुरा वृष्या वीर्योष्णा बृंहणी गुरुः ।

तिक्ता रसायनी हन्ति गुदजान्यनिलं तथा ॥ (भावप्रकाश)

Musali madhurā vṛṣyā vīryoṣṇā bṛmhaṇī guruh

Tiktā rasāyanī hanti gudajānyanilam tathā ||

(Bhāvaprakāśa)

वाराही मेहकुष्ठघ्नी बल्या वृष्या रसायनी । (हृदयप्रिया)

Varāhī mehakuṣṭhaghñī balyā vṛṣyā rasāyanī

(Hṛdayapriya)

मुसली मधुरा शीता वृष्या पुष्टिवलप्रदा ।

पिच्छिला कफदा पित्तदाहश्रमहरा परा ॥

(राजनिघण्टु)

Musali madhurā śītā vṛṣyā puṣṭibalapradā

Picchilā kaphadā pittadāhasramaharā parā ||

(Rājanighaṇṭu)

मुसली द्विविधा प्रोक्ता श्वेता चापरसंज्ञका ।

श्वेता स्वरगुणोपेता त्वपरा च रसायनी ॥

(राजनिघण्टु)

Musali dvividhā proktā śvetā cāparasamjñikā |

Śvetā svalpagunopetā tvaparā ca rasāyanī ||

(Rājanighaṇṭu)

Musali is mucilagenous. It increases *kapha* and reduces *pitta daham* (burning sensation) and *sramam* (exhaustion). It is *vātaharam*. It stimulates digestion and is a good *rasāyan* (rejuvenator). *Musali* is used for the following diseases. (i) *Badhiryan* (deafness) A choornam of *Musali* and *Bakuci* to be taken with ghee or honey. (ii) *Mukhakanti* As a cosmetic to brighten the complexion of the face. *Musali* prepared as a paste with goat's milk or honey and applied locally over the face. (iii) *Vrsyam*. As an aphrodisiac - *Musali* powder to be taken with ghee followed by milk.

CURCULIGO ORCHICIDES Gaertn.

Synonyms: *Curculigo malabarica* Wight.; *C. brevifolia* Dryand.;

Hypoxis dulcis Stand.;

Family: Amaryllidaceae.

Sanskrit — Musali

Malayālam — Nilapana or Nilappana

Tamil — Nilapanai

Hindi — Mushali, Kalimusli

Distribution and habitat.

The plant is found in all districts from near sea level to 2300 meters altitude. It has been recorded occurring in the subtropical Himalayas from Kumaon eastwards ascending to 1800 meters, the Khasia hills, Bengal, Assam, Konkan, Kanara, the Western Peninsula and Madras extending south as far as Cape Comorin.

Habit and general features.

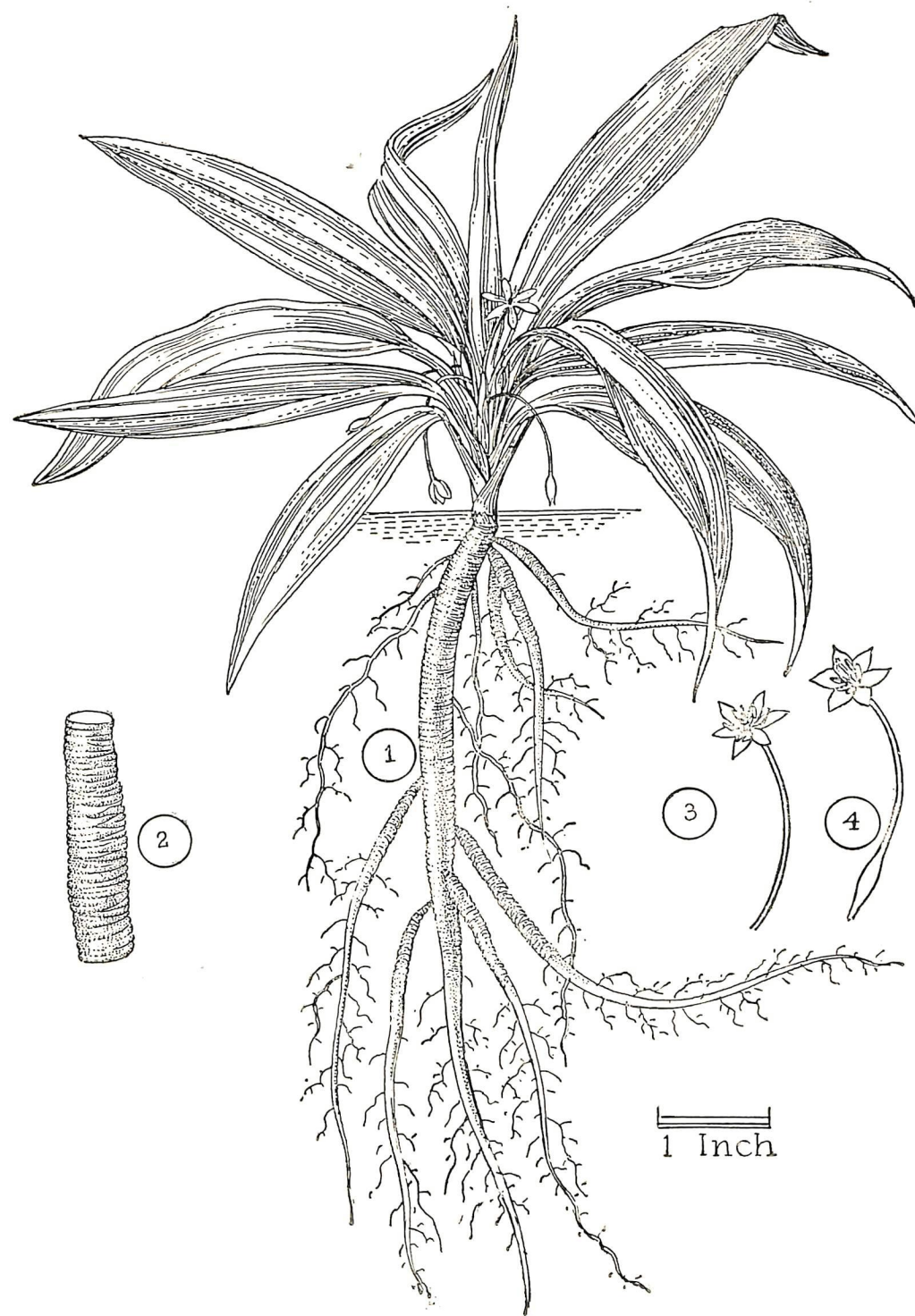
Curculigo orchicoides Gaertn. is a small geophilous perennial herb perennating by means of a fairly stout short or more often elongate root-stock having several fleshy lateral roots and with a rosette of sessile or short-petiolate, linear-lanceolate, membranous leaves close to the ground level.

External morphology.

Root-stock: tuberous narrowly cylindrical from 5 to 22 cms. long. 5 to 8 mm. thick with several obliquely attached fleshy lateral roots that by their continued longitudinal contraction pull down the stem into the soil year after year, thereby keeping the leaves always near the ground level. A few fibrous roots also occur.

Leaves: sessile or short-petiolate with sheathing bases 15 to 45 cms. by 1.2 to 2.5 cms. linear or linear lanceolate, membranous glabrous or sparsely softly hairy and plicate in bud. The leaf tip when it contacts the soil occasionally roots and produces adventitious buds.

Inflorescence: Axillary, scapose racemose or sub-spikate, the scape very short, clavate, flattened with the pedicels, bracts and



Curculigo orchicoides Gaertn.

1. The entire plant.
2. Part of the root stock enlarged.
3. Staminate flower.
4. Bisexual flower.

ovary concealed in the leaf sheaths. The lower flowers on the scape are mostly bisexual and the upper staminate.

Flowers: epigynous, bright yellow, bisexual or unisexual with lanceolate membranaceous bracts. *Perianth*—gamophyllous, rotate six partite located at the top of a slender sterile 12 mm. long extension of the ovary by means of which the perianth is exposed above ground. *Perianth segments* similar, 12 to 16 mm. long, elliptic oblong, acute, hairy on the back. *Stamens*— 6, the filaments very short and small, adnate to the base of the perianth lobes and bearing short linear erect anthers. *Ovary*—inferior, tricarpellary syncarpous, lanceolate and three locular with a fairly long, slender beak or extension – the stipe. Each cell of the ovary contains 6 – 8 ovules attached by or having distinctly long funicles: *style* – short, columnar; stigma 3 cleft with the lobes or segments oblong, erect and appressed.

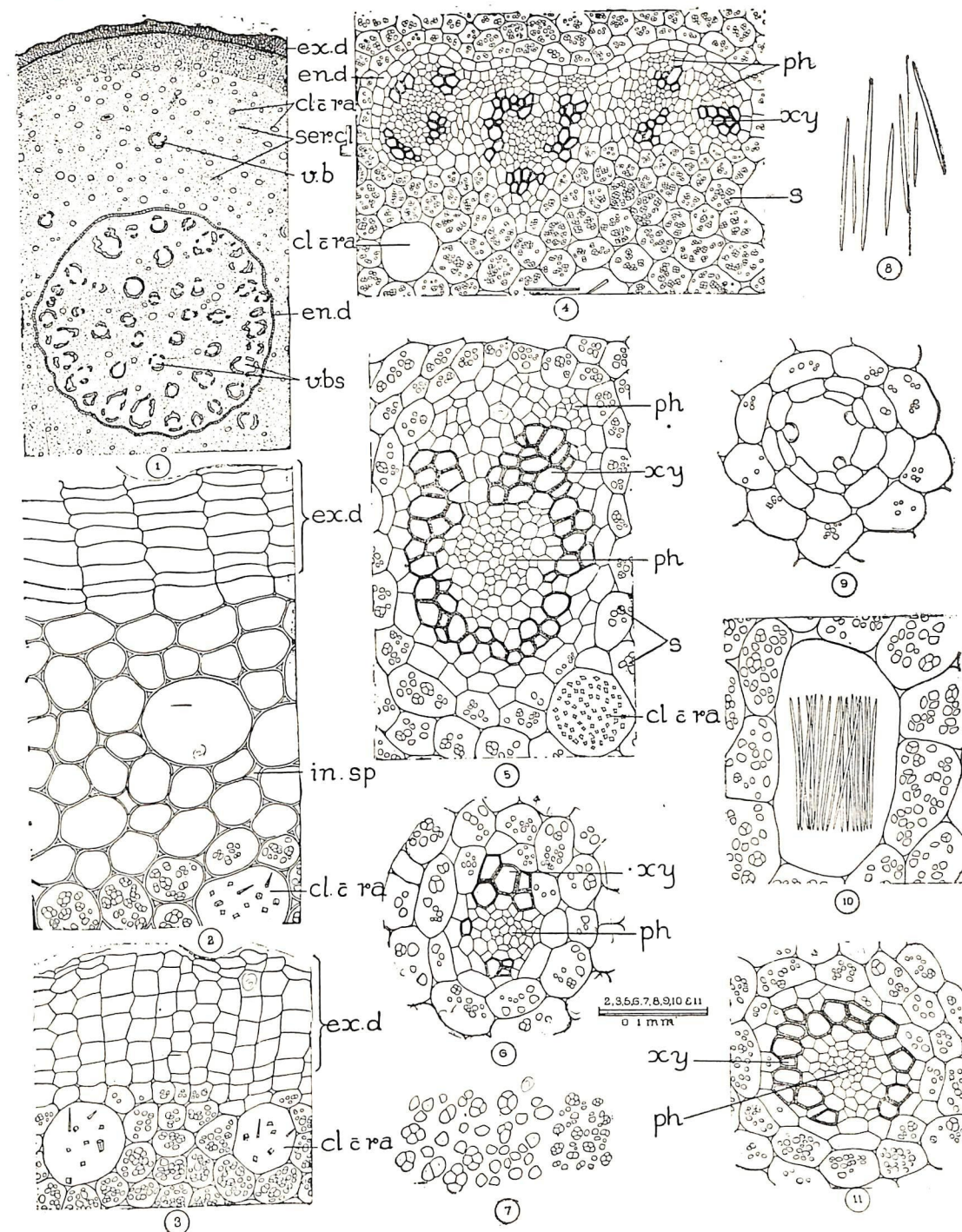
Fruit: A hypogynous one to four seeded capsule about 1.2 cms. long with a slender beak and spongy septa. *Seeds* – oblong, black and shiny with the testa crustaceous and deeply grooved in wavy lines.

Official part: Root – stock.

Description: The rootstock is straight, cylindrical, tuberous, 5 to 20 cms. long, less than a centimetre in diameter with the surface brownish and marked with closely spaced prominent transverse wrinkles in the upper or basal half. It bears a few (5 to 6) stout lateral roots each 8 or more cms. long. The lateral roots have a dull white colour and are spongy externally. They arise from the portion of the root stock below the region of transverse constriction as well as from the lower end. The fresh cut section of the root stock has a starchy white colour and is mucilaginous.

Histology. A transverse section of the root-stock (underground stem) about 6 or 7 mm. thick is circular in outline. It shows an outer peripheral cortical portion which has a starchy lustre and a central stelar region about 3 mm. in diameter wherein most of the vascular bundles are located. The outermost tissue is the 'storied cork' which is formed of 5-8 rows of cells with light brown coloured cell walls. In young specimens the cells of this tissue are nearly

cubical to rectangular in shape whereas in older specimens the cells are tangentially elongated (45 to 70μ in length and 15 to 21μ in width as seen in T. S.). The walls of these cells are not thickened. They do not appear to be of cellulose but turn yellow when treated with chlorozinc iodide showing thereby that they are lignified. The cortex which is next within is $1\frac{1}{2}$ to less than 2 mm. in width and consists of 35 to 40 rows of fairly large almost round cells with numerous intercellular spaces. These cells have a diameter varying from 30 to 45μ and are densely packed with compound starch grains. Nearly all the grains are having 3 to 5 or occasionally more components. They vary in diameter from 9 to 18μ in different specimens. The starch grains in some specimens appear nearly double the size of those in others. Occasional simple grains also occur. Scattered within the cortex are several much larger rounded or oblong cells containing raphide bundles of calcium oxalate. Cut ends of these are often observed within the cells. In transverse sections these cells have a diameter of 54 to 165μ . In L. S. these appear oblong and measure 128 to 192μ in length. The size and length of raphide bundles vary in different cells. The crystals present in the individual bundle within a cell are acicular and of the same length but those from different cells vary in length from 60 to 150μ . Within the cortex can also be made out a few small rounded to tangentially elongated lysigenous cavities which secrete mucilage. Small globules of mucilage are present within these cavities. While in almost all rootstocks the whole cortical region is starchy, in certain very old specimens the cortical region appears differentiated into a narrow outer zone 0.5 to 1 mm. in thickness wherein starch grains are not present and an inner wider zone which is starchy. The cells of the outer zone resemble those of the inner in shape but their walls have nearly double the thickness of the latter and are slightly lignified. In addition to the above in certain specimens within the cortex a limited number of small collateral vascular bundles are present. A distinct endodermis consisting of a single row of almost rectangular cells with rounded corners slightly smaller in size than the cortical cells and devoid of starch grains is present. In some specimens the endodermis appears as a broken ring. The ground tissue of the stele is formed of parenchymatous cells similar in size shape and contents to those of the cortex. Mucilage cavities however do not usually occur within the stele.



Histology of the rootstock of *Curculigo orchioides* Gaertn.

1. Diagrammatic sketch of the sector of T. S. of the rootstock.
2. Exodermis and the adjacent layers.
3. Exodermis and the adjacent layers of a young rootstock.
4. Endodermis and a part of central stele.
5. A vascular bundle just inner to the endodermis.
6. A vascular bundle at the centre of the stele.
7. Starch grains
8. Crystals from different raphide bundles.
9. Lysigenous secretory cavity.
10. L. S. of a cell with the raphide bundle.
11. A vascular bundle of the stele.

Within the stele can be made out many closed, collateral vascular bundles. The peripheral bundles are arranged in a ring just within the endodermis while the inner ones appear scattered in the ground tissue. The bundles vary in size and shape and are of closed collateral as well as amphivasel types. The xylem elements partly or completely surround the phloem in vascular bundles. Most of the vascular bundles located in the centre of the stele are small. The xylem elements present within these bundles occur on the sides of the phloem and the vessels are very narrow and mostly of the annular and spiral types. The cells of phloem tissue are very small and almost polygonal. Sieve tubes and companion cells are not distinct. The xylem almost completely surrounds the phloem in the larger vascular bundles. A single or occasionally double row of parenchyma cells slightly smaller in size than the cells of the ground tissue is present surrounding each bundle.

The complete absence of any kind of mechanical tissue either associated with the bundles or in any other part of the root-stock is an important distinguishing character. The kind and quantity of the starch grains, the type of raphide bundles of calcium oxalate crystals as well as the presence of mucilage cavities in the periphery of the root stock are other diagnostic features.



SAHADEVI

Source plant : *Vernonia cinerea* Less.

Family : Compositae

Sanskrit text

Descriptive synonyms

सहदेवी ज्वरहरा रक्तपित्तप्रसादनी ।

वृष्या चेतोविकारघ्नी मङ्गल्या कान्तिसंयुता ॥ (योगरत्नसमुच्चयम्)

Sahadevi jvarahara raktapitta prasādanī |

Vṛṣyā cetovikāraaghñī maṅgalyā kāntisaṁyuta ||
(Yogarātna samuccayam)

सहदेवी ज्वरहरा रक्तपित्तरुजापहा ।

(हृदयप्रिया)

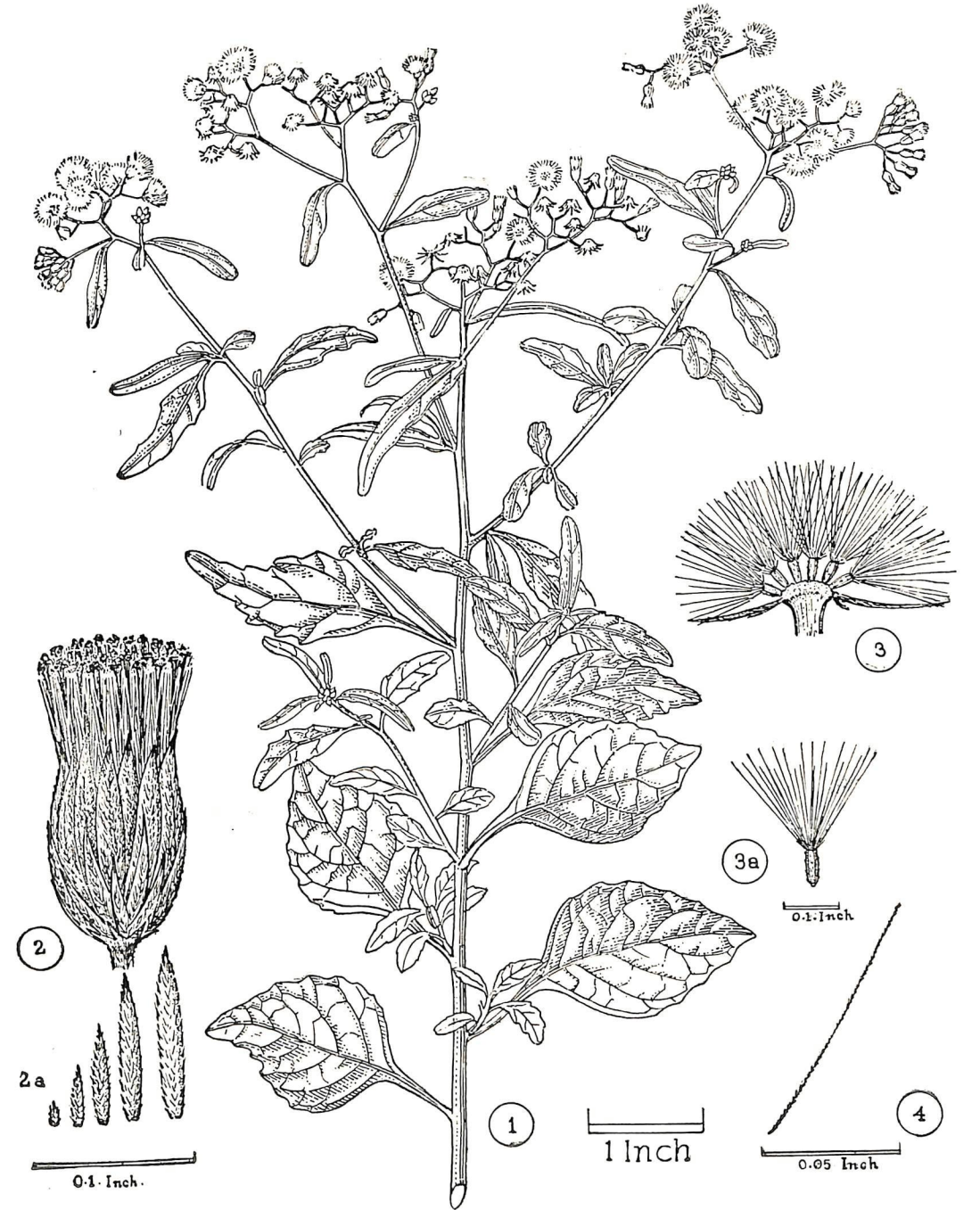
Sahadevi jvarahara raktapittarujāpahā |

(Hṛdayapriya)

The terms do not refer to any descriptive feature. The entire plant is used in medicine (*Sarvaṁs'o grāhyah*). It is considered very beneficial in fevers (*viṣmajvaranāsini*) It purifies or improves the blood, bile *pitta* and semen *vṛṣya*.—It is *cetovikaraghni* (subdues mental distraction) and bestows (*mangalya* and *kanti*) bliss or happiness and beauty or loveliness (to women).

According to *Yogamrutam* it is a specific for *astisravam* and *asṛgdaram*. It is also used in some chronic skin diseases.

Plate V



Vernonia cinerea Less.

1. A flowering branch
2. A head
- 2a. Bracts

3. Peduncle with the achenes
- 3a. Achene
4. A hair

VERNONIA CINERIA Less.

Family :	Compositae
Sanskrit -	Sahadevi - ardhaprasadana
Malayālam -	Puvankuruntal
Tamil -	Puvamkurundal, Sahadevi, Naichittie Sirashengalanir
Hindi -	Dandotpala, Sahadevi, Sadodi, Sadori.

Distribution and habitat.

The plant is found distributed throughout India in all plains districts and to some extent in the hills the chief areas of distribution being Bengal, United Provinces, Bombay, Deccan, Sind, Madras, and Kerala. It is a very common weed of the roadsides open forests and garden lands and growing as it does under various situations and under varying conditions of moisture and soil, the plant is naturally a somewhat variable one.

Habit and general features

Vernonia cineria Less. is an erect annual herb from 12 cms. to 75 cms. high with cylindric striate more or less pubescent slightly branched stem bearing very variable glabrous or pubescent, ovate or lanceolate petioled leaves 2.5 to 5 cms. long and 1.8 cms to 3.8 cms. broad and pink or lilac flowers in involucrate heads and smooth or slightly 4-5 angular achenes covered with appressed silky hairs and with a white silky pappus. The involucre bracts are oblong lanceolate acuminate and usually glabrous above. It is in flower most part of the year. Those growing in dry districts or areas are quite small.

External morphology

Leaves: simple, alternate, exstipulate, petioled the petioles 6 to 12 mm. long blade very variable in shape and size the lower or basal ones larger, the upper the smallest broadly elliptic or lanceolate, obtuse or acute, shortly mucronate, more or less pubescent on both sides, the margins irregularly toothed or shallowly crenate-serrate from 2.5 to 5 cms. long and 1.8 cms to 3.6 cms. broad but considerably smaller in plants growing in dry areas; petioles 6 to 12 mm. or more long.

Heads: small, less than 6 mm. in diameter in lax divaricate terminal corymbs with a minute linear bract beneath each head of flowers and with small bracts in the forks of the peduncles. The individual heads which are homogamous bear about twenty bisexual tubular flowers and are surrounded by several linear lanceolate awned involucre bracts, silky on the back.

Flowers: pinkish violet; *calyx* - or pappus copious and more or less persistent, composed of many long white hairs in two series, the outer shorter some what flattened and bristly and about 5mm. long. *Corolla* - tubular, five lobed. *Stamens* - five, filaments epipetalous, anthers syngenesious, anther bases sagittate. *Ovary* - inferior, unilocular with one basal ovule; *style* arms subulate, hairy. *Achenes* 1.25 mm. long, oblong, terete, not ribbed slightly narrowed at base and clothed with appressed white hairs.

Official part: The plant as a whole.

S'AS'AS'RUTI*

Source plant: *Emilia sonchifolia* DC.

Family: Compositae.

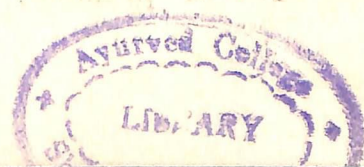
Sanskrit text

शशश्रुतिर्ज्वरहरा वातवैगुण्यनाशिनी । (हृदयप्रियः)

S'ās'asrutirjvaraharā vātavaigūṇyanāś'ini | (Hṛdayapriya)

This plant (drug) is used in fevers, intestinal worms and nervous disorders. It is considered a specific for bleeding piles, (*Raktārs'as*)

* S'ās'as'ruti has the following synonyms: Citra (चित्र) Pacitra (पचित्र) Nyagrodhi (न्यग्रोधि) Dravanti (द्रवन्ति) S'ambarī (शम्बरी) Vṛsa (वृषा) Pratyaks'renī (प्रत्यक्ष्रेणी) Sutasrenī (सुतश्रेणी) Andā (अण्डा) and Mūsikaparṇī (मूषिकपर्णी). Entirely different plants are equated with some of these terms. *Ezhuttānipacca* *Eliccevia*, and *Tirudevi* are Malayālam names considered synonyms but there is confusion in their identity. The terms *Ezhuttānipacca* and *Narāyapacca* are applied also to *Stachytarpheta indica* (Verbenaceae).



EMILIA SONCHIFOLIA DC.

Synonyms : *Emilia glabra* DC. *Cacalia sonchifolia* Linn.

C. glabra Heyne. ; *Gynura calyculata* DC.

Family	—	Compositae
Sanskrit	—	Saśasruti
Malayālam	—	Muyalcevi
Tamil	—	Muyalcevi
Hindi	—	Kirankuri

Distribution and habitat

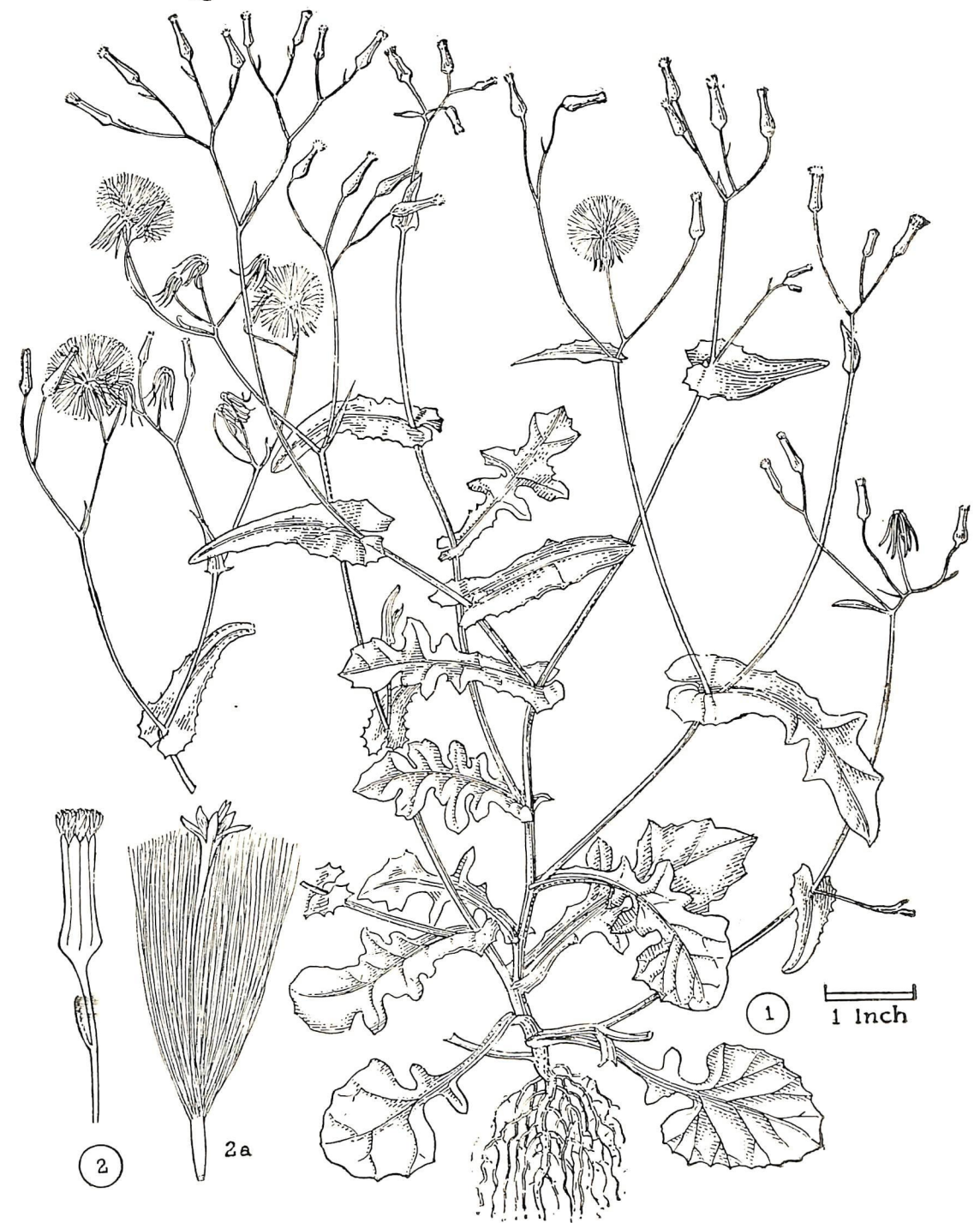
Common throughout India from Punjab and Bengal in the north, southwards through Konkan, Deccan, S. M. Country, Kerala and Madras to Cape Comorin. It is quite common in all districts of south India in the plains and up to an elevation of 1200 meters in the hills.

Habit and general features

Emilia sonchifolia D.C. is a glaucous nearly glabrous slender erect decumbent or straggling annual herb 30 to 60 cms. high with a variously branched soft fistulose stem, bearing both radical and cauline very variable leaves. The lower or radical leaves which are crowded at the base of the stem are petiolate entire, obovate and pinnatifid, while the cauline are mostly amplexicaul and auricled at base fewer and alternate and the uppermost often reduced or linear. Flowers all bisexual, discoid, purplish or red on terminal long peduncled, solitary or laxly corymbose homogamous heads about 12 mm. long (devoid of bracteoles beneath) with the involucre cylindric and composed of a single series of free or more or less cohering striate calycine bracts. Fruits subterete or five ribbed achenes copiously tufted with very slender soft white pappus hairs.

External morphology :

Stems and branches fistular. *Leaves* : variable, simple, alternate, up to 12 cms long, both radical as well as cauline, the lower or basal leaves petioled, obovate or lyrate pinnatifid with a large termi-

*Emilia sonchifolia* DC.

1. Entire plant

2. A head

2a. A floret

nal lobe, entire or toothed; the cauline mostly amplexicaul, acutely auricled, acute or less often obtuse at apex, and the uppermost ones still smaller or reduced, sometimes simply linear.

Heads few terminal homogamous, long peduncled, solitary or in loose lax corymbs without bracteoles beneath, about 12 mm. long. *Involucre* cylindric, somewhat swollen at base, composed of a single series of nearly glabrous to puberulous equal free or cohering greenish bracts that get reflexed in fruit. *Receptacle* - flat.

Flowers: all discoid (not rayed). bisexual, fertile and bracteate; *bracts* - about the same length as the calyx, linear oblong, acute with scarious margins. *Calyx* - modified to form a persistent pappus of very slender soft white hairs. *Corolla* - purplish or red gamopetalous, tubular, slender, elongate; its limb dilated and shortly fivefid or lobed. *Stamens* - five, filaments free epipetalous; *anthers* - syngeneceious; anther bases obtuse or very minutely tailed. *Ovary* inferior, unilocular with a single basal anatropous ovule; *style arms* subterete, the tips hairy short and obtuse or long and acute.

Fruits: narrowly oblong or subterete, five-ribbed brownish achenes about 3 mm. long, glabrous or slightly scabrid along the ribs and copiously tufted with a soft white minutely hairy pappus that nearly equals the involucral bracts.

Officinal part: The entire plant.

DŪRVĀ

Source plant : *Cynodon dactylon* Pers.

Family: Gramineae

Sanskrit text

Descriptive terms

नीलदूर्वा रुहाऽनन्ता भार्गवी शतपर्विका ।
शष्पं सहस्रवीर्या च शतवल्ली च कीर्तिता ॥ (भावप्रकाशः)

Niladūrvā ruhāsnantā bhārgavī śataparvikā |
Śaṣpam sahasravīryā ca śatavallī ca kīrttitā ||

(Bhāvaprakāśa)

Three varieties (*dūrvatrāyam*) namely *Niladūrvā*, *Svetadūrvā* and *Gandadūrvā* are mentioned in *Bhāva prakāśa*. The first namely *Niladūrvā* is *haritam* – greenish (dark or bluish green): *svetadūrvā* has *svetākāṇṭha* whitish stems and branches, *suparva* well formed or firm joints and is *durmara* never dying; *ganda dūrvā* is *granthila* i e. with nodulose stem and *rohat parva*.

The terms *dūrvā* and *ananta* mean growing indefinitely or extensively; *ruha* that which revives growth even after drying (drought-resistant) *śataparvika*, means with numerous joints or nodes; and *śatavalli* with numerous thin or wiry branches: *sahasravīrya* indicates that the herb has many potent virtues.

Properties and uses

नीलदूर्वा हिमा तिक्ता मधुरा तुवरा हरेत् ।
कफपित्तास्रवीर्यसर्पतृष्णादाहत्वगामयान् ॥ (भावप्रकाशः)

Niladūrvā himā tiktā madhurā tuvarā haret |
Kaphapittasravisarpatṛṣṇādāhatvagāmayān ||

(Bhāvaprakāśa)

दूर्वा ज्वरहरा व्रण्य रक्तपित्तविनाशिनी । (हृदयप्रियः)

Dūrvā jvaraharā varṇyā raktapittavināśinī |
(Hṛdayapriya)

दूर्वा शुक्ला तु गोलोमी शतवीर्या च कथ्यते ।
श्वेता दूर्वा कषाया स्यात्स्वाद्वी व्रण्य च जीवनी ॥
तिक्ता हिमा विसर्पा स्रुतपित्तकफदाहहृत् ।
गण्डदूर्वा तु गण्डाली मत्स्यक्षी शकुलाक्षकः
गण्डदूर्वा हिमालोहद्राविणी ग्राहिणी लघुः ॥
तिक्ता कषाया मधुरा वातकृत्कटुपाकिनी ।
दाहतृष्णावलासास्र कुष्ठपित्तज्वरापहा ॥

(भावप्रकाशः)

Dūrvā śuklā tu gōlōmī śata vīryā ca kathyatē |
Śvetā dūrvā kaṣāyā syātsvā dvi vṛṇyā ca jivani.
Tiktā himā visarpā sra tṛt pitta kapha dāha hṛt
Gaṇḍa dūrvā tu gaṇḍālī matsyākṣī śakulakṣakah
Gaṇḍa dūrvā himālōha drāvinī grāhinī laghu.
Tiktā kaṣāyā madhurā vātakṛt kaṭupākinī
Dāha tṛṣṇāvalāsāsra kuṣṭha pitta jvarāpahā.

(Bhāvaprakāśa)

The herb is used with benefit to remedy defects of *kapham*; *pittam* and *raktam*. It is cooling and has *kaṣāya tiktā* and *madhura-rasam*. It is beneficial in *dāham* (thirst, burning sensation) and *twagāmayam* (skin disease) and is considered a specific remedy in *nasagadaraktapittam* (epitaxis), *adhogaraktapittam* (Haematuria) and *vicarcika* (scabies).

CYNODON DACTYLON Pers.

Synonyms: *Cynodon erectus* Presl.; *C. filiformis* Voight.,
C. linearis Willd.; *C. maritimus* H.B. & K.;
Panicum dactylon Linn.

Family: Gramineae

Sanskrit — Dūrvā, Syāma, Vijaya

Malayālam — Karuka, Arukam pullu

Tamil — Arugampillu

Hindi — Dub. Dubra, Hariali, Kabbar

Distribution and habitat.

Distributed throughout India ascending to 1500 meters elevation in the Himalayas.

It is extensively used as fodder being highly nutritious. It is eminently suited for sand binding and turfmaking and on both these accounts it is quite often cultivated in large parks etc. for making lawns.

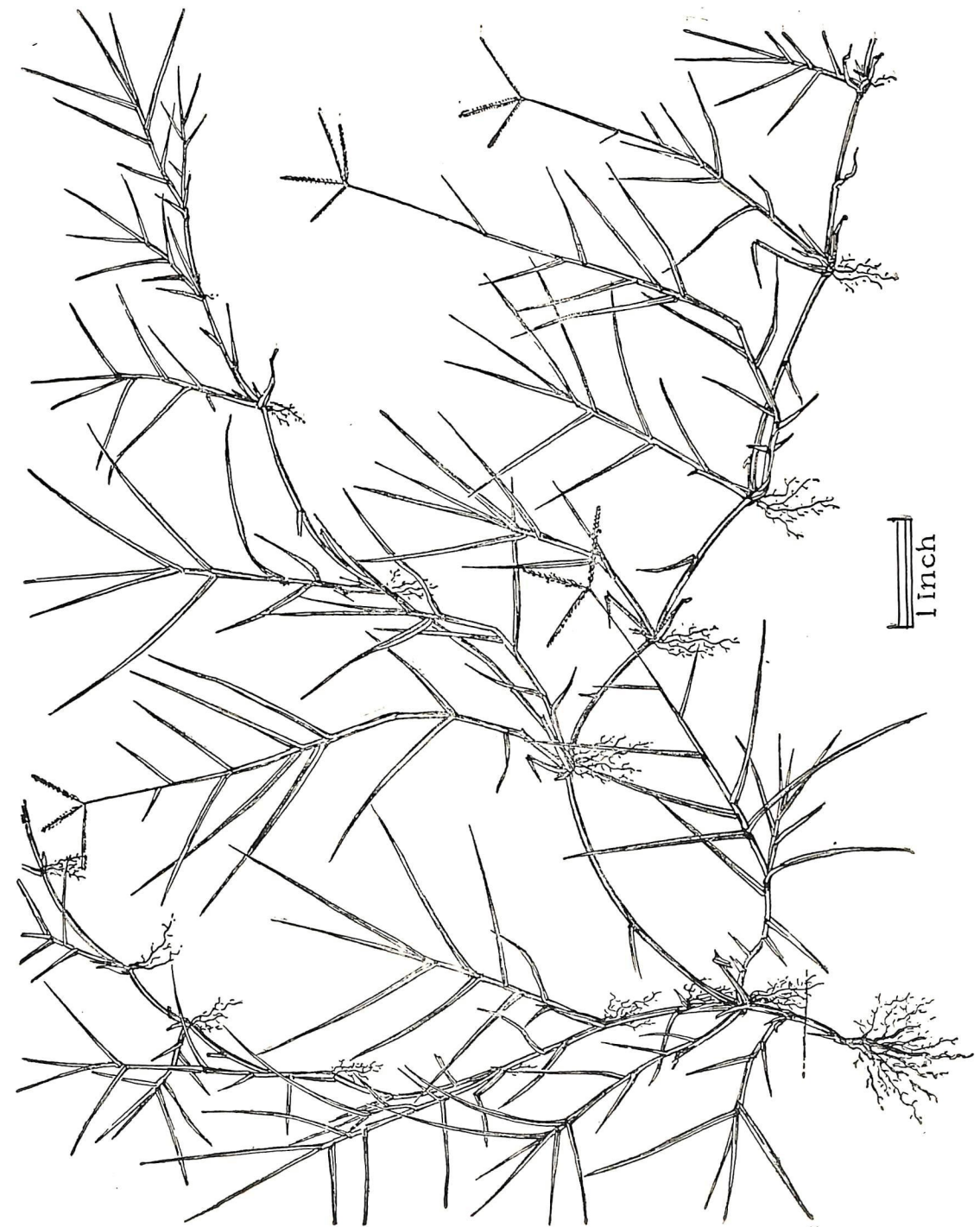
Habit and general features.

Cynodon dactylon Pers. is a perennial widely creeping glabrous grass with a highly branched and prostrate stem forming matted tufts rooting at every node and with short erect or ascending branches, bearing short, narrow flat subulate glaucous leaves and at the ends of simple peduncles 5 to 10 cms. long, three to six, digitate or radiating slender spikes 2.5 to 5 cms. long, of minute, 1-2 seriate unilateral one-flowered spikelets.

External morphology :

Stems slender, creeping, rooting at all the nodes forming matted tufts and producing from the nodes fascicles of slender erect, flowering as well as sterile branches 5 to 45 cms. high.

Leaves: simple, short or long, narrowly linear or lanceolate flat or complicate (folded upon itself) subulate, finely acute to pungent more or less soft, smooth, glaucous, usually arranged conspicuously two ranked on the barren shoots as well as the bases of the stems with



Cynodon dactylon Pers.

tight glabrous or hairy sheaths and with a very fine ciliate or hairy ligula at the rim. Lower leaves usually flat, the upper often complicate 1 to 11.5 cms. long and 1 to 3 mm. wide.

Inflorescence: of 3-7 fascicled more or less erect digitate or radiating green or purplish slender spikes 1.5 to 6 cms. long arranged at the top of a slender peduncle 5 to 10 cms. long. *Rachises* slender compressed or angled and scaberulous. *Spikelets* - all alike, sessile, minute laterally compressed, unilaterally arranged in two alternating imbricate series on the rachis of the spike. Each spikelet has its rachilla equalling half the length of the spikelet, very slender, disarticulating at the base and not produced beyond the lemma. It is 2 to 2.5 mm. long one flowered and composed of three glumes of which glumes 1 and 2 are empty thin ovate acute or mucronate keeled - the keels scabrid - , and persistent or separately deciduous. Lower glume 1 to 2 mm. long; glume 3 or *lemma* much larger or broader about 2 mm. long, obliquely oblong to semiovate, cymbiform, or boatshaped firmly membranous three nerved, awnless, its keel and margins scabrid, and with a 2-nerved or keeled palea as long as the lemma, both together enclosing a bisexual flower composed of the pistil, stamens and lodicules; *lodicules* 2, short, minute obovate cuneate glabrous, *stamens*-three with large anthers about one mm. long. *Ovary* glabrous with the styles distinct or free and slightly shorter than the plumose stigmas.

Fruit or grain-oblong, subterete, laterally compressed about one mm. long, free within the lemma and palea.

Official part - The entire plant or more often the terminal tender part of the branches with two or three leaves.

LAKṢMI (Lakṣmaṇa)*

Source plants in Kerala : *Ipomaea sepiaria* Koen.; and
I. obscura K. Gawl.

Family: Convolvulaceae.

Sanskrit text**Āyurvedic properties**

लक्ष्मीः पित्तहरा ज्ञेया वातश्लेष्मविवर्द्धिनी ।
 सौभाग्य गर्भजननी मदासक्ष्मीश्चतत् समाः
 गोक्षीरसदृशं पुष्पं रोमवल्लीसमन्वितम्
 रक्तबिन्दुसमं पत्रं लक्ष्मणाकारमुच्यते ॥

Lakṣmī pittaharā jneyā vāta śleṣma vivarddhinī
 Sowbhāgya garbha jananī mahālakṣmīścatat samāḥ
 Gokṣīrasadṛśam puṣpam romavallī samanvitam
 Raktabindu samam patram lakṣmanākāramucyate ॥

* Authorities differ in equating the botanical source of *Lakṣmī (Lakṣmaṇa)*, probably because this term occurs also as a synonym of other drugs such as *Ṛddhi*, *Vṛddhi*, *Priyangu*, *Haridra* etc.

In Kerala *Lakṣmaṇa* is equated with *Ipomaea sepiaria* as well as *I. obscura* (see page 57 of Number 3 of the Pharmacognosy of Ayurvedic Drugs (1957). Other plants equated with *Lakṣmaṇa (Lakṣmī)* are *Ionidium suffruticosum* belonging to Violaceae; known as *Orilatamra* in Malayalam and the "white" variety of *Ocimum sanctum*.

INDRAVALLĪ

Source plant: *Cardiospermum halicacabum* Linn.*

Family: Sapindaceae.

Sanskrit text**Properties and uses.**

इन्द्रवल्ली ज्वहरा वातघ्नी वृद्धिनाशिनी । (हृदयप्रिया)

Indravallī jvaraharā vātaghñī vṛddhināśinī | (Hṛdayapriya)

It is useful in fevers and *vṛddhi* or scrotal swelling. It is used as one of the ingredients for preparing a medicated oil for the hair. It is also useful for sprains, asthma and diseases of the nerves.

Official part: The entire plant as well as the different parts separately.

CARDIOSPERMUM HALICACABUM Linn.

Synonym: *C. microcarpum* H.B.K.

Family: Sapindaceae.

Sanskrit	—	Jyotiṣmati,* Karavi, Karnaspota Parvatapadi Tejovati
Malayālam	—	Uzhinja, Palloolavam.
Tamil	—	Modakkittan, Modikottan, Modokottan.
Hindi	—	Khanaphata Kapal-phodi
Bengali	—	Laraphatkari or Lalaphatkari Latāpha- tkīri, Nayāphatki.

Distribution and habitat.

Throughout India: N. Circars. Carnatic, the Coromandel and West Coast. It is a very common plant of waste places found scrambling over hedges etc. or occasionally spreading on the ground.

The plant is in flower nearly throughout the year.

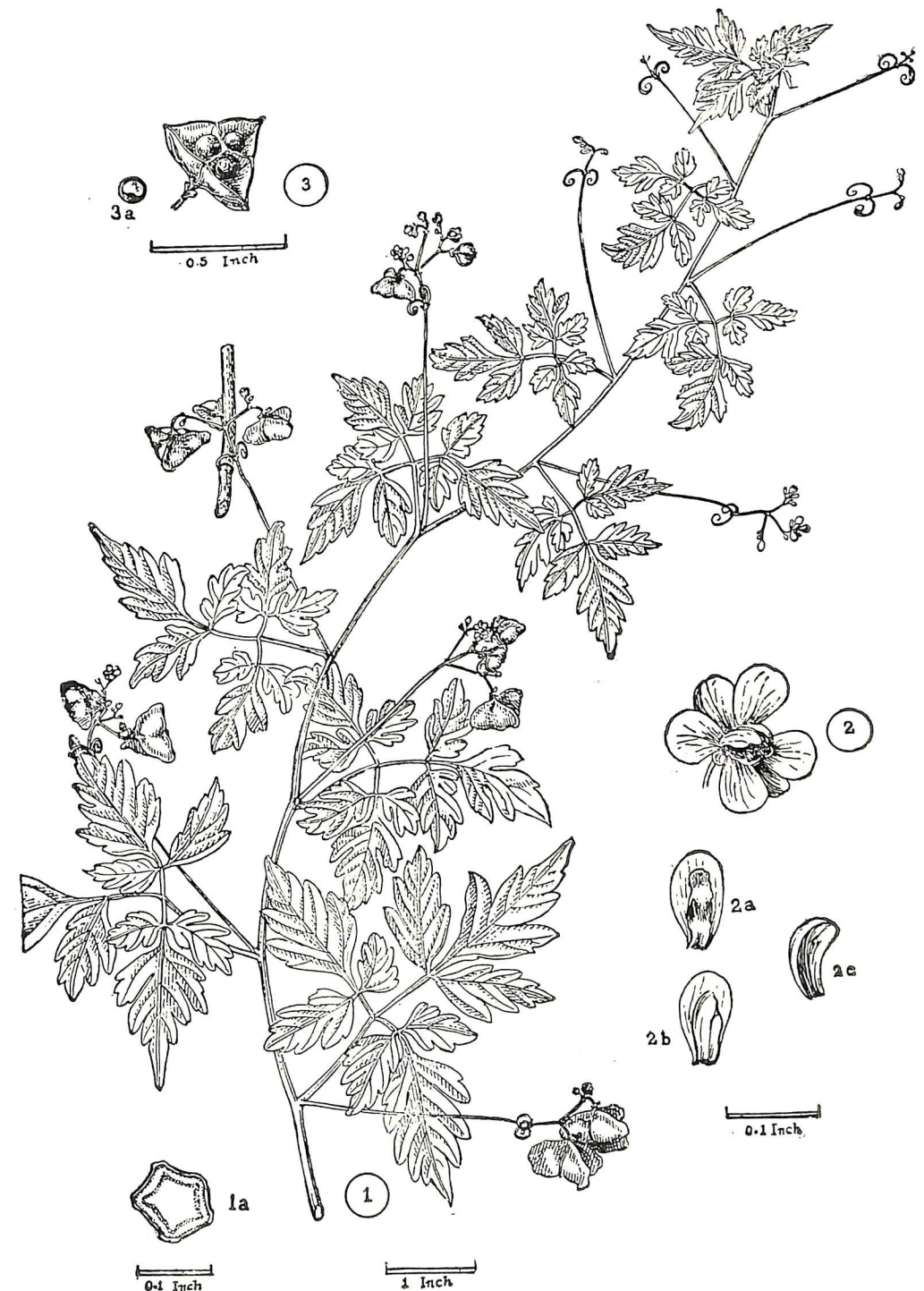
Habit and general features:

Cardiospermum halicacabum Linn. is a nearly glabrous to thinly pubescent annual or occasionally perennial scrambling shrub climbing by means of tendrillar hooks with a short stem and numerous strong wiry furrowed branches bearing ternately bicompond leaves and at the ends of long, thin but wiry, axillary peduncles small greenish white flowers and broadly pyriform trigonous membranous inflated capsules containing two or three globose blackish seeds each with a conspicuous heartshaped whitish hilum. The tendrillar hooks are very slender but woody, or wiry, coiled like the hairspring of a watch and occur in pairs in the axils of small bracts one slightly below the other, at the distal ends of the peduncles just below the flowers.

External morphology.

Leaves: alternate, exstipulate, long stalked, biternate, deltoid to broadly ovate in outline 4 to 7.5 cms. either way. *Leaflets* — short-

**Jyotiṣmati* is also equated with *Celastrus paniculatus*. According to certain authorities *Jyotiṣmati* and *Tejovati* are different plants.



Cardiospermum halicacabum Linn

- | | |
|-----------------------|---------------------|
| 1. A branch | 3. C. S. of a fruit |
| 1a. T. S. of the stem | 3a. Seed |
| 2a. Petals | 2c. A sepal |

stalked or sessile, oblong, thin and flaccid, nearly glabrous, and pale green above, deeply and coarsely serrate or dentate, narrowed at base and very acute or acuminate at apex. *Petiole* - 5 to 7.5 cms. long, longitudinally furrowed, spreading or finally deflexed. *Inflorescence* : axillary, bearing small corymbiform cymes of few crowded flowers at the end of a long slender but wiry, stiff, naked, horizontal or oblique peduncle and provided with two nearly opposite reflexed coiled springy tendrillar hooks just below the flowers.

Flowers : small, 3 to 4 mm. across, white, or greenish-white short-stalked, irregular, polygamo - dioecious, hypogynous. *Sepals* : four greenish rounded, or oblong, concave the outer pair smaller, the inner larger nearly double. *Corolla* - of four free rounded or oblong whitish petals slightly tapering towards the base, each about as long as the inner pair of sepals. The upper or posterior pair is slightly larger and partially adnate to the sepals and each of them is provided with an emarginate supra-basal petaloid scale: the lower pair is smaller, and more distant from the stamens, each furnished with a small glandular yellow crested scale or appendage inflexed beneath the apex. There is also present opposite the lower petals a unilateral disk in the form of two rounded glands. *Stamens* - eight, excentric; the filaments unequal, free or partially connate below, the anterior four or those nearest the pair of glands being shorter than the other four. Pistil-tricarpellary, syncarpous. *Ovary* superior, three angular, three chambered containing one ascending ovule in each chamber; *style* : very short, threefid with the stigmatic surface on the inner face of the segments.

Fruits : Short stalked, inflated or bladder like, broadly pyriform, trigonous or slightly winged, three chambered, loculicidally three valved capsules 12 mm. to nearly 18 mm. long, truncate or slightly depressed at the top and tapering towards the base, with the pericarp or valves of fruit very thin or membranous dry or papery, strongly reticulate or veiny and finely pubescent. *Seeds* - nonendospermic, globose 3 to 4 mm. in diameter, black with a large white, two lobed heartshaped conspicuous white hilum at base; testa crustaceous. Embryo with large transversely conduplicate cotyledons.

Parts used. The leaves, seeds, root, as well as the plant as a whole.



BHADRĀ*

Source plant: *Aerva lanata* Juss.

Family: *Amarantaceae*.

Sanskrit Text

रक्तपित्तहरी शीता भद्रा कृच्छ्रप्रमेहजित्

(हृदयप्रियः)

Raktapittaharī śītā bhadrā kṛcchrapramehajit
(Hṛdayapriya)

The whole herb is used in medicine. It is considered *s'itavīryam*. It is used in *raktapittam* (haematemesis) and diabetes. It effectively helps to arrest bleeding or haemorrhage associated with pregnancy. It is an effective diuretic (*mutrala*) and used with benefit for certain diseases such as lithiasis (*astmabayda*). The roots are considered demulcent. They are used in the treatment of headache and strangury.

* *Bhadra* occurs also as a synonym of a few other drugs namely *Ananta*, *Aparājita*, *Kṛṣṇa*, *Jivanti*, *Nīlī* and *Rāsna*. In Kerala *Bhadra* is equated with *Aerva lanata*. *Aerva tomentosa* Forsk. is occasionally used as a substitute.

*Aerva lanata* Juss.

1. The entire plant

2. A portion of the branch with the inflorescence

1a. A branch

2a. A flower.

AERVA LANATA Juss.*

Synonyms	<i>Aerva floribunda</i> Wight. <i>Achyranthus villosa</i> Forsk. <i>A. lanata</i> Linn.
Family :	Amarantaceae.
Sanskrit	- Bhadram, Astmabayda.
Malayālam	- Scherubula, Cerupila, Velipoo.
Tamil	- Pulai, Cirupulai, Pilai, Sirupilai.
Hindi	- Chaya,
Telugu	- Kaminpulai, Nilapulai.

Distribution and habitat.

A very common almost perennial weed found in all plains districts and up to about 900 metres elevation in the hills. Recorded as occurring in Bengal Bihar and westwards to the Indus; the Konkans, Central India and throughout Deccan and S. India. Flowering all the year round.

Habit and general features.

Aerva lanata Juss. is a ramous many branched hardy erect or occasionally prostrate woody herb or undershrub from 30 to 60 cms. high, the main stem short but stout and woody at base from which arise six to ten or more elongate cylindric ascending or prostrate more or less cottony hairy to wooly branches bearing small alternate short petioled entire, nearly orbicular or obovate pubescent leaves 8 to 18 mm. long and numerous minute hoary—white sessile flowers on short sessile densely wooly axillary spikes 6 to 24 mm. in length.

External morphology.

Leaves: simple, alternate, exstipulate, short-petioled, the *petiole* thinly coriaceous, entire, orbicular or orbicular-obovate to orbicular elliptic, tapering towards the base, obtuse or acute, mucronate, wooly or glabrate or finely hairy pubescent above and white wooly beneath,

* *Aerva lanata* Juss. is one of the dasapuspam (or ten flowers) *Aerva javanica* w is also occasionally used in the same category.



the basal leaves from 1.2 to 2.5 cms. long while those in the branches subtending the spicate inflorescence are often considerably smaller. *Inflorescence*:—spicate; axillary, sessile, oblong to subcylindric, small or short, 6 to 18 mm. long, densely softly wooly, solitary or biternate or occasionally several and then forming subglobose clusters bearing numerous minute flowers. *Flowers*: minute, sessile, bisexual monochlamydeous, greenish or hoary-white often clustered, under 1.3 mm. long, with one bract and two apiculate bracteoles, both smaller than the flowers. *Perianth*—calycine, membranous, of five free keeled segments (sepals) about twice as long as the bracteoles, with membranous margins and covered outside with long white wooly hairs, quincuncial in bud, the two outer lanceolate with whitish nerves, the inner ones subspathulate and greenish veined; all persistent. *Androecium*—stamens five, filaments subulate, connate at base with alternating or interposed linear staminodes, the whole forming a short hypogynous cup; *anthers*—two-celled. *Gynoecium*—superior; Ovary ovoid or subglobose, unilocular with one solitary ovule pendulous from a long basal funicle; *style*; simple; *stigma* capitellate or bifid.

Fruit: a greenish, roundish, compressed membranous, utricle or circumscissile capsule with a coriaceous upper part or lid and containing a single seed. *Seed*—reniform, inverse, with smooth, shining black coriaceous testa and floury endosperm. *Embryo* annular with linear cotyledons and a superior radicle, surrounding the floury albumen.

Parts used. The leaves and or most often the entire plant.

LAJJALU

Source plant: *Biophytum sensitivum* DC*
and other species like *B. reinwardtii* Edgew & Hk. f.

Family: Geraniaceae — Oxalideae

Sanskrit text:

Descriptive synonyms.

लज्जालुः स्याच्छमीपत्रा समङ्गाञ्जलिकारिका ।

रक्तपादी नमस्कारी स्पर्शसङ्कोचपर्णिका ॥

(भावप्रकाशः)

Lajjāluḥ syācchmīpatra samāṅgāñjalikārikā ।

Raktapādī namaskārī spars'asañkocaparnikā ॥

(Bhāvaprakāśa)

Lajjālu means bashful, *sañkoca* may indicate the characteristic manner of the folding of the leaflets as if to cover nudity. *Samaṅga* with parts or organs all round - or may mean symmetrical. *Añjalikārikā* - folding hands (leaves or leaflets) as if for praying. (This is what we see in *Desmodium gyrans* which is also equated as *Añjalikarika*). *Namaskārī*—leaves folding as if prostrating (in *Mimosa pudica*). *Raktapādī*—with reddish roots. *Sparsa sankoca' parnika* closing, shrinking or contracting on touching (may refer to both *Mimosa pudica* and *Biophytum*).

* According to some authorities *Mimosa pudica* (Mimosoideae) is considered as the botanical source. The term *Lajjālu* is more correctly applicable to *Biophytum* in the light of the term *sañkocapatrika*. *Desmodium gyrans* the telegraph plant is equated as *Añjalikarika* in some books.

Properties and uses

लज्जालुवैपरीत्यान्या अल्पक्षुपवृहदला ।

वैपरीत्या तु लज्जालुर्ह्यभिधाने प्रयोजयेत् ॥ (राजनिघण्टुः)

Lajjalurvaiparityānyā alpakṣupabṛhaddalā |

Vaiparityā tu lajjalurhyabhidhāne prayojayet ||

(Rājanighaṇṭu)

लज्जालुः शीतला तिक्ता कषाया कफपित्तजित् ।

रक्तपित्तमतीसारं योनिरोगान् विनाशयेत् ॥ (भावप्रकाशः)

Lajjaluh sītālā tiktā kaṣāyā kaphapittajit |

Raktapittamatisāram yonirogān vināśayet ||

(Bhāvaprakāśh)

रक्तपादी कटुः शीता पित्तातीसारनाशनी ।

शोफदाहश्रमश्वासव्रणकुष्ठकफासनुत् ॥ (धन्वन्तरिनिघण्टुः)

Raktapādī kaduḥ sītā pittātīśāranāśanī |

Śophadahāśramasvāsavraṇakuṣṭhakaphāsanut ||

(Dhanvantari nighaṇṭu)

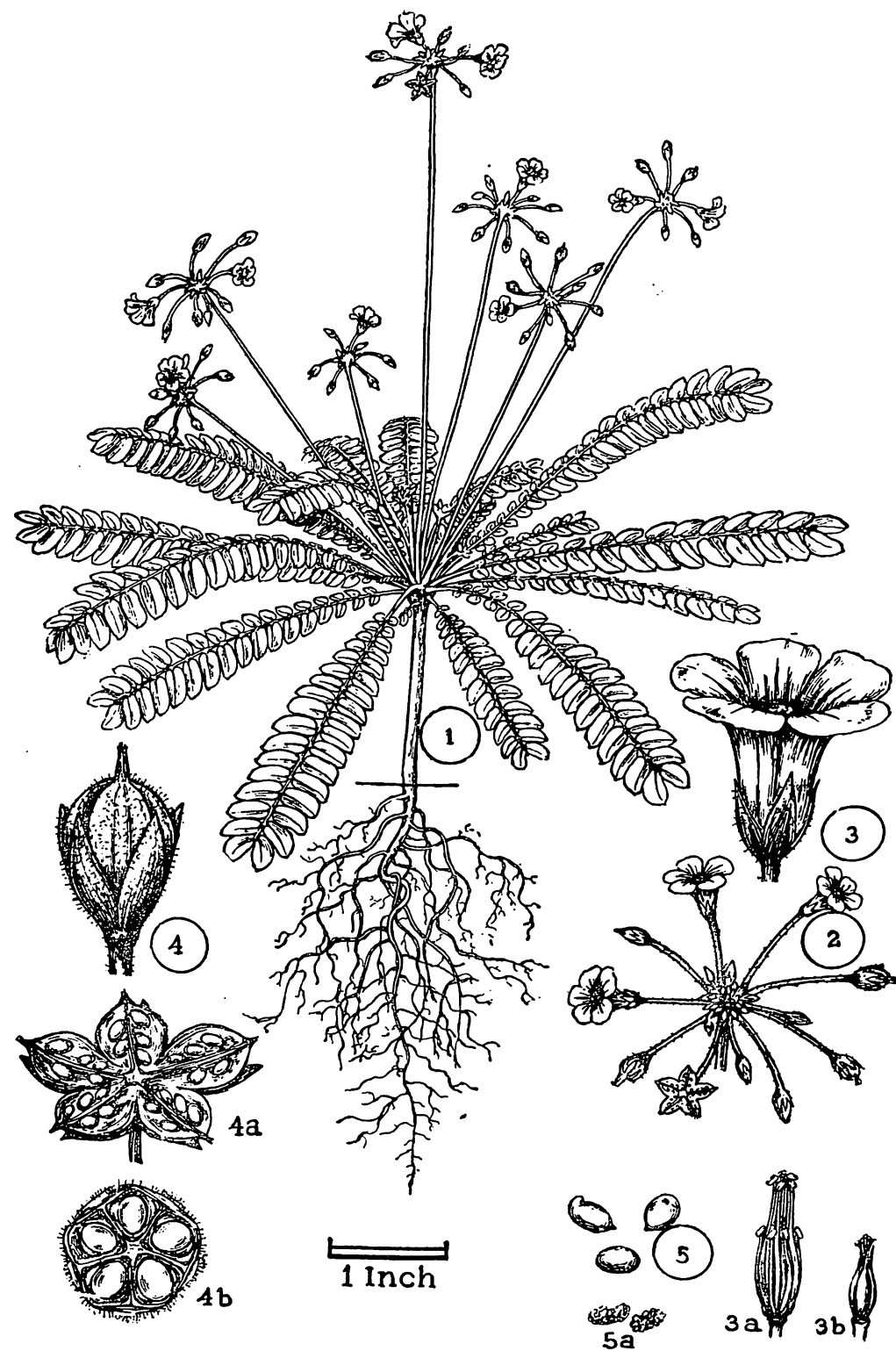
स्पर्शसहा व्रणहरा शुक्लस्रावविनाशिनी ।

(हृदयप्रियः)

Sparsāsahā vraṇaharā śuklasrāva vināśinī | (Hṛdayapriya)

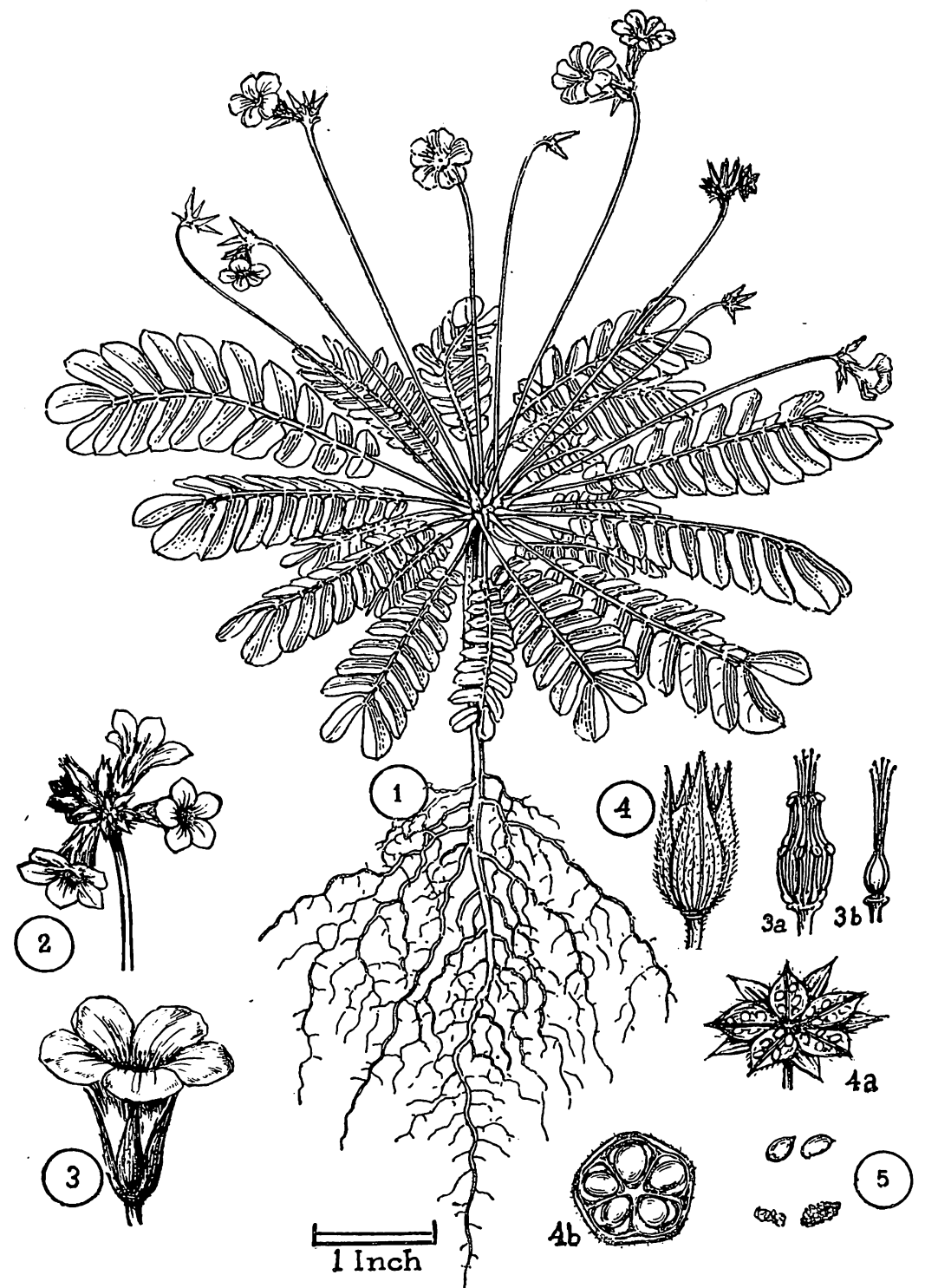
This is *sītavīryam*, and *tiktakaṣāyārasam*. It reduces *kapham* and *pittam*. It is beneficial in *raktapittam*, *atisaram yonirogam* (diseases of the female genital organ) *vranam* (ulcer) and *kushtam* (leprous types). It is considered an effective remedy for snake poison.

Parts used: The whole plant.



Biophytum reinwardtii Edgw. & Hk. f.

- | | |
|---|------------------------------------|
| 1. Entire plant. | 4. A fruit. |
| 2. An umbel. | 4a. Fruit dehiscent. |
| 3. A flower. | 4b. C. S. of a fruit. |
| 3a. A flower without the sepals & petals. | 5. Seeds |
| 3b. Pistil. | 5a. Seed and the membraneous aril. |



Biophytum sensitivum DC.

- | | | |
|---|----------------------|-------------------------------|
| 1. Entire plant. | 2. An umbel. | 3. A flower |
| 3a. A flower without the sepals and petals. | 3b. Pistil | |
| 4. A fruit. | 4a. Fruit dehiscent. | 4b. Cross section of a fruit. |
| 5. Seeds. | | |

BIOPHYTUM SENSITIVUM DC.

Synonym :	<i>Oxalis sensitiva</i> L. (Willd.)
Family :	Geraniaceae (Oxalideae)
Sanskrit -	Lajjālu
Malayālam -	Mukkutti, Tindanāzhi, Toddavādi
Tamil -	Tindanāzhi
Hindi -	Lakehana

Distribution and habitat.

The plant is found throughout the hotter parts of India—ascending to 1800 metres elevation in the Himalayas,—Bengal, Konkan, Deccan, Circars, Carnatic, East and West coast districts. It is common in somewhat shady moist places, roadsides, riverbanks as well as on cultivated ground.

Habit and general features :

Biophytum sensitivum DC. is an annual or occasionally perennial herb with a usually simple or sometimes sparingly branched short or long slender or robust hispidly pubescent stem bearing a crown of small abruptly pinnate crowded sensitive leaves at the end of the main stem or its branches and fairly long peduncled umbellate cymes of small pretty yellow flowers and very small ovoid or oblong capsular fruits enclosing many very small seeds that are enclosed by turgid white membranous arils by the sudden splitting eversion and crumpling of which the latter are shot out. The plant is in flower throughout the year.

External morphology.

Stem - mostly simple, very rarely branched.

Leaves - alternate, very closely crowded into a rosette at the top of the main stem or its branches, 3.8 to about 10 cms. long, abruptly pinnate, short-stalked; the *rachis* - slender, glabrous, hispidulous or merely ciliate; *leaflets* - subsessile, many, 6 to 15 pairs, opposite very variable in size and to some extent in shape, even on the same leaf; the terminal pair the largest, the pairs getting smaller towards the base, less than 6 to 12 mm.

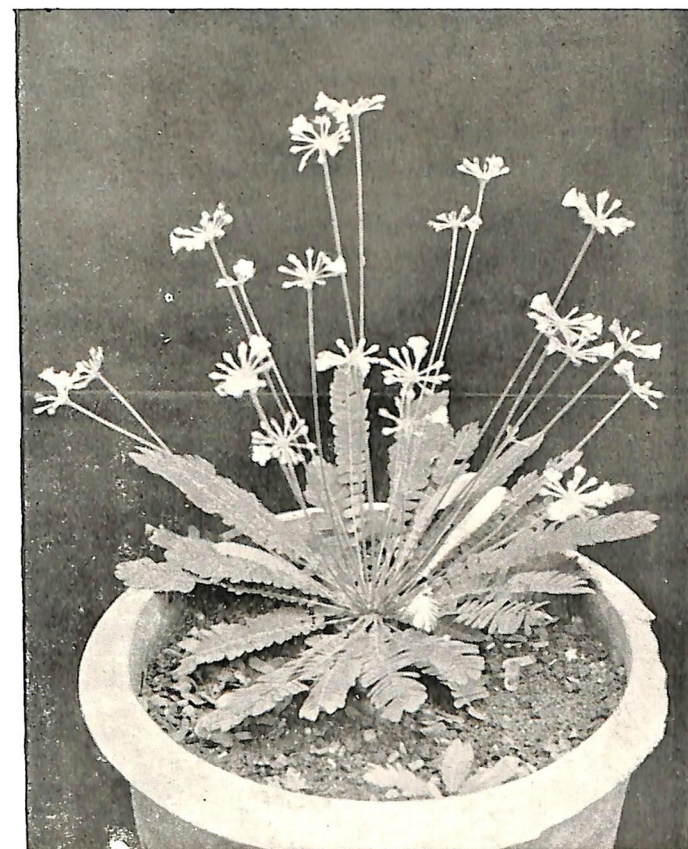
in length, oblong, obovate, nearly glabrous or with few scattered hairs, paler beneath, obliquely rounded and apiculate at the apex, most often arched a little upwards, all or at least the terminal leaflets oblique at base with many rather thick oblique and often waved or irregular main as well as secondary nerves.

Peduncles long, terminal or axillary many, of various lengths from 2.5 to 10 cms. long, hispid pubescent or glabrous often swollen at the top from where the flowers arise.

Flowers: small, dimorphic, about 8 mm. wide when open, pretty, yellow or rarely rose, purple, or whitish, in small umbells or umbellate cymes subtended by rigid lanceolate setaceous persistent bracts that occur crowded beneath the flowers. *Pedicels* - very short or absent, when present usually shorter than or rarely equalling the sepals. *Sepals* - five, rigid subulate or lanceolate, acute or acuminate, grooved with parallel nerves, glandular and hispid. *Petals* - five generally about twice as long as the sepals, yellow or rarely purple rose or whitish, rounded spreading and laterally cohering to form a salver-shaped corolla. *Stamens*: ten, distinct, filaments free, the five inner ones longer and alternating with the five shorter outer ones. *Pistil* - five carpellary syncarpous; *ovary* - five chambered, with many ovules in each locule on axile placenta; *styles* - five, nearly glabrous ending in notched or bifid stigmas.

Fruit: A small, elliptic, apiculate, shining loculicidal capsule slightly exceeding the sepals dehiscing into five spreading valves and enclosing few to several seeds. *Seeds* - minute, with fleshy albumin; ovoid acute with many prominent transverse oblique acute or obtuse striations or ridges. Each seed is completely enclosed when mature by a translucent white membranous aril or outer coat which on exposure to air dries, splits, everts elastically and crumples, as a result of which the seed is shot out to a considerable distance as from a catapult.

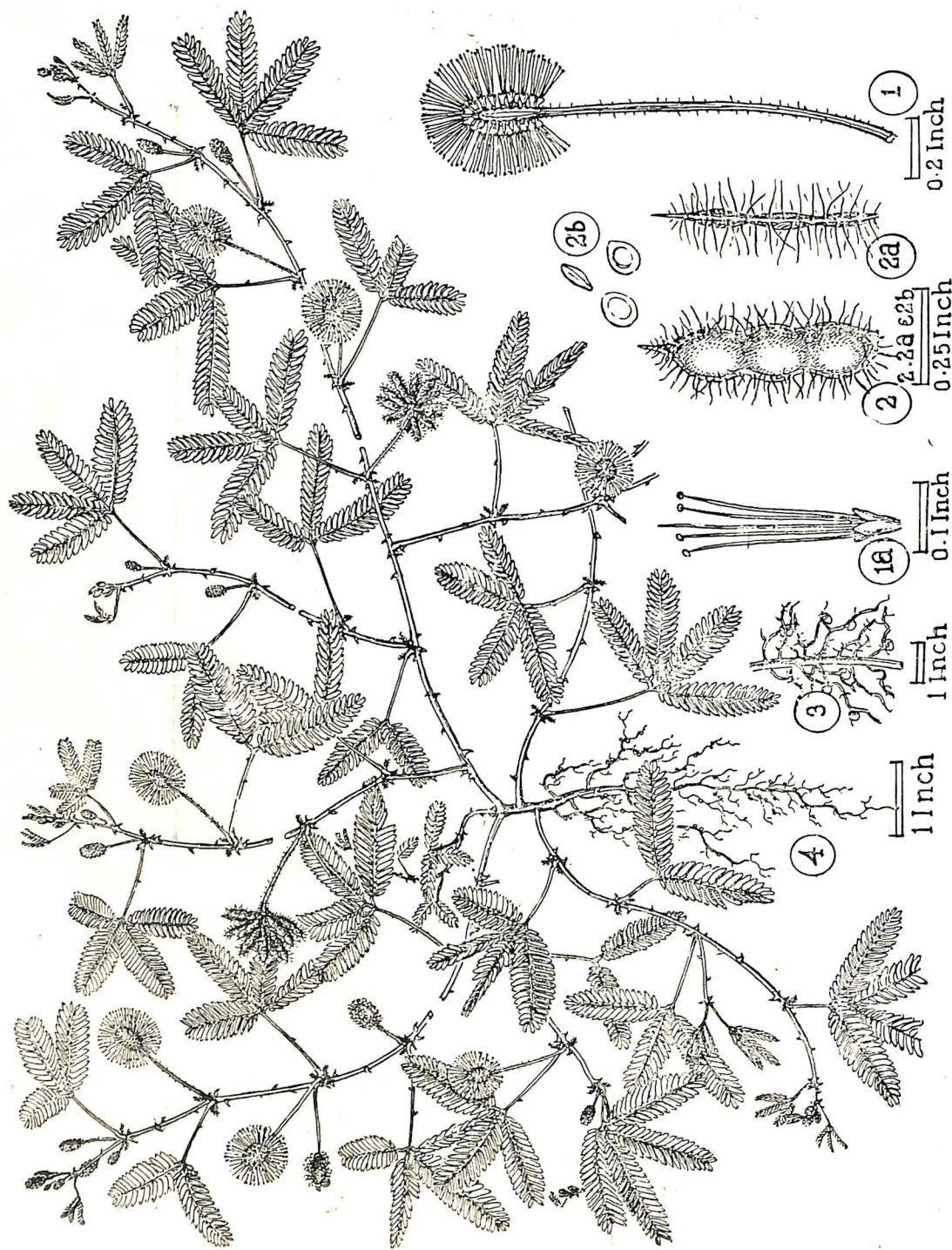
Biophytum reinwardtii Edgw & Hook f.



Scale $\frac{1}{3}$

Biophytum reinwardtii Edgw & Hookf. differs from *B. sensitivum* chiefly in the number of leaflets which are more (many) in number 10 to 20 pairs and the long- pedicellate nature of the flowers. It can be easily distinguished from the latter by its strikingly graceful habit, smaller flowers on longer slender pedicels and by the capsule nearly equalling the sepals in length.

The plant as a whole is used in medicine.

*Mimosa pudica* Linn.

1. L.S. of an inflorescence
 2a. Side and edge views of fruit
 2b. Seeds
 3. Part of a rootlet with root nodules.
 4. The plant

MIMOSA PUDICA Linn.*

Family: Leguminosae — Mimosoideae

Sanskrit	...	Khadiri, Anjalikārika Lajjālu
Malayālam	...	Tottālvādi, Tottāvādi
Tamil	...	Tottālvādi
Hindi	...	Lajwati

Distribution and habitat.

The plant though supposed to be indigenous to tropical America (Brazil), has become more or less naturalised throughout the hotter parts of India in the plains districts. It grows under most types of soil conditions but best in the hot moist soil of the garden and waste lands in the low country. The plant is a very troublesome weed as it spreads very fast and is difficult to eradicate or weed out.

The leaves are considered a good feed for sheep.

Habit and general features

Mimosa pudica Linn. is a diffuse, widely spreading or occasionally slightly scandent sparsely prickly, trailing or suffruticose perennial herb or undershrub, growing 40 to 90 cms. high, with a very short stem and several radiate spreading sparingly to densely prickly branches 30 to 100 cms. long, bearing alternate stipulate very sensitive digitate leaves having 1 or 2 pairs of sessile pinna carrying 10 to 20 pairs of leaflets, and axillary peduncled globose heads of small pinkish flowers followed by clusters of jointed bristly 2 to 6 seeded pods or lomenta.

The plant has an acrid and pungent taste.

External morphology.

Stem and branches: Stem very short, branches often very long, reaching one metre or more in length, sparingly or sometimes

* This plant also is found equated as *Lajjālu* in some books on Indian Materia Medica and by some authorities. But from the way in which the leaflets fold (as if in worship or prayer) which is just the opposite way of that of the leaflets of *Biophytum* which fold downwards as if to cover or mask (nakedness) the name *Lajjālu* is more apt for *Biophytum sensitivum* and other species of *Biophytum*.

densely prickly, the prickles hard and also clothed with long weak bulbous based deflexed bristles.

Leaves: alternate, petiolate, the *petioles* 2.5 to 4 cms. long, and bristly; stipulate, the *stipules* – about 8 mm long, linear lanceolate, acute and bristly; digitately compound, having one or two pairs of sessile pinnae 5 to 8 cms. long at the end of the petiole and beset or clothed with ascending bristles; stipellate, the *stipels* small, generally two to each pinnae: *leaflets* 10 to 20 pairs, small, very sensitive to touch and folding obliquely upwards, each 6 to 8 mm. long and 4 mm. broad, sessile, obliquely narrow or linear-oblong, obliquely rounded at base, acute, subcoriaceous, nearly glabrous on the upper side and clothed with appressed bristles on the lower side deciduous.

Inflorescence:— dense flowered axillary peduncled heads 6 to 8 mm. in diameter in bud and 2 cms. when the flowers are open; the peduncles slender 2 to 2.5 cms. long, beset with spreading bristles and arising often in pairs throughout the branch.

Flowers – small, sessile, polygamous, regular, pinkish, bracteolate; *bracteole* – solitary, linear, acute, ciliolate; *calyx* – very minute almost inconspicuous so that some consider that there is no calyx; *corolla* – pinkish, 2 to 2.5 mm. in length, divided less than half way down, or about 1/3 into 4 ovate oblong obtuse lobes which are valvate in bud; *stamens* – 4, filaments free, rose coloured much exerted bearing small (not glanderested) anthers; *pistil* – monocarpellary; *ovary* – superior, sessile or short – stalked, oblong, unilocular containing many ovules, *style* filiform, resembling in size form and colour the filament and ending in a small terminal stigma.

Fruit: A slightly recurved flattened jointed pod or lomentum, half to two cms. long and about 2 or 3 mm. broad, having 2 to 5 or 6 oneseeded indehiscent segments that when ripe individually separate and fall away from the persistent sutures which are clothed with yellowish spreading bristles about 3 mm. long, the rest of the pod being glabrous.

The roots of the plant are somewhat fibrous and abound in root nodules of various sizes and shapes. The roots contain 10% of tannin which with salts of iron form a good black ink.

The plant as a whole is used in medicine.

LĀNGALI

Source plant: – *Gloriosa superba* Linn.

Family: – Liliaceae

Sanskrit Text:

Descriptive synonyms

कलिकारी लाङ्गलिकी दीप्ता च गर्भघातिनी ।

अग्निजिह्वा वह्निशिखा वह्निवक्त्रा च लाङ्गुली ॥ (शालिग्रामनिघण्टुः)

Kalikārī lāṅgalikī dīptā ca garbhaghātini

Agnijihvā vahnisikhā vahnivaktrā ca lāṅguli

(S'aligrāmanighaṇṭuḥ)

स्याल्लाङ्गलिक्यग्निशिखा..... ।

(अमरकोशः)

Syallāṅgalikyagnisikhā.....

(Amarakośah)

Properties and uses

कलिकारी सारा तीक्ष्णा कुष्ठदुष्टव्रणापहा । (विकारतिमिरभास्करः)

Kalikārī sarā tīkṣṇā kuṣṭhaduṣṭavṛṇāpahā

(Vikāratimirabhāskaraḥ)

कलिकारी सारा कुष्ठशोफार्शो व्रणशूलजित् ।

सक्षारः श्लेष्मजित्तिक्ताः कटुकातुवरापि च ॥

तीक्ष्णोष्णाकृमिहलध्वी पित्तला गर्भघातिनी ।

(भावप्रकाशः)

Kalikārī sarā kuṣṭhas'ophāro vṛṇasūlajit

Sakṣarāḥ śleṣmajittiktā katukā tuvarāpica

Tīkṣṇoṣṇā kṛmihlaghvī pittalā garbhaghātini

(Bhāvaprakāśah)

*The botanical source of *Lāṅgali* or *Kalikārī* (*Karihari*) in Kerala as in other parts of India is *Gloriosa superba* Linn. According to Abhinava bhooti darpana a Hindi publication *Hydrolea zeylanica* Vahl. (Hydrophyllaceae) is also considered a source plant by some authorities. The same publication indicates *Costus speciosus* also as *Kalihari*. It is quite doubtful whether the latter two can be equated with *Lāṅgali*.

कलिकारी सरा तीक्ष्णा गर्भशल्यव्रणापहा ।

शुष्कगर्भञ्च गर्भञ्च पातयेत्पमात्रतः ॥ (सोढलनिघण्टुः)

Kalikāri sarā tikṣṇā garbhasalyavranāpahā

S'uṣkagarbhañca garbhañca pātayellepamātrataḥ

(Soḍalanighaṇṭuḥ)

कलिकारी सरा तिक्ता कट्वी पट्वी च पित्तला ।

तीक्ष्णोष्णा तुवरा लघ्वी कफवातकृमिप्रणुत् ॥

वस्तिशूलं विषञ्चार्शः कुष्ठकण्डूव्रणं तथा ।

शोषं शोथञ्च शूलञ्च नाशयेदिति कीर्त्तिता ॥ (निघण्टुरत्नाकरः)

Kalikāri sarā tiktā katvī patvī ca pittalā

Tikṣoṣṇā tuvara laghvī kaphavātakṛmipraṇut

Vastisūlam viṣaṇcārśaḥ kuṣṭhakandūvraṇaṁ tathā

Śoṣaṁ sothañca sūlañca naśayediti kīrtitā ॥

(Nighaṇṭuratnakaraḥ)

Some of the special uses

पाठालांगलिसिंहास्यमयूरकजटैः पृथक् ।

नाभिवस्तिभगालेपात् सुखं नारी प्रसूयते ॥ (चक्रदत्तः)

Pathālāṅgalisimhāsyamayūrakajātaiḥ pṛthak

Nābhivastibhagālepāt sukhaṁ nārī prasuyate ॥

(Cakradattah)

मूलेन लांगलिक्याः संलिप्त्वा पाणिपादे च ।

अपरापातनं मद्यैः पिप्पल्यादिरजः पिबेत् ॥ (चक्रदत्तः)

Mūlena lāṅgalikyāḥ saṁliptvā paṇipāde ca

Aparāpātanaṁ madyaiḥ pippalyādirrajaḥ pibet ॥

(Cakradattah)

Meaning of descriptive terms

Lāṅgaliki

- similar in form to a *lāṅgali* or plough. The root-stock is bent like an inverted plough with a long and a short arm. (Just like the plough tilling and overturning the soil the drug has the property of ejecting or bringing out the foetus in the womb.)

Kalikāri

- The term *kali* has the same meaning as *lāṅgali* and conveys the same idea namely forcibly causing the expulsion from the womb of the foetus, which is a detestable action.

The terms *Agnis'ikhā*, *Agnijihvā*, *Vahnis'ikhā* and *Vahnivaktrā* - most probably refer to the reddish flame coloured flowers which are formed at the tips of the shoots. The terms may also indicate its property of being hot in action.

Garbhaghātini

- Destroyer of pregnancy, an important property of the drug.

Properties and uses.

Lāṅgali is bitter, pungent and astringent in taste. It is alkaline, light, hot, sharp and germicidal. It induces abortion or expels the foetus from the womb. It cures leprosy or dermatosis of any kind, swelling, piles, chronic ulcers, colic pains in the bladder, toxicosis, consumption and itching. Its tuber is considered to be one of the seven minor poisons.

Some of the special uses.

The paste of the *Lāṅgali* root-stock is applied to the navel-supra pubic region and vagina for easy delivery.

Its paste applied on the hands and feet and the powder of long pepper taken in with toddy, helps to expel the placenta after delivery.

GLORIOSA SUPERBA Linn.

Family : Liliaceae

Sanskrit — Lāngali, Agnisikha, Haripriya,
Uthemaramani

Malayalam — Mentonni, Kalappa-kizhangu

Tamil — Kalappa-kilangu, Kannuvelli

Hindi — Karihari, Kariari

Distribution and habitat

The plant is distributed throughout tropical India from sea level to about 2000 metres elevation. It grows under a variety of soil conditions but is specially common in moist sandy soil. It is not usually cultivated but is worth doing so for its medicinal uses as well as for the beauty of its flowers.

Habit and general features.

Gloriosa superba Linn. is a glabrous scrambling perennial herb, growing over hedges and small trees. It is highly ornamental and most beautiful when in flower. It has a cylindrical arched inverted ploughshare shaped, tuberous root-stock from which arise annually one or two slender terete herbaceous glabrous slightly glaucous generally unbranched shoots one and a half to five metres or more long that bear sessile or subsessile alternate oblong lanceolate acuminate leaves with spirally coiled tips and towards the apices of the shoots large bright red flowers on fairly long solitary axillary pedicels (*Agnisikha*). The shoots come up at the beginning of the rainy season - June and July - begin to bear flowers after about two months and fruits are formed from November onwards.

External morphology

Root-stock. tuberous solid or firm, pale brown to yellowish white, nearly cylindric and plough-share-shaped, or like an inverted "V" but with its arms unequal in length, and their ends bluntly pointed. The tubers when mature may reach a length of 15 to 30 cms. and a width or diameter of 3 cms. or more. The tips of either or occasionally both the arms bear buds. These grow into new shoots the following year or season.

Stem: twining, cylindrical, slender reaching 5 metres or more in length and from 5 to 8 mm. in thickness usually unbranched or with one or two branches at the distal flower-bearing portion.

Leaves: Simple, sessile or subsessile alternate or occasionally in the upper flower-bearing regions on account of shortening of internodes sub-opposite or three-nately whorled, variable in shape, ovate to oblong-lanceolate entire, cordate or semicordate at base, acuminate, the tip most often coiled into a semi woody watch spring like tendrillar hook; the blade seven to twenty cms. long and two to five cms. broad excluding the tendrillar coil. The leaf has a prominent midrib and several oblique, subdued, secondary nerves running parallel to each other.

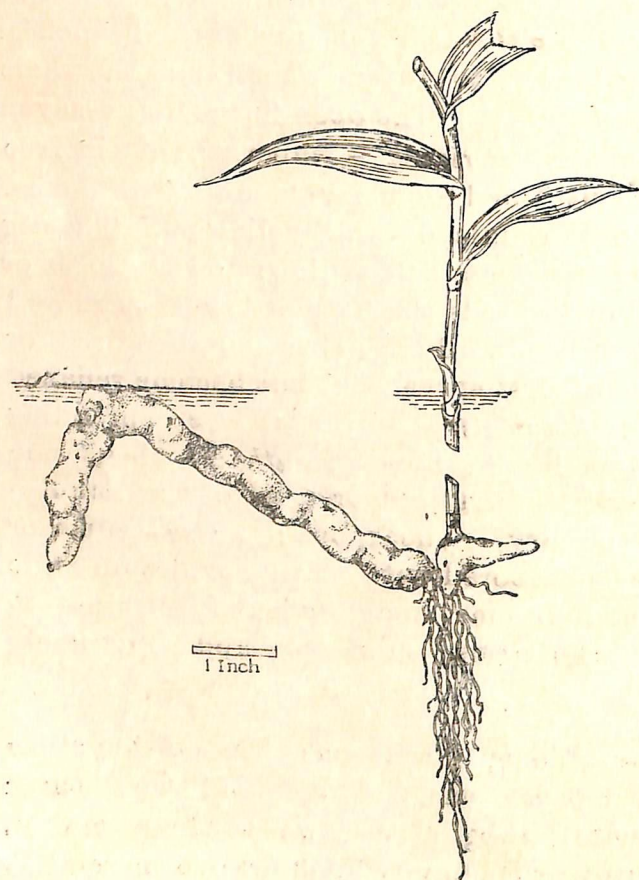
Flowers: large and very showy, bisexual getting reflexed after anthesis, solitary and axillary or on account of the nearness of the nodes appearing sub-corymbose towards the ends of the branches. The pedicels are fairly long (seven to fifteen cms.) and the buds at first somewhat drooping or pendent. The open flowers are seven to nine cms. or more in diameter. **Perianth** - superior, of six free linear-lanceolate segments about 1 or 1½ cms. wide and 4 or 5 cms. long with their margins crisply undulate and yellowish. The segments in the bud condition are greenish yellow: on anthesis or opening they turn golden yellow towards the base or lower third and bright red in the upper two thirds, and finally become blood red or crimson throughout: they are at first spreading, but become reflexed afterwards. **Stamens** - six; **filaments** - filiform free spreading golden yellow, about five cms. or less in length; **anthers** - about one cm. long, linear dorsifixed versatile and extrorse with the connective greenish. **Pistil** - tricarpeal, syncarpous; **ovary** - superior oblong, three-lobed and three-chambered with many ovules on axile placenta; **style** - filiform about 5 cms. long, deflexed terminating in a three-fid stigma with the arms subulate and introrsely stigmatose.

Fruit: a large linear-oblong, coriaceous greenish-yellow septicidal capsule, three to five or six cms. in length and two to three cms. in diameter. **Seeds** - several, subglobose two to three mm. in diameter with a somewhat pulpy or spongy reddish orange or reddish brown testa and arranged in two rows within the inner angle in.

each chamber. They possess perisperm and have a cylindrical embryo.

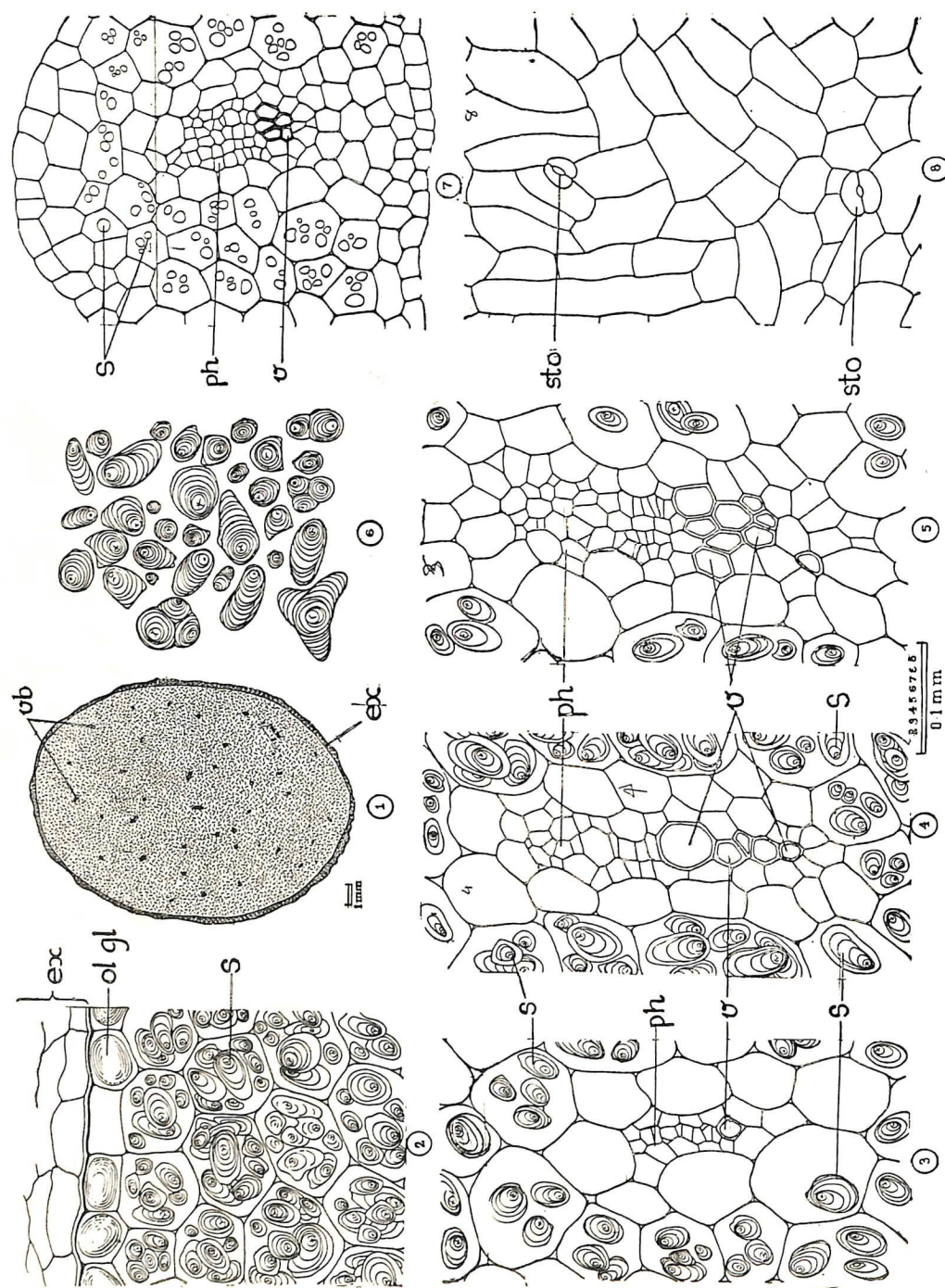
Part used: the root-stock or tuber.

Description. The underground tuber (root-stock) is fairly thick, nearly cylindrical or slightly laterally flattened and often with surface depressions on the lateral faces. The tubers have a characteristic shape resembling a ploughshare or inverted "V" and hence the Tamil name - *kalappakizhangu*. The two arms of the "V" are however unequal - one arm being generally more than double the length of the other. These tubers vary in size according to the age of the plants. In very young plants the entire tuber may measure only two or three cms. in length and four or five mms. in thickness. The large tubers measure from fifteen to twentyfive cms. in length and from one or one and a half to three cms. in thickness. The length of the longer arm of the tuber varies from 5 to 20 cms. or over, and the diameter from $\frac{1}{2}$ to 3 cms.



The tubers of plants one or two years old are nearly whitish and very soft with a soft skin while older ones four or five years old appear slightly brownish to light reddish yellow. The surface skin is very thin and easily scraped. On the upper side of the apex or place of bifurcation or forking of the tuber there is shallow roundish depression with a prominent round scar at its centre, which represents the scar of the previous year's aerial shoot. On the lower

side almost at the same region there is another scar indicating the



Histology of the tuber of *Gloriosa superba* Linn.

1. Diagrammatic sketch of the T. S. of the tuber
2. Details of the peripheral part showing exoderm and cortex
- 3, 4 & 5. Vascular bundles of the ground tissue
6. Starch grains
7. T. S. of the fleshy outer scale of a very young developing tuber
8. Surface view of the epidermis

place of attachment of the tuber to its parent root-stock (the previous year's tuber) as well as the scars of a few roots. The distal halves of the arms are slightly narrower and end bluntly with at the tip of each a rudimentary bud protected by a few adpressed scales. Most often the bud at the tip of the longer arm develops into a new tuber in the following favourable season by producing an inverted V-shaped tuber. From the apex of the latter the new or current season's shoot arises (see figure) and from the lower side near its attachment to the parent tuber a cluster of roots. The tubers are quite soft and are easily cut. The transversely cut surface of a fresh tuber has a light yellowish white colour and appears homogeneous. It has no special odour but has a bitter taste. The tubers are considered very poisonous.

Histology

A transverse section of the tuber has a nearly circular or oval that is, a somewhat laterally compressed outline. In most cases outside the section of the tuber proper and nearly covering it may be made out the sections of one or two very thin brownish scales which in the mature tuber is composed of two or three rows of thinwalled rectangular tangentially elongated cells. The outer scale in very young tubers is slightly fleshy white in colour. It is composed of four to eight rows of parenchymatous cells with thin colourless walls, and traversed by a single vascular bundle. These cells contain small starch grains. The peeled off thin brown outer skin of well developed tubers on surface view shows that it is composed of mostly elongated cells of various sizes with thin brownish walls. A few stomata are found scattered amidst these cells. These do not however show chloroplasts in the guard cells. In T. S. this outer skin of tuber is seen to be composed of one or two rows tangentially elongated cells. The outermost row or epidermis is formed of nearly rectangular cells with their outer walls thickened. Some of these cells contain large globules of a greenish yellow colour nearly filling the cells. These globules when treated with sodium hydroxide turn yellow and gradually dissolve. Inner to this region is a homogeneous fleshy parenchymatous ground tissue wherein many small vascular bundles are present in scattered array. The parenchyma cells are large, polygonal, fully loaded with starch grains and with prominent intercellular spaces. The starch grains are

mostly simple, and oblong rounded or polyhedral in outline. The grains vary from 8 to 72μ in length. They show a distinct or clear hilum which is 2 to 5 radiate. The striations or lamellations are very clear and distinctly made out in fresh material. Compound grains with 2 to 3 components are also present.

The vascular bundles are simple. They are collateral many in number, and arranged scattered in the ground tissue. The xylem vessels are mostly of the annular and spiral types. In the smaller vascular bundles there is only a single xylem vessel. The phloem parenchyma cells are very small and thinwalled and the sieve tubes and companion cells are not easily discernible. Surrounding each vascular bundle is a row or sheath of small sized parenchyma cells which are smaller than those of adjacent ground tissue and normally devoid of starch grains. An important and characteristic feature of the tuber is the complete absence of mechanical tissues of any kind either separately or in association with the vascular bundles. The starch content is very high and the comparatively very large size of the grains measuring up to 72μ in length is also a noteworthy feature. The thinwalled isodiametric starch laden nature of the parenchymatous cells which form the bulk of the ground tissue of the tuber, as well as the simple structure and loose arrangement of the vascular bundles are features often associated with underground storage organs.



Hydrolea zeylanica Vahl.

***HYDROLEA ZEYLANICA Vahl.**

Synonyms: *Hydrolea javanica* Blume,
Nama zeylanica Linn.
 Family: Hydrophyllaceae.
 Vern: (Bomb) ... Popti, Keriti

Distribution and habitat.

The plant is distributed throughout India in all plains districts (ascending to 1200 meters in wet places) chiefly in Konkan, Deccan, Gujerat, Kerala and Carnatic. The plant is a fairly common inhabitant of wet or damp places like margins of tanks and water courses, rice fields etc.

Habit and general features.

Hydrolea zeylanica Vahl. is an erect or more often decumbent branched somewhat succulent unarmed glabrous annual herb often rooting at the nodes, growing 5 to 50 cms. high, bearing simple, short-petioled alternate entire lanceolate or linear lanceolate (glabrous) leaves acute at base and tapering at tip, 2.5 to 7 cms. long and 0.3 to 1.5 cms. wide; numerous small bluish flowers in short terminal racemes or disposed on a racemose manner on short lateral branches and small ovoid oblong capsular fruits about 3 mm. x 2.5 mm. enclosed in the enlarged persistent calyx and containing numerous minute oblong seeds.

The plant is in flower nearly throughout the year when conditions are favourable.

External morphology.

Stems: 7.5 to 45.0 cms., erect or more often procumbent and branched.

Leaves: simple, very short petioled, exstipulate, alternate, lanceolate or linear lanceolate, entire, glabrous, acute at base and tapering towards the tip 2.5 to 7 cms. long and 0.3 to 1.5 cms. wide.

* Indicated as a botanical source of *Kalihari*

Flowers: usually numerous or many, short pedicelled bracteate, of a pretty blue colour, regular, bisexual and fivemerous. They are borne in the axils of leafy bracts in terminal patently viscidly hairy racemes 2.5 to 5 cms. long or on short lateral branches in a racemose manner. *Pedicels* – 3 to 8 mm. long, glandular hairy. *Bracts* narrow 6 to 12 mm. long. *Calyx* – persistent and enlarging in fruit, gamosepalous, glandular hairy about 6 mm long, deeply five partite or divided nearly to the base, the tube being very short – less than 1 mm., and the segments lanceolate striate, acute and exceeding the capsule. *Corolla* – gamopetalous, about 12 mm. long, of a fine blue and marked with darker veins, rotate or campanulate, the tube about 1 mm. in length and the lobes ovate, acute and imbricate. *Stamens* – five, inserted on the short tube of the corolla and alternating with the corolla lobes; *filaments* equal, filiform dilated at base, *anthers* sagittate, versatile, *Pistil* bicarpellary, syncarpous; *ovary* – completely two-chambered with many ovules in each chamber, borne on fleshy placentas adnate to the septum: *styles* – two distinct and spreading, each ending in a capitate stigma.

Fruit: A globose or ovoid two valved septicidal or irregularly dehiscent capsule 4 mm. x 2.5 mm. enclosed within the enlarged persistent calyx. *Seeds* – numerous, minute, oblong, irregularly wrinkled, with fleshy albumin and a minute embryo.

S'ATAVARI*

Source plant : *Asparagus racemosus* Willd.

Family : Liliaceae.

Sanskrit Text

शतमूली महाशीताऽभिरुपत्री शतावरी ।
महाशतावरीत्वन्या शतवीर्या महोदरी ॥ (शालिग्रामनिघण्टुः)

S'atamūli mahāsitasbhirupatṛi śatāvarī
Mahāśatāvaritvanyā śatavīrya mahodari
(S'aligrāma nighaṇṭu)

शतावरी बहुसुताऽभीरुर्न्दीवरी वरी ।
नारायणी शतपदी शतवीर्या च पीवरी ॥
महाशतावरी चान्या शतमूल्यध्वकण्टिका ।
सहस्रवीर्याऽहेरुश्च ऋषिप्रोक्ता महोदरी ॥ (भावप्रकाशः)

S'atāvarī bahusutāsbbhirurindīvarī varī
Nārāyaṇī śatapadī śatavīryā ca pīvarī
Mahāśatāvarī cānyā śatamūlyādhvakāṇṭikā
Sahasra vīryāśherus'ca ṛṣiproktā mahodari
(Bhāvaprakāśaḥ)

शतावरी शतपदी पीवरीन्दीवरी वरी ।
ऋष्यप्रोक्ता द्वीपशत्रु द्वीपिकाऽमरकण्टिका ॥
सूक्ष्मपत्रा सुपत्रा च बहुमूली शताह्वया ।
नारायणी स्वादुरसा शताह्वा लघुपणिका ॥
आत्मशल्या जटामूला शतवीर्या महोदरी ।
मधुरा शतमूला च केशिका शतनेत्रिका ॥
विश्वारूपा वैष्णवी काष्णीं वामुदेवी वरीयसी ।
दुर्मरा तैजवल्ली च स्यान्नयस्त्रिंशदाह्वया ॥ (राजनिघण्टुः)

* In addition to *Asparagus racemosus* Willd. which is the botanical source of 'S'atāvari' in Kerala, books on Indian Materia Medica equate also a few other species such as *A. adscendens*; *A. sarmentosus* etc. with S'atāvari.

S'atāvari s'atapadī pivarindivari vari
 Rṣyaproktā dvīpas'atrurdvīpikāsmarakantikā
 Sūkṣmapatrā supatrā ca bahumūlī s'atāhvayā
 Nārāyaṇī svādurasā s'atāhvā laghuparnikā
 Ātmas'alyā jātamūlā s'ataviryā mahodari
 Madhurā s'atamūlā ca kesikā satanetrikā
 Viśvakhyā vaiṣṇavi kārṣṇī vāsudevi varīyaśī
 Durmarā taijavallī ca syāttayastrimsadāhvayā

(Rājanighaṇṭuḥ)

Properties and uses

शतावरी गुरुः शीता तिक्ता स्वाद्वी रसायनी ।
 मेघाग्निपुष्टिदा स्निग्धा नेत्र्या गुल्मातिसारजित् ॥
 शुक्रस्तन्यकरी बल्या वातपित्तास्त्र शोथजित् ।
 महाशतावरी मेध्या हृद्या वृष्या रसायनी ॥
 शीतवीर्या निहन्त्यर्शोग्रहणीनयनामयान् ।
 तदङ्कुरस्त्रिदोषघ्नो लघुरर्शः क्षयापहः ॥ (भावप्रकाशः)

S'atāvari guruh sītā tiktā svādvī rasāyaṇī
 Medhāgnipūṣṭidā snigdha netryā gulmātisārajit
 S'ukrastanyakārī balyā vātapittāsras'othajit
 Mahā's'atāvari medhyā hṛdyā vṛṣyā rasāyaṇī
 S'itaviryā nihantyarśo grahaṇī nāyanāmayān
 Tadaṅkurastridoṣaghno laghurars'ahkṣayāpahaḥ
 (Bhāvaprakāśaḥ)

शतावर्यौ हिमे तिक्ते मधुरे पित्तजित्परे ।
 कफवातहरे वृष्ये महाश्रेष्ठे रसायने ॥ (राजनिघण्टुः)

S'atāvaryau hime tikte madhure pittajitpare
 Kaphavātahare vṛṣye mahāśreṣṭhe rasāyane
 (Rājanighaṇṭuḥ)

शतावरी तु मधुरा शीता वृष्या च तिक्तका ।
 रसायनी गुरुः स्वाद्वीः स्निग्धा दुग्धप्रदा मता ॥
 अग्निदीप्तिकरी बल्या मेध्या शुक्रकरी मता ।
 चक्षुष्या पुष्टिकृत् पित्तरुफवातक्षयपहा ॥
 रक्तदोषगूलमहन्त्री शोथातीसारनाशिनी
 तैले घृते प्रयोगार्थं प्रशस्ता मुनिभिर्मता ॥ (निघण्टुरत्नाकरः)

S'atāvari tu mahdhurā sītā vṛṣyā ca tiktakā
 Rasāyaṇī guruh svāduḥ snigdha dugdhapradā mata
 Agnidiptikārī balyā medhyā s'ukrakārī mata
 Cakṣuṣyā pūṣṭikṛt pittakaphavātakṣayāpaha
 Raktadoṣagūlmahantrī s'othātīsāranāśinī
 Taile gṛṛte prayogārtham pras'asthā munibhirmatā ॥
 (Nighaṇṭu ratnākaraḥ)

महाशतावरी हृद्या मेध्या चाग्नि प्रदीपनी ।
 शुक्रला शीतवीर्या च बल्या वृष्या रसायनी ॥
 अर्शः संग्रहणी रोगनेत्ररोगविनाशिनी । (निघण्टुरत्नाकरः)

Mahā's'atāvari hṛdyā medhyā cāgnipradipani
 S'ukralā s'itaviryā ca balyā vṛṣyā rasāyaṇī
 Ars'ah saṅgrahanīroganetrarogavināśinī ॥
 (Nighaṇṭu ratnākaraḥ)

वहती कफवातघ्नी तिक्ता श्रेष्ठा रसायनी । (राजनिघण्टुः)

Mahatī kaphavātagñī tiktā s'reṣṭhā rasāyaṇī ॥
 (Rāja nighaṇṭuḥ)

शतावर्याङ्कुरस्तु तिक्तो वृष्यो लघुस्पृत् ।
 हृद्यस्त्रिदोषपित्तघ्नो वातरक्तार्शसां हरः ॥
 क्षयसंग्रहणी रोगनाशनस्तिक्तको लघुः ॥ (निघण्टुरत्नाकरः)

S'atāvaryāhyāṅkurastu tikto vṛṣyo laghusmṛtaḥ
Hṛdyastridoṣapittaghno vātaraktārs'asām haraḥ
Kṣayasāṅgrahanīroga nās'anastiktako laghuḥ ॥
(Nighaṇṭuratnākaraḥ)

षतावर्यङ्कुरास्तिक्ता वृष्या दोषत्रयापहः । (अष्टांगहृदयम्)

Sathāvaryāṅkurāstiktā vṛṣyā doṣatrayāpahah
(Aṣṭāṅgahṛidayam)

वातपित्तहरी वृष्या स्वादुतिक्ता शतावरी ।
महती चैव हृद्या च मेघाग्निबलवर्धिनी ॥
ग्रहण्यशोविकारघ्नी वृष्या शीता रसायनी ।
कफपित्तहरास्तिक्तास्तस्या एवाङ्कुरास्मृताः ॥ (सुश्रुतः)

Vātapittaharī vṛṣyā svādutiktā s'atāvarī
Mahatī caiva hṛdyā ca medhāgni balavardhini
Grahanyar'ovikāraghni vṛṣyā sitā rasāyanī
Kaphapittaharāstiktāstasya evāṅkurāsmṛtāḥ ॥
(Susrutaḥ)

Some of the special uses

शतावर्याश्च मधुना पित्तशूलहरो रसः । (शाङ्गधरः)

S'atavaryās'ca madhuna pittas'tlaharo rasaḥ ॥
(S'āṅgadharaḥ)

घृतं शतावरीगर्भं क्षीरे दशगुणे पचेत् ।
शर्करापिप्पलीक्षौद्रयुक्तं तद्वृष्यमुच्यते ॥ (चक्रदत्तः)

Ghṛtam s'atāvarīgarbham kṣīre das'aguṇe pachet
S'arkarāpippalīkṣaudrayuktam tadvṛṣyamucyate ॥
(Cakradattaḥ)

इन्दीवरी वरी स्यच्छतवीर्या द्वीपिका करण्डेति ।
सूक्ष्मदला शतमूला ऋश्यप्रोक्ता केशिका जटामूला ॥

(कभिधानमञ्जरी)

Indīvarī varī syacchataaviryā dvīpika karaṇḍeti
Sūkṣmadalā satamūla ṛs'yaprokta kesikā jaṭāmūla ॥
(Abhidhānamañjarī)

प्रोक्ताभीरुः प्राज्ञैः सहस्र वीर्या शतावरी महती ।
ऊर्ध्वाहवकण्टका सा बहुपुत्री शतांगिनी महाकान्ता ॥
(अभिधानमञ्जरी)

Prokabhīruḥ prājñaih sahasraviryā s'atāvarī mahatī
Urdhvāhava kantaḥ s bahuputrī s'atāṅginī mahākāntā ॥
(Abhidhānamañjarī)

Meanings of the descriptive terms

The terms *S'atāmūli* and *S'atapadī* meaning hundreds of roots or feet refer to the numerous roots of this plant which are long and tuberous.

Gatāmūla – mean the roots in a tangle or intertwining.

Bāhusuta – meaning many off-springs, may indicate the successive formation of several shoots or that the shoot is highly branched.

Sūkṣmapatrā – having minute leaves – here the reference is evidently to the several small leaf-like cladodes.

Indīvari, *Nārayani*, *Satāvari* – that which clasps the earth with its numerous roots. The term also indicates that it is acceptable to hundreds as a tonic.

Abhirupatri –

S'atavīrya – having multifold action.

Varīyasī – most acceptable (of drugs)

Pivari – stout – may refer to the stout roots.

Durmara – Undying or perennial.

Rsyaprokta – That which is eschewed by Rsis.

Properties and uses.

There are two kinds of *s'atāvari*. One is bigger in size having bigger leaves and roots. Both of them are almost of the same quality.

S'atāvari is sweet and bitter in taste. It is cold and heavy. It promotes the receptive power of the mind, is unctuous, cordial and aphrodisiac. It increases breast milk gastric juice and is strength giving and roborant. It cures swelling, consumption, diseases on account of impurity of blood, phantom tumor diarrhoea, piles and diseases of the eyes. It cures the diseases caused by the morbidity of *vāta*, *pitta* and *kapha*. The bigger sized *s'atavari* is more useful for curing piles and digestive disorders. Its sprouts are light and bitter.

Some of the special uses.

1. The extract of *s'atāvari* (juice) with honey cures colic pain caused by the discordance of *pitta*.
2. Ghee prepared with its juice, milk sugar, powder of long pepper and honey is highly recommended for sexual vigour.
3. *S'atāvari ghritam* is a specific for many uterine diseases and excess of bleeding.
4. A preparation known as *S'atāvari guda* in which this is the chief ingredient is indicated in urinary disorders, diabetes and jaundice.

Plate XVI



Asparagus racemosus Willd.

*Asparagus racemosus* Willd.

1. Flowering twigs

2. A single flower

3. A portion of branchlet enlarged

ASPARAGUS RACEMOSUS Willd.

Synonyms: *Asparagus volubilis* Ham.
Asparagus acerosus Wall.
Asparagus fasciculatus Br.

Family: Liliaceae.

Sanskrit	—	S'atāvari, S'atāmūli
Malayalam	—	S'atāvari, S'atāvali, Tannirmuttan (kizhangu) Simasadavari
Tamil	—	Tannirvittan or Nirmittan (kizhangu) S'atāvari, Ammaikodi, Kadumulla, Nilichedi
Telugu	—	Pilli-gaddalu
Hindi	—	Sadabori, Shakakil, Satawari

Distribution and habitat.

The plant is indigenous to tropical India and quite commonly met with in most provinces from sea level to about 1400 metres elevation. It grows well under a variety of soil and climatic factors.

Habit and general features.

Asparagus racemosus Willd. is an excessively branched (*bahusuta*) scandent or rambling spiny twining undershrub straggling over hedges and bushes or occasionally climbing to great heights on tall trees. It has a short stout root-stock bearing numerous considerably long fusiform succulent tuberous roots. Periodically or seasonally one or more shoots with long uniformly cylindrical rattan-like stems are formed from the root-stock. The stems and main branches when young are very delicate brittle and smooth but on maturing become woody and slightly striated. They are devoid of normal leaves but bear instead at each node, one to several branches and branchlets that arise from the axils of downwardly pointed thorns (considered modified leaves). The ultimate branchlets which are numerous bear in the axils of small scales or short spines, in clusters of 2-6 or more small narrow falcate triquetrous channelled finely acuminate divaricate dark greenish leaflike segments (cladodes) — *sūkṣmapatra* — one or two cms. long and about two mm. wide.

The flowers arise from nodes on older generally leafless branches and are borne on short racemes 5 to 7 mm. long that arise in fascicles in the axils of small scale leaves or short spines. Flowering time December to February. Seeds ripen by March – April.

External morphology

Roots: perennial, many, fascicled, 30 cms. to about one metre or more in length, smooth tapering at both ends, succulent and tuberous.

Stem: scandent twining armed with strong straight or recurved spines at the nodes, woody when mature. Branchlets angular.

Leaves: reduced to minute chaffy scales or spinescent and subtending leaflike cladodes. *Cladodes* dark green divaricate falcate triquetrous or very slightly compressed and channelled beneath, 10 to 25 mm. long and about 2 mm. wide, borne in axillary clusters of 2–6.

Inflorescence: short, simple, few or many-flowered racemes, 2.5 to 8 cms. long which are either solitary or more often in crowded fascicles of 3 or more arising from the 'naked' nodes of the main shoots or in the axils of the thorns on slender woody branches.

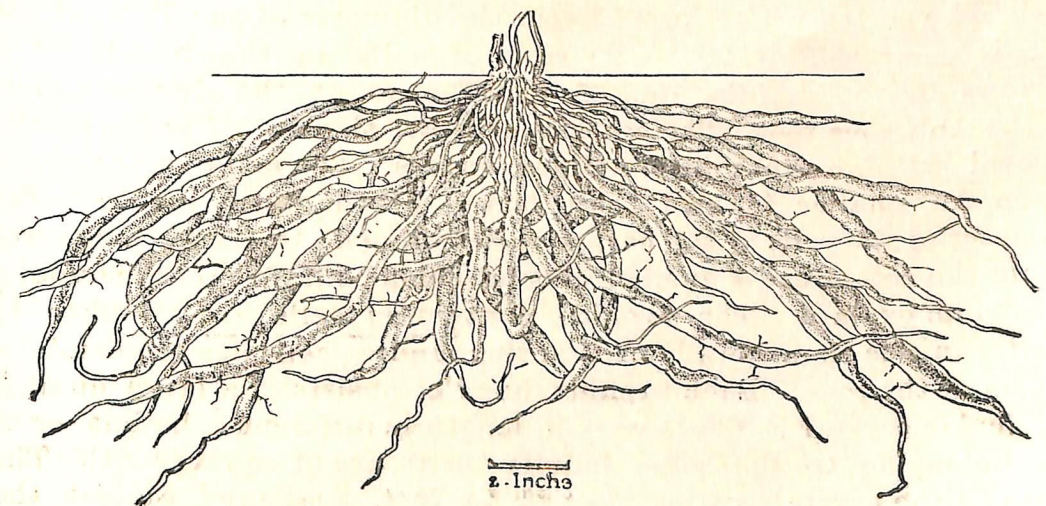
Flowers: usually numerous and bracteate, small 3–4 mm. across. They are bisexual, whitish and very strongly and sharply scented, permeating the atmosphere with their rather irritating odour. *Pedicels* – very slender, about 1.2 mm. long, slightly pendulous and jointed in the middle. *Bracts* – minute, scarious, cordate, *Perianth* – six partite, the segments oblong, spreading reflexed 2–3 mm. long and companulately connivent below. *Stamens* – six; *filaments* free, filiform, subulate or linear and in-curved, each one opposite to shorter than and arising from the base of a perianth segment; *anthers* – purplish, small or minute, erect, dorsifixed, oblong, cordately 2-lobed or emarginate at base, 2-celled and introrse. *Pistil* – tricarpellary, syncarpous: *ovary* – superior, trigonous, slightly narrowed towards the base and three chambered with 6–8 anatropous ovules in each loculus attached in two rows to the central axis of the ovary: *style* – short and columnar ending in three recurved stigmatic lobes.

The *fruits* are globular or more often obscurely three lobed pulpy berries 4 to 6 or 7 mm. in diameter. They are greenish or light rose when young but turn purplish black when ripe and contain 2 or 3 hard seeds. *Seeds* – with a thin but hard and brittle black testa and horny or cartilaginous endosperm. *Embryo* – dorsal transverse and curved in a serpentine manner in the back of the endosperm, and nearly opposite to the umbilicus or funiculus.

Officinal part: The tuberous succulent roots. These are as recommended in the texts mostly used only in the fresh condition. Their keeping quality is poor.

Description:

The roots arise from the short root-stock adventitiously. They are all generally considerably long,—the length varying from 25 cms. to about a metre or more—and gradually tapering towards the basal and distal ends. The main body of the root is nearly cylindrical or of the same width except for small depressions here and there and varies from one to two cms. in diameter. They are cream white or light cream yellow and have a fairly smooth surface except for the presence of a few rootlets. The surface skin is quite soft and easily scrapable. On dried roots the surface appears longitudinally wrinkled and short transverse fissures are found. The transversely cut surface of a fresh root shows a narrow light yellow peripheral strip, a silverywhite fleshy soft middle region which forms the bulk



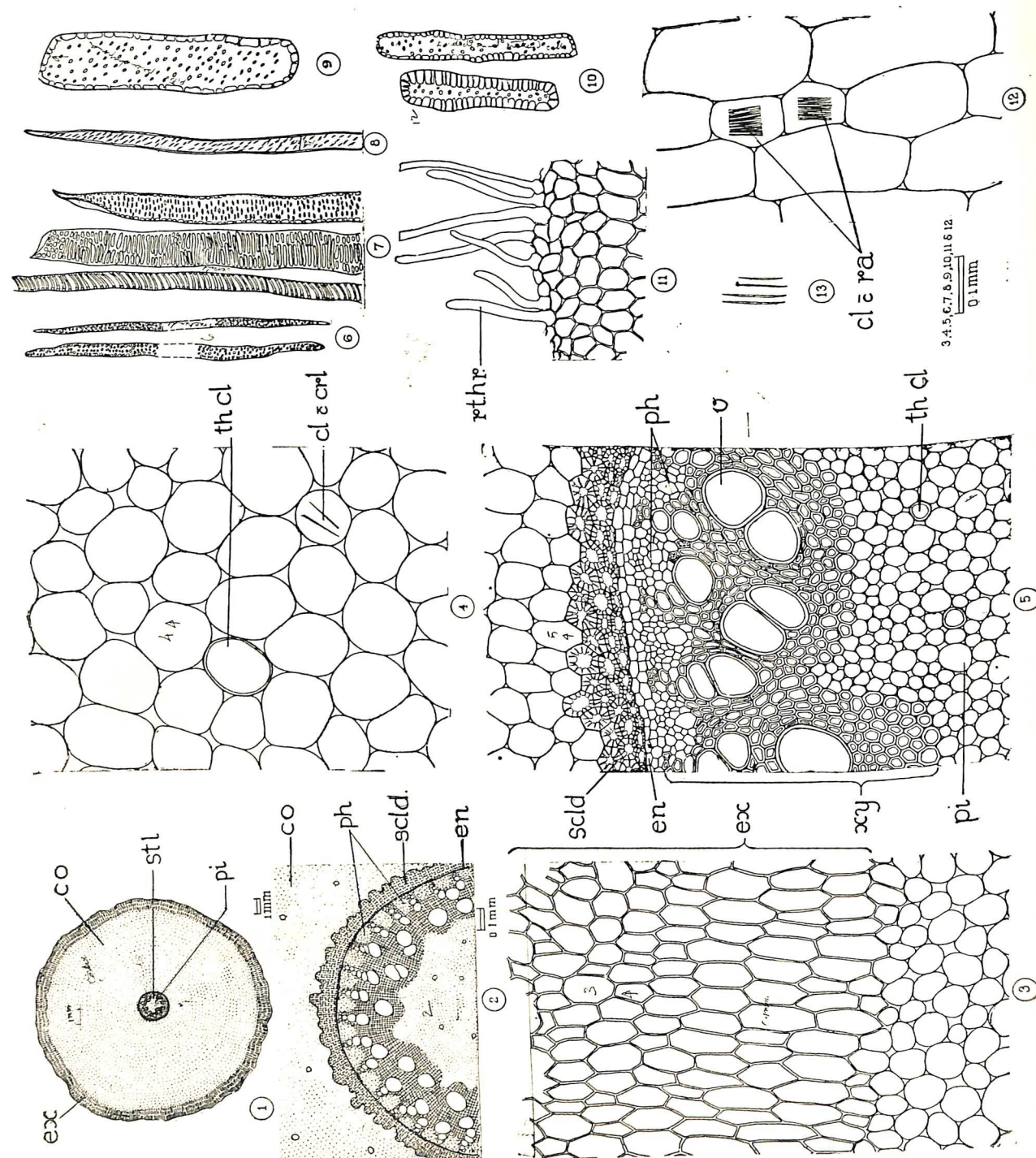
part of the root, and a slightly hard narrow central woody core. In fresh roots the light yellow coloured outer layer or rind can be easily separated from the silvery white part, but adheres firmly in dried roots.

The roots have no characteristic odour but possess a slightly sweetish mucilaginous taste.

Histology:

A transverse section of the root is nearly circular. It shows an outer exodermis which is light yellow in colour within which is a wide cortex surrounding a ring or circlet of vascular bundles and a central pith. The outermost tissue is formed of 6 to 10 rows of compactly arranged polygonal to slightly radially elongated slightly thickwalled cells whose walls are suberised as well as lignified. These cells measure 54 to 135μ \times 25 to 60μ in T.S. The length of these cells in L.S. varies from 800 to 1050μ . The number of rows of cells of this zone varies slightly at different levels of the root. Towards the distal or apical narrower end of the root in addition to the exodermis, the outer piliferous layer is present at certain regions which is seen to be composed of small thinwalled mostly rectangular cells many of which are modified into root hairs. At certain portions of this region this layer is seen ruptured and replaced by a dark pigmented mass of broken down cells.

The cortex which forms $3/4$ ths the diameter of the T. S. of the root is composed of 20 to 25 rows of cells in the basal, 30 to 45 rows in the middle, and 25 to 30 rows at the distal regions of the tuberous root. The cortical cells are thinwalled and circular or oval with distinct intercellular spaces. The cells of the outer region are smaller in size than those of the inner region. The diameter of the cells of the cortex varies from 45 to 120μ . Scattered within the cortex are a number of cells which contain raphide bundles of calcium oxalate. The raphide containing cells are found to be smaller in size than the adjacent or surrounding cells in a longitudinal section of the root. Each raphide bundle consists of a large number of acicular crystals. These vary in length in different cells but crystals belonging to the same bundle (cell) are of equal length. The length of the crystals varies from 45 to 75μ . Scattered amidst the



The centre of the root is occupied by the pith which is composed of small rounded mostly thinwalled cells with large intercellular spaces. The diameter of the pith cells varies from 21 to 48 μ . Scattered within the pith are a few cells whose walls are slightly thickened (similar to those in the cortex). These cells are however narrower and nearly three to four times longer than those occurring in the cortex.

Histology of the root of *Asparagus racemosus* Willd.

1. Diagrammatic sketch of the T. S. of the root 2. Semi-diagrammatic sketch of a part of the stele 3. Exodermis along with a portion of the cortex 4. Cortex (middle region)
5. A portion of the vascular ring showing xylem and phloem and adjacent tissues
6. Tracheids 7. Vessels 8. A part of a septate fibre 9. A pitted parenchyma cell of the cortex 10. Thickwalled cells outer to the endodermis 11. Exodermis and remnants
12. Raphide bearing cells of cortex 13. Crystals from different raphide bundles

APĀMĀRGA

Source plant : *Achyranthes aspera* Linn.
Family : *Amarantaceae*

Sanskrit text

अपामार्गः शैखरिको धामार्गवमयूरकौ ।
प्रत्यक्षपर्णी कीशपर्णी किणिही खरमञ्जरी ॥ (अमरकोशः)

Apāmārgaḥ saikhariko dhāmārgavamayurakau
Pratyakparṇi kīśaparni kiṇihī kharamañjarī ॥
(Amarakośaḥ)

अपामार्गस्तु शिखरी ह्यधः शल्योः मयूरकः ।
मर्कटी दुग्धो चापि किणिही खरमञ्जरी ॥ (भावप्रकाशः)

Apāmārgastu sikhari hyadhahṣalyo mayūrakah
Markatī durgrahā cāpi kiṇihī kharamañjarī ॥
(Bhāvaprakāśaḥ)

अपामार्गस्तु शिखरी किणिही खरमञ्जरी ।
दुर्ग्रहश्चाप्यधः शल्य प्रत्यक्षपुष्पी मयूरकः ॥
काण्डकण्टः शैखरिको मर्कटी दुरभिग्रहः ।
वसिरश्च पराक्षुष्पी कण्टी मर्कटपिप्पलः ॥
कटुर्मञ्जरिको नन्दी क्षवकः पङ्क्तिः कण्टकः ।
मालाकण्टश्च कुब्जश्च त्रयोविंशेतिनामकः ॥ (राजनिघण्टुः)

Apāmārgastu sikhari kiṇihī kharamañjarī
Durgrahasṣāpyadhahṣalyaḥ pratyakpuṣpī mayūrakah
Kāṇḍakaṇṭaḥ saikhariko markatī durabhigrahaḥ
Vasiraśca parākpuṣpī kaṇṭī markatapippalāḥ

* Another plant *Cyathula prostrata* also belonging to *Amarantaceae* and known in Malayālam as *Cerukataladi* (small *Achyranthes*) is considered by some as a variety of *Apāmārga*.

Katurmañjariko nandī kṣavakaḥ paṅktikaṇṭakaḥ
Mālākantaśca kubjaśca trayaviṁśetinaṃmakah ॥
(Rājanighaṇṭuḥ)

प्रोक्तोऽपामार्गोऽधः शल्यः किणिही च दुर्ग्रहो घण्टा ।
खरमञ्जरी च शिखरी प्रत्यक्षपुष्पी मधुरकश्चेति ॥ (अभिधानमञ्जरी)

Proktospāmārgodhaḥ śalyaḥ kiṇihī ca durgraho ghaṇṭā
Kharamañjarī ca sikhari pratyakpuṣpī madhurakasṣeti ॥
(Abhidhānamañjarī)

अपामार्गस्तु शिखरी प्रत्यक्षपुष्पी मयूरकः ।
अधः शल्योऽथ किणिही दुर्ग्रहः खरमञ्जरी ॥
स चैवोक्तः शैखरिको मर्कटी दुरभिग्रहः ।
पराक्षुष्पी वसिरश्च कण्टी मर्कटपिप्पली ॥
अन्यो रक्तो रक्तपुष्पो वसिरः कपिपिप्पली ।
क्षुद्रापामार्गको रक्तः ख्यातव्यो रक्तपूर्वकः ॥ (धन्वन्तरिनिघण्टुः)

Apāmārgastu sikhari pratyakpuṣpī mayūrakah
Adhaḥśalyostha kiṇihī durgrahaḥ kharamañjarī
Sa caivoktaḥ saikhariko markatī durabhigrahaḥ
Parākpuṣpī vasiraścha kaṇṭī markatapippalī
Anyo rakto raktapuṣpo vasiraḥ kapipippalī
Kṣudrapāmārgako raktaḥ khyātavyo raktapūrvakah
(Dhanvantari nighaṇṭuḥ)

कषामार्गस्तु तृणवत्सिद्धो दुर्मञ्जरी स्थिरः ।
वरनार्य इवाकृष्टिं कुर्वन्त्यध्वगवाससाम् ॥ (शिवनिघण्टुः)

Apāmārgastu tṛṇavatsiddho durmañjarī sthiraḥ
Varanārya ivākṛṣṭim kurvantyadhvaga vāsasām ॥
(S'ivanighaṇṭuḥ)

Properties and uses

अपामार्गः सरस्तीक्ष्णो दीपनस्तिक्तकः कटुः ।

पाजनो रोचनच्छर्दिकफमेदोनिलापहः ॥

निहन्ति हृद्रुजाध्मानकण्डूशूलोदरापचीः । (भावप्रकाशः)

Apāmārgaḥ sarastikṣṇo dīpanastiktakaḥ kaṭuḥ
Pācano rocanacchardikaphamedonilāpahaḥ
Nihanti hṛdrujādhmāna kaṇḍūsūlodarāpacīḥ ॥
(Bhāvaprakāśaḥ)

अपामार्गस्तु तिक्तोष्णः कटुश्च कफनाशनः ।

अर्शः कण्डूदरामघ्नो रक्तहृद्ग्राहि वान्तिकृत् ॥ (राजनिघण्टुः)

Apāmārgastu tiktoṣṇaḥ katuscha kaphanāś'anaḥ
Arśaḥ kaṇḍūdarāmaghno raktahṛdgrāhī vāntikṛt ॥
(Rājanighaṇṭu)

अपामार्गोऽग्निवत्तीक्ष्णः क्लेदनः स्त्रंसनः परः । (राजवल्लभः)

Apāmārgosgnivattikṣṇaḥ kledanaḥ sraṁsanaḥ paraḥ ॥
(Rājavallabhaḥ)

अपामार्गोऽभिकृत्तीक्ष्णो नस्याच्छीर्षकृमीञ्जयेत् ।

वामको रक्तसंग्राही रक्तातीसारनाशनः ॥

नस्मै वातौ प्रशस्तः स्याद्दद्रुकण्डूकफापहः । (शोढलनिघण्टुः)

Apāmārgosgnikṛttikṣṇo nasyācchīrṣakṛmīñjayet
Vamako raktasaṁgrāhī raktotīśāranāś'anaḥ
Nasye vāntau prasastaḥ syād dadrukandū kaphāpahaḥ
(S'odhalanighaṇṭuḥ)

रक्तान्यो वशिरो वृत्तफलो धामार्गबोऽपिच ।

प्रत्यक्पर्णी केशपर्णी कथिता कपिपिप्पली ॥ (भावप्रकाशः)

Raktānyo vaś'iro vṛttaphilo dhāmārgavospica
Pratyakparṇī keśaparnī kathitā kapipippalī

(Bhāvaprakāśaḥ)

रक्तापामार्गकः किञ्चित् कटुकः शीतलः स्मृतः ।

मलावष्टंभ वमिकृद्वातविष्टंभकारकः ॥

रूक्षो व्रणं विषं वातं कफं कण्डूञ्च नाशयेत् ।

बीजमस्य रसे पाके दुर्जरं स्वादुशीतलम् ॥

मलावष्टंभकं रूक्षं वान्तिकृद्रक्तपित्तजित् ।

कासनाशकरं प्रोक्तं मुनिभिस्तत्त्वदर्शिभिः ॥ (निघण्टुरत्नाकरः)

Raktāpāmārgakaḥ kiñcit katukaḥ śītalāḥ smṛtaḥ
Malāvaṣṭambhavamikṛdvāta viṣṭambhakārakaḥ
Rukṣo vṛṇaṁ viṣaṁ vātaṁ kaphaṁ kaṇḍūñca nāśayet
Bijamasya rase pāke durjaraṁ svādu śītalaṁ
Malāvaṣṭambhakam rūkṣaṁ vāntikṛdraktapittajit
Kāsanāśakaram proktaṁ munibhistatvadarsibhiḥ
(Nighaṇṭuratnākaraḥ)

अपामार्गोऽरुणो वातविष्टंभि कफहृद्धिमः ।

रूक्षपूर्वगुणैर्न्यूनः कथिनो व्रणवेदिभिः ॥

अपामार्गफलं स्वादु रसे पाके च दुर्जरम् ।

विष्टंभिवातलं रूक्षं रक्तपित्तप्रसादनम् ॥

(भावप्रकाशः)

Apāmārgosruṇo vātaviṣṭambhi kaphahṛddhimāḥ
Rūkṣaḥ purvagūṇairnyūnaḥ kathito vṛṇavedibhiḥ
Apāmārgaphalam svādu rase pāke ca durjaraṁ
Viṣṭambhi vātalaṁ rūkṣam raktapittaprasādanam ॥
(Bhāvaprakāśaḥ)

अपामार्गद्वयं तिक्तं तीक्ष्णोष्णं कफवातनुत् ।

सिध्मोदरापची दद्रुकण्डूशोर्ध्वेऽतिवान्तिकृत् ॥

(मदनपालनिघण्टुः)

Apāmārgadvayam tiktam tikṣṇoṣṇam kaphavātanut
Sidhmodarāpacī dadrukaṇḍvrs'oghnostivāntikṛt ॥
(Madanapālanighaṇṭuḥ)

अपामार्गद्वयं तिक्तं कृमिशीर्षविशोधनम् ।
वातकं रक्तसंग्राहि रक्तातीसारनाशनम् ॥ (राजनिघण्टुः)

Apāmārgadvayam tiktam kṛmis'irṣavis'odhanam
Vātakam raktasamgrāhī raktātīśāranāśanam ॥
(Rājanighaṇṭuḥ)

रक्तोपमार्गकः शीतः कटुकः कफवातनुत । (राजनिघण्टुः)

Raktopāmārgakah sītah katukah kaphavātanut ॥
(Rājanighaṇṭuḥ)

Some of the special uses.

1. प्रत्यक्पुष्पी शिरोविरेचनानाम् (श्रेष्ठं) (चरकः)

Pratyakpuṣpi s'irovirecanānam (sreṣṭham)
(Carakah)

2. (अर्शसु) अपामार्गमूलञ्च तण्डुलोदकेन सक्षौद्रमहरहः (पिबेत्)
(सुश्रुतः)

(Ars'assu) Apāmārgamūlañca taṇḍulodakena sakṣaudra-
maharahaḥ (Pibet) (Susrutah)

3. (अपामार्ग) ज्ञारः पेयोविमूत्रेण शर्करास्वश्मरीषु च ।
(अष्टांगहृदयम्)

(Apāmārga) kṣārah peyovimūtreṇa s'arkarāsvs'marīṣu ca ॥
(Aṣṭāṅgahṛdayam)

4. अपामार्गजटा कट्यां लोहितैः सप्ततेन्तुभिः ।
बद्धा वारे रवेस्तूर्णं ज्वरं हन्ति तृतीयकम् ॥ (वृन्दमाधवः)

Apāmārgajāṭa kaṭyām lohitaib saptatantubhiḥ
Baddhā vāre ravestūrṇam jvaram hanti tṛtiyakam ॥
(Vṛndamādhavaḥ)

5. अपामार्गस्य मूलन्तु प्रातरक्षालिताननः ।
विषमज्वरनाशाय बध्नीयाद्दामपाणिना ॥ (शोढलनिघण्टुः)

Apāmārgasya mūlantu pratarakṣalitānanah
Viṣamajvaranāśāya badhniyādvāmapāṇinā ॥
(Sōḍhalanighaṇṭuḥ)

6. अपामार्गस्य संसिक्तं पत्रोत्थेन रसेनतु
सद्योव्रणेषु रक्तं हि प्रवृत्तं परिनिष्ठति ॥ (चक्रदत्तः)

Apāmārgasya saṁsiktam patrotthēna rasēnatu
Sadyovraṇeṣu raktam hi pravṛttam paritiṣṭhati ॥
(Cakradattaḥ)

7. अपामार्गक्षारजले ।
तत्कृतेन साधितं तिलजम् ॥
अपहरति कर्णनादं
बाधिर्यं चापि पूरणतः ॥ (चक्रदत्तः)

Apāmārgakṣārajale
Tatkṛteṇa sādhitam tilajam
Apaharati karṇanādam
Bādhiryam cāpi pūṇanataḥ ॥
(Cakradattaḥ)

8. शिफां बहिशिफायास्तु क्षीरेण परिपेषिताम् ।
पिबेदृतुमती नारी गर्भधारण हेतवे ॥ (शोढलनिघण्टुः)

S'iphām barhis'iphāyāstu kṣīreṇa paripeṣitām
Pibedṛtumatī nārī garbhadhārana hetave ॥
(Sōḍhalanighaṇṭuḥ)



Meanings of descriptive terms.

- Apāmarga* - indicates that the plant acts as a hindrance to passers by. The presence of the plant in the vicinity of pathways is a regular nuisance since its fruits with the help of barbs stick on to clothes of human beings and fur of animals.
- Mayuraka* - indicates a resemblance to the crest or comb on a peacock's head. (?)
- Pratyakparni* - the leaves of the plant are borne at right angle to the stem.
- Kisaparni* - having hairs similar to the hairs of a monkey.
- Pangtikañtaka* - *Kharamanjari* and *Avākpūspi* refer to the arrangement in regular rows of flowers and fruits, the presence of sharp points on them and that the latter are downwardly pointed.

Two varieties namely *sweta* or white and *rakta* or red are mentioned in texts. Nighaṇṭuratnākaram mentions a third variety '*Toyāpamarga*' growing near water. In Kerala a large and a small variety are recognised; the latter being known as '*cerukataladi*' in Malayalam. *Katalādi* is *Achyranthes aspera* and *cerukatalādi*, *Cyathula prostrata* which is reddish.

Properties and uses.

The common qualities are described as follows:—

Both kinds of *Apāmarga* are bitter, sharp (*tīkṣṇa*) quick in action and hot. They cure diseases due to the morbidity of *kapha* and *vāta*. They are used as errhines. They remove the troubles due to worms and pathogenic organisms. They arrest bleeding and dysentery. They cure cutaneous diseases, ascitis, scrofula, itching and piles. They are emetics also.

Separate properties and uses are as described below:—

Svetāpāmarga is bitter and pungent. It causes vomiting. It is quick in action, hot, digestive in itself and promotes the digestive power also. It subdues diseases due to *vāta* and *kapha*. Ringworm, itching sensation, bleeding piles, cardiac disorders, colic pains, flatu-

lence, indigestion, ascites are all overcome by the use of *Apāmarga*. Used as errhine it dispels pathogenic organisms from scalp. It stops bleeding and creates retching (*utkles'a*) due to its heat.

Raktapāmarga is also bitter and pungent. It is cold and creates obstruction to faeces. It eliminates toxins. Its fruits are sweet in taste as well as on digestion and cures cough and morbidity of *pitta*. They are not easily digested.

Some of the special uses

The *ksāra* obtained out of it is used for many purposes because it contains large quantity of potash. (The ashes obtained by burning the plant is mixed with water. The supernatant water is taken out or allowed to evaporate and the sediment obtained is the *ksāra* used for medicinal purposes).

1. *Apāmarga* is very efficacious for errhines (*nasyam*) (Carakah)
2. The paste of *Apāmarga* root with rice water (*tandulotaka*) and honey used daily cures piles. (Susruta)
3. *Apāmarga ksāra* with urine of sheep cures calculi and stones in bladder. (Astāngahṛdayam)
4. The root of *Apāmarga* well tied with seven red threads and worn at the waist on Sundays cures tertian fever. (Vṛndamādhavah)
5. By wearing *Apāmarga* root fastened with a thread on the left hand as soon as one wakes up from bed in the morning cures intermittent fevers. (Sodhalanighaṇṭuh)
6. The juice extracted out of the leaves of *Apāmarga* arrests the bleeding from wounds instantaneously. (Cakradattah)
7. The paste of *Apāmarga* root well mixed in milk and used internally in menstrual periods aids conception. (Sodhalanighantu)
8. Take Sesamum oil four parts, water sixteen parts, the *ksārā* of this plant one part and boil them together in the usual way. The oil thus prepared is poured into the meatus in cases of tinnitus and deafness. (Cakradattah)

ACHYRANTHES ASPERA Linn

Family: — Amarantaceae.

Sanskrit:	—	Apāmārga, Kharamañjari
Malayālam	—	Kaṭalāti, Nāyuruvi
Tamil:	—	Nāyuruvi, Kaṭlalāṭi, Kadelāri
Hindi:	—	Chirchira, Chikri, Latjira, Latchirae, Agareh, Aghedo.

Distribution and habitat.

The plant is found throughout India in all plains districts as well as in hills up to 900 metres elevation. It is a fairly common to abundant, gregariously growing troublesome weed of dry waste places, road sides, grasslands etc. found throughout the year but especially during the rainy and cold seasons.

Habit and general features

Achyranthes aspera Linn. is an erect or semi-erect much-branched diffuse or suffrutescent biennial shrub growing half to one metre in height (occasionally attaining a height of two metres) with terete or bluntly quadrangular striate pubescent branches thickened just above the nodes, bearing simple, opposite, orbicular-ovate or elliptic, usually obtuse slightly thick ashgreen velvety tomentose herbaceous leaves, up to 10 cms. in length and 7.5 cms. in width and long slender terminal spikes reaching up to 45 cms. in length of small greenish deflexed flowers and easily disarticulating fruits that by means of small spiny bracteoles are capable of securely adhering to fur of animals, or clothing.

External morphology

Leaves: short-petioled, opposite, ex-stipulate, somewhat thick, membranous to leathery, velvety tomentose to pubescent rarely glabrate, soft above; variable in shape, orbicular-ovate or elliptic abruptly attenuated at the base, very obtuse or shortly acuminate at tip, up to 10 cms. long by 7.5 cms. broad and with the margin entire but, slightly wavy.

*Achyranthes aspera* Linn.

1 & 2. Flowering branches

3. Part of the fruiting spike enlarged

4. Two views of a fruit one showing bract and the other the two bracteoles

5. Fruit and seed

Flowers: small, bisexual, monochlamydeous with membranous bract and spinescent persistent bracteoles. They are slightly longer than the bracteoles, 4 to 6 mm. long, shining, purplish-green, or tinged red or purple and arranged densely crowded in slenderly virgate, rigid, generally simple or rarely branched terminal twiggly pubescent spikes, which at first are short but rapidly lengthen during the ripening of the fruits ultimately reaching a length of 45 cms. or more when the fruits are ripe. The flowers are erect in bud but during ripening of the fruit become deflexed or retrofracted and readily disarticulate from the rachis along with the persistent bracteoles. *Bracts*-membranous, persistent; *bracteoles*-two, persistent, ovate, spinescent with the lower or basal half hyaline broad or wing-like and adherent to the flower. *Perianth* - persistent, less than six mm. in length or about twice as long as the bract. It consists usually of five subequal rigid, ovate-oblong, subulate-lanceolate, glabrous or shining, calycine aristate imbricate segments (sepals) each less than 6 mm. long, that are somewhat connate below. The segments ultimately become ribbed and hardened. *Stamens* - five with filiform filaments and two celled anthers. These have membranous bases which are connate to and alternate with an equal number of quadrate, truncate, fimbriate or lacerate staminodes that are with or without dorsal appendages. *Ovary*-superior, oblong, sub-compressed and one-celled with a solitary pendulous ovule on a long basal funicle; *style* - filiform ending in a capitate stigma.

Fruit: an oblong, oblong-cylindric, or ovoid, smooth brown utricle, truncate, rounded or areolate at apex. When ripe it usually disarticulates easily from the rachis above the bract. (The persistent perianth containing the ripe fruit disarticulates from the rachis above the bract carrying away with it the spinescent bracteoles by means of which it gets attached to fur or clothing or other objects and is thus transported). *Seeds* - brown, inverse, subcylindric, oblong, truncate at apex, rounded at base, with coriaceous testa and membranous tegmen. - endospermic. *Embryo* - annular surrounding a central floury albumen. It has oblong cotyledons that are recurved again and an erect radicle.

The plant as a whole is used in medicine.

CYATHULA PROSTRATA Blume.*

Synonyms: *Desmochaeta prostrata* D.C.

Family: *Amarantaceae*

Distribution and habitat.

Bengal, Sikkim, Khasia mountains, Western Peninsula etc. It is a plant of the plains districts growing in somewhat shady moist localities and because of its spreading habit often covering an area of a few square metres.

Habit and general features

Cyathula prostrata Bl. is an annual or occasionally perennial slender much branched herb with the stems and main branches prostrate or decumbent reaching 30 to 60 cms. in length, rooting at the lower nodes, and the end branches ascending or erect. These bear simple, opposite, exstipulate short-petioled, ovate or rhomboid-ovate subacute slightly hairy leaves often reddish on the under surface up to 7 cms. long and 3.5 cms. broad (2.5 to 7 by 1.3 to 3.5 cms.) and simple slender terminal racemes or spikes, 10 to 20 cms. or more long, of small pale violet flowers arranged in fascicles of 2 or 3 at slightly to fairly distant intervals.

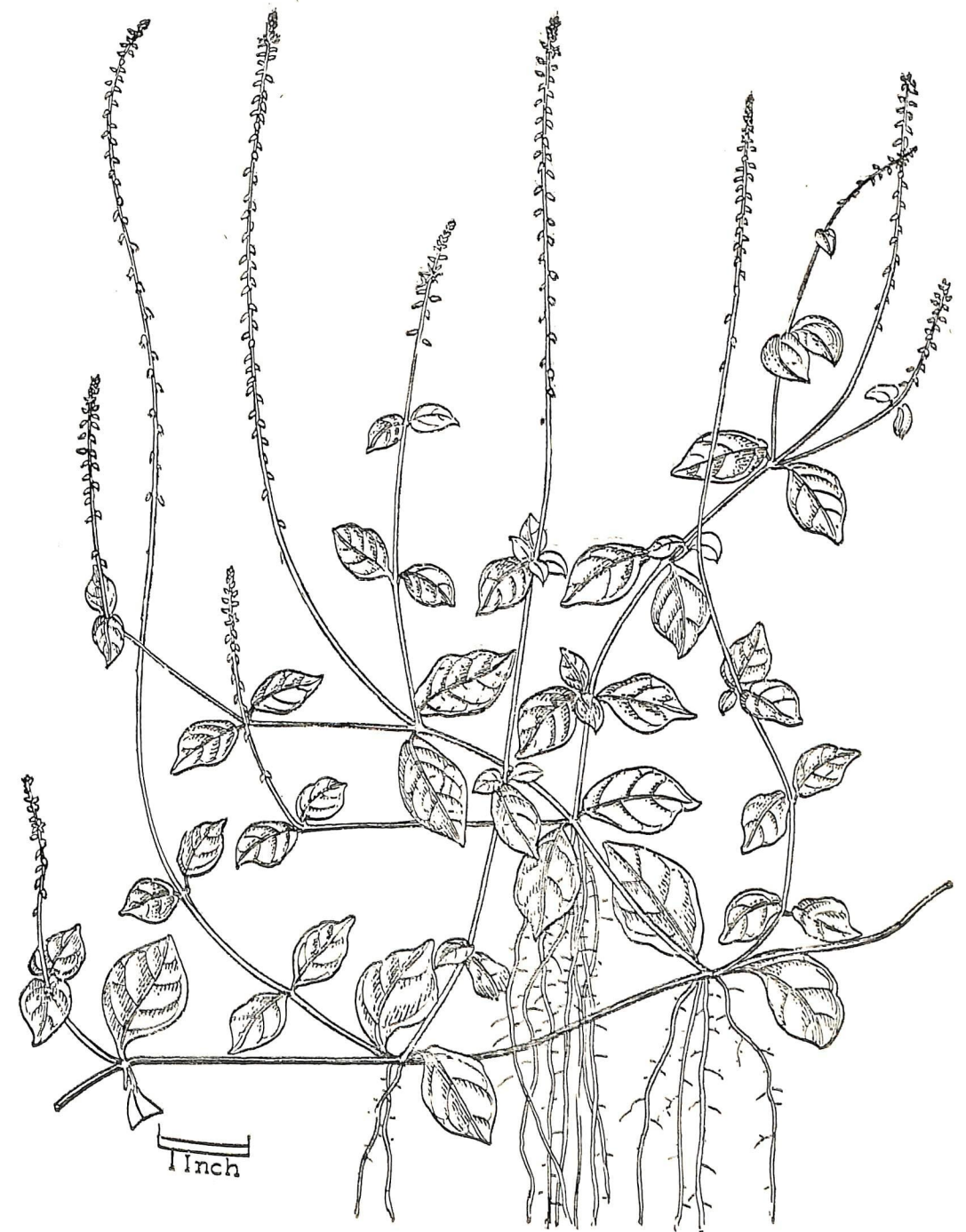
The plant is in flower nearly throughout the year.

External morphology.

Stems and branches: slender, more or less hairy, purplish or reddish purple or dark green, the basal or lower older portions decumbent and rooting at the nodes, the younger branches ascending and terminating in spicate racemes.

Leaves: simple, opposite, exstipulate, very shortpetioled, 2.5 to 7 cms. by 1.2 to 3.5 cms. ovate, or ovate - or elliptic - rhomboid, entire, sabacute, slightly hairy on both surfaces, the under surface often pinkish red.

* The plant known as *Cerukatalādi* (Malayālam) (that is smaller *Achyranthes*) is occasionally used in Kerala instead of *Achyranthes aspera* or as a variety of *Apāmārga*.



Cyathula prostrata Blume.

Inflorescence: simple, slender terminal pedunculate erect spicate racemes 10 to 20 cms. or more long bearing laxly arranged few flowered drooping fascicles of small flowers. Rachis slender hairy.

Flowers: monochlamydeous, small pale violet, in few flowered fascicles bracteate and bracteolate. *Bracts*: ovate, acuminate, shortly aristate, pubescent. *Bracteoles* similar to bracts. In each fascicle only one or two are perfect, and the others (laterals) sterile, pedicels less than one mm.—in length. The perianth segments of the sterile flowers ultimately become modified or reduced to rigid hooked awns and help in dispersal by animal agency. *Perianth segments* — of the perfect flowers: five, calycine scarious, 2 to 2.5 mm. long, oblong one nerved acuminate or shortly apiculate slightly connate at base and imbricate in bud. *Stamens* — five, the filaments which bear two celled ovoid anthers alternate with 2 to 3 forked or lacerate staminodes and all these are united towards the base to form a membranous hypogynous cup. *Ovary* — superior, obovoid, glabrous, unilocular and encloses a solitary ovule pendulous from a long basal funicle; *style* very short (less than a mm.) filiform ending in a capitate stigma.

Fruit: an ovoid thinly membranous utricle enclosed in the perianth and with its apex areolate. *Seeds* — about one mm. long, oblong, ellipsoid, yellowish brown smooth shining inverse; *testa* coriaceous; *embryo* annular with linear flat cotyledons and an erect radicle.

*PRASĀRĀNĪ

Source plants : *Merremia hastata* Hallier f. and *M. tridentata* Hall f.

Family : Convolvulaceae.

Sanskrit text

प्रसारणी राजबला भद्रपर्णी प्रताननी ।

सरणी सारणी भद्रा बला चापि कटम्भरा ॥ (भावप्रकाशः)

Prasārāṇī rājabalā bhadraparṇī pratānānī

Sarāṇī sārāṇī bhadrā balā cāpi kaṭambharā ॥

(Bhāvaprakāśaḥ)

प्रसारणी राजबला चारुपर्णी प्रतानिका ।

शारणी सारणी भद्रपर्णी तप्तसरा सरा ॥ (मदनपालनिघण्टुः)

Prasārāṇī rājabalā cāruparṇī pratānikā

Sārāṇī sārāṇī bhadraparṇī suprasarā sarā ॥

(Madanapāla nighaṇṭuḥ)

प्रसारणी सुप्रसरा सारणी सरणी च सा ।

चारुपर्णी राजबला भद्रपर्णी प्रतानिका ॥ (धन्वन्तरिनिघण्टुः)

Prasārāṇī suprasarā sārāṇī sarāṇī ca sā

Cāruparṇī rājabalā bhadraparṇī pratānikā ॥

(Dhanvantari nighaṇṭuḥ)

प्रसारिणी सुप्रसरा सारणी सरणी सरा ।

चारुपर्णी राजबला भद्रपर्णी प्रतानिका ॥

प्रबला राजपर्णी च बल्या भद्रबला तथा ।

चन्द्रवल्ली प्रभद्रा च ज्ञेया पञ्चदशाह्वया ॥ (राजनिघण्टुः)

*Books on Indian materia medica such as, U. C. Dutt's *Materia medica of the Hindus*, Kirtikar & Basu's *Indian medicinal plants*, Nadkarni's *Indian Materia medica* etc. equate *Paederia foetida* Linn. belonging to Rubiaceae as *Prasārīṇī*. In Kerala the plants used as *Prasārīṇī* are *Merremia hastata* Hallier f. and *Merreia tridentata* Hallier f. They are very similar in general habit and go under the same Malayālam and Tamil names. Of these *M. tridentata* Hallier f. is also equated as *Prasārāṇī* by Kirtikar and Basu and Nadkarni.

Prasārīṇī suprasarā sārāṇī sarāṇī sarā

Cāruparṇī rājabalā bhadraparṇī pratānikā

Prabalā rājaparṇī ca balyā bhadrabalā tathā

Candravallī prabhadrā ca jñeya pañcadasāhvya ॥

(Rāja nighaṇṭuḥ)

Properties and uses.

प्रसारणी गुरुवृष्या बलसन्धान कृत्सरा ।

वीर्योष्णा वातहृत्तिक्ता वातरक्तकफापहा ॥ (भावप्रकाशः)

Prasārāṇī gururvṛṣyā balasandhānakṛtsarā

Vīryoṣṇā vātaḥṛttiktā vātaraktakaphapahā ॥

(Bhāvaprakāśaḥ)

प्रसारणी गुरुश्रोष्णा तिक्ता बल्या सरा मता ।

भग्नास्थिसन्धानकरी कान्तिकृद्धातुवर्धका ॥

वातार्शःशोफकफहा मलस्तम्भकरी मता ।

वातरक्तं त्रिदोषं च नाशमेदिनि कीर्तिता ॥ (निघण्टुरत्नाकरः)

Prasārāṇī gurusroṣṇā tiktā balyā sarā matā

Bhagnāsthīsandhānakarī kāntikṛddhātuvardhakā

Vātārsāḥsophakaphahā malastambakarī matā

Vātaraktam tridoṣaṇca naśayediti kīrtitā ॥

(Nighaṇṭuratnākaraḥ)

प्रसारणी गुरुस्तिक्ता सरा सन्धानकृन्मता ।

त्रिदोषशमनी वृष्या तेजःकान्तिकृत्प्रदा ॥ (धन्वन्तरिनिघण्टुः)

Prasārāṇī gurustiktā sarā sandhānakṛnmatā

Tridoṣaśamanī vṛṣyā tejaḥkāntikṛtpradā ॥

(Dhanvantarinighaṇṭuḥ)

प्रसारणी गुरुष्णा च तिक्ता वातविनाशिनी ।

अर्शः श्वयथुहन्त्री च मलविष्टम्भहारिणी ॥ (राजनिघण्टुः)

Prasāraṇī gurūṣṇā ca tiktā vātavinasīni
 Ars'ahs'vayathuhantri ca malaviṣṭambhahārini
 (Rājanighaṇṭuḥ)

Meanings of the descriptive terms

Prasārani Pratārani Sārani Suprasa and Sarā. – All these terms indicate that the plant has a spreading habit. The term *Prasārini* also indicates the property of the drug of stretching out parts of the body contracted by paralysis. (relaxing the muscles)

Cāruparni and *Bhadruparni* refer to the beautiful appearance of the leaves

The terms, *Bhadra*, *Rājabalā*, *Rājaparni*, *Balya* and *Prabhadra* refer to certain attributes of the plant such as giving strength.

(Is this a variety of *Balā*?)

Properties and uses

Prasārani is heavy, laxative, bitter, and hot in action. It overcomes the ill effects of *vāta*, *vātarakta* and *kapha*. It helps in building up the basic tissues of the body and is useful in curing piles, oedema and simultaneous vitiation of three doṣas namely *vāta*, *pitta* and *kapha*. *Prasārani* promotes sexual vigour, increases semen, and gives bodily strength and youthful glow.

“The entire plant including stem leaves and root is used internally and externally in rheumatic affections with contraction and stiffness of the joints, for which *Prasārani* is regarded as a specific”

Some of the more important preparations in the composition of which this enters are:-

1. *Prasārini tailam*.
2. *Prasārinyādi kaṣāyam*.

These are mainly used for curing facial paralysis and partial paralysis of the body.

MERREMIA HASTATA Hallier f.*

Synonyms: *Ipomaea angustifolia* B. Clarke. *Ipomaea flicaulis* Blume. *Ipomaea denticulata* Br. *Convolvulus hastatus* Desv. *Convolvulus angustifolius* C. *Convolvulus flicaulis*

Family: Convolvulaceae

Sanskrit	—	Prasārini,
Malayālam	—	Ceruṣayera, Talanīli
Tamil	—	Tiruppapullu, Tiruppan-pullu Mudiakuntal

Distribution and habitat

The plant is recorded as occurring in the hills of the Deccan peninsula extending north to Bundelkund and the Khasia mountains, the Konkan, Orissa, Bombay and Kerala from sea level to 900 meters elevation. It grows under a fairly wide range of climatic and soil conditions.

Habit and general features

Merremia hastata Hallier f. is a diffuse perennial or rarely annual herb with several elongate slender or filiform angular smooth creeping or occasionally twining branches starting from a short but thick stem or root-stock and bearing simple, alternate, sessile, linear-hastate, acute leaves 2.5 to 7.5 cms. long and small cream-yellow mostly solitary axillary flowers on long slender peduncles.

External morphology

Leaves: simple, alternate, exstipulate, sessile sub-sessile or very short-petioled, narrow linear-oblong to linear-lanceolate, quite smooth, hastate at base with the auricles coarsely denticulate or toothed, and acute and mucronate at apex. They vary from 2.5 cms. to 7.5 cms. or more in length and up to 1.2 cms. in width.

* *Merremia tridentata* Hallier f. and *M. hastata* Hallier f. are the accepted botanical sources of *Prasārani* in Kerala. The plants are very similar in habit and are known by the same local names. They are used medicinally for the same purpose.

Flowers: small, mostly solitary, pale or cream-yellow or occasionally whitish, with a dark throat, borne on long slender axillary peduncles that are usually longer than the leaves and reaching up to 7.5 cms. in length. Sometimes there may be more than one flower present on a single peduncle. Buds acute. *Pedicels* clavate; *bracts* - minute, persistent. *Calyx* - of five free ovate-acuminate or lanceolate-acuminate, glabrous sepals with recurved tips, each 6 to 8 or 10 mm. long. *Corolla* - small, less than or about 18 mm. in length, gamopetalous, funnel-shaped, pale yellow with a purple or crimson eye; limbs with shallow lobes. *Stamens* - five, filaments epipetalous free; *Pistil* - bicarpellary syncarpous; *ovary* - superior, 2 or 4-celled and four - ovuled.

Fruit: an ovoid or depressed globose glabrous two-celled capsule about 6 mm. in diameter with a thin papery pericarp surrounded by the slightly enlarged sepals. *Seeds* - four, glabrous.

Official parts: The entire plant or occasionally the roots only.

Description of the root.

The root system consists mainly of a straight slightly tuberous tap-root with many long narrow lateral roots. The tap root is about 25 cms. or more in length and about 1 or more cms. in thickness. It is dark brown in colour, irregularly bent or curved and slightly woody. The surface is fairly smooth but uneven due to the presence of many depressions, a few transverse fissures and many small wiry rootlets. The dark brown outer layer can be removed by gently scraping and exposes a cream coloured cortex and a central woody core. A few lateral roots are present at intervals. These are long narrow and provided with many wiry rootlets. A milky latex exudes from the cut surface of fresh roots. This is sticky and on drying turns light brown in colour. The fresh cut surface shows a central cream white wood region surrounded by a light brown to dark bark. On drying the root shrinks and many longitudinal wrinkles appear on the root and no latex is found to exude from the bark which is then found closely appressed to the wood.

Histology

The transverse section of a root about 7 mm. thick is circular in outline. The bark is about 1 mm. in thickness and the central



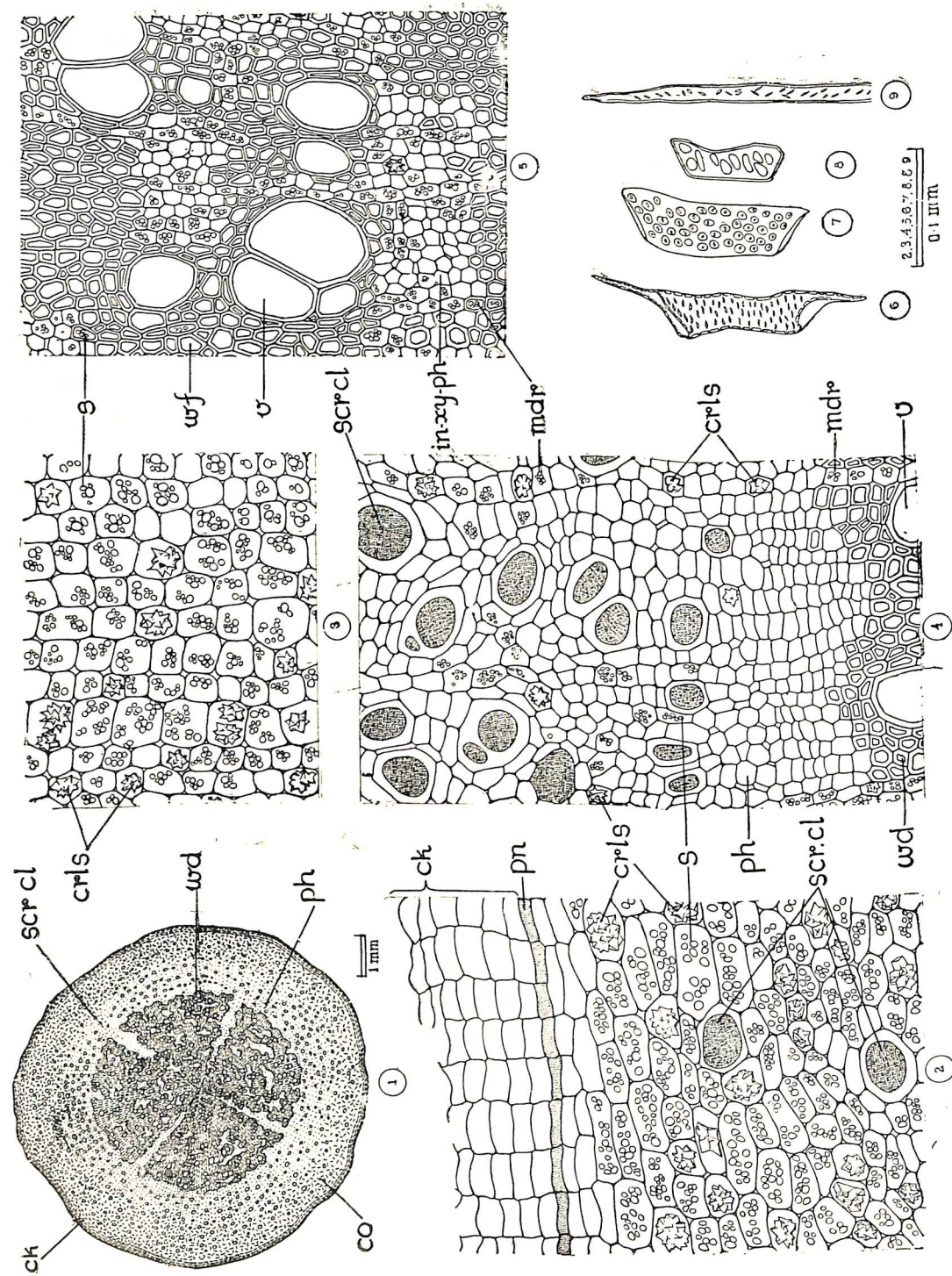
1. *Merremia hastata* Hallier f.

2. *Merremia tridentata* Hallier f.

3. A fruit of *M. hastata*

3a. A fruit of *M. hastata* after the removal of the thin pericarp

3b. Seeds



Histology of the root of *Merremia hastata* Hallier f.

1. Diagrammatic sketch of the T. S. of the root
 2. Cork and the cortex
 3. A part of the wide medullary ray
 4. Phloem with the secretory cells
 5. Wood with the interxylary phloem
 6 & 7. Vessels
 8. Wood parenchyma
 9. Part of a wood fibre

woody core has a diameter of 5 mm. Latex exudes from the inner part of the bark. The outermost tissue is the *cork*. This is a very narrow zone and consists of four to six rows of thinwalled rectangular twice as long as broad. A *phellogen* of a single row of cells can be made out and just inner to that is a *phelloderm* composed of 1 or 2 rows of cells. The *cortex* comprises about 1/3 of the thickness of the bark and consists of tangentially elongated thinwalled cells. Those towards the periphery are comparatively larger. Most of the cortical cells are filled with simple small rounded starch grains 3 to 12 μ in diameter. Several other cells contain cluster crystals of fairly large size that vary from 15 to 30 μ in length. Cut ends of a number of thinwalled circular cells scattered in the midst of cortical parenchyma. They may be solitary or arranged superposed in vertical rows. Their contents turn brown on drying. The cells of the phloem are distinct towards the innermost region of the phloem. Some of the phloem parenchyma cells contain small sized cluster crystals and some others starch grains. Several secretory cells containing latex occur distributed throughout the major portion of the phloem also.

The *wood* - forms the major part of the root. The xylem is characterised by the presence of interxylary phloem and appears furrowed by four broad prominent medullary rays that start from near the centre. Vessels are many in number. They occur either solitary or in small groups of 2 and 3. The diameter of the vessels varies from 18 to 120 μ . They are mostly pitted but vessels with bordered pits are also common. Thickwalled woody fibres are present surrounding the vessels their length varying from 300 to 700 μ .

Within the wood or xylem are present several irregularly scattered patches of thinwalled phloem tissue. In some of these patches of interxylary phloem, sieve tubes and companion cells are distinct and the phloem parenchyma cells contain starch grains. A few of the phloem parenchyma cells contain small sized cluster crystals of calcium oxalate. At the centre of the wood four groups of primary xylem can be distinguished.

Medullary rays: The four prominent multiseriate rays are broader towards the outer or peripheral region of the wood where they have a width of 500 to 700 μ whereas near the centre of the root their width is only about 80 μ . The ray cells are square rectangular or slightly radially elongated. Almost all the ray cells contain starch grains and a few cells have cluster crystals of calcium oxalate which may be one or two or more in each cell. Within the secondary wood many long uniseriate and biseriate rays also occur. The cell walls of these ray cells of the wood are thick except for those present at the regions of the interxylary phloem. Most of the ray cells here also contain starch grains. The ray cells in the phloem are thinwalled and rectangular to slightly radially elongated. They too contain either starch grains or cluster crystals of calcium oxalate. The rays are not straight on account of the presence of a very large number of secretory cells at the phloem region.

Distinguishing features

1. The presence of a large number of secretory cells scattered within the phloem which exude a milky latex.
2. The presence of four broad prominent medullary rays.
3. The presence of interxylary phloem in the wood.

MERREMIA TRIDENTATA Hallier f.*

Synonyms: *Ipomaea tridentata* Roth. *Evolvulus tridentatus* Linn. sp. pl. (Burm.) *Convolvulus tridentatus* Linn. (Willd.)

Family : Convolvulaceae.

Sanskrit	...	Prasāraṇi, Prabhadrā, also Balā, Bhadrabalā and Rājabalā.
Malayalam	...	Pradharini, Prasāraṇi, Talanili, Senderacandi (?)
Tamil	...	Mudiyakunthal, Thiruppanpullu or Thiruppampullu.
Hindi	Somaragi, Prasarani, Bakuchi (?)

Distribution and Habitat.

Found in all the plains districts in various parts of south India, chiefly in Konkan, Bombay, Deccan, Coramandel, Carnatic and Kerala, extending north to Chotanagapur. It is a fairly common herb and occurs both in cultivated land as well as in waste places often amidst grass or similar herbage.

Habit and general features.

Merremia tridentata Hallier f. is a small glabrous prostrate or very rarely twining herbaceous annual or occasionally biennial or perennial, with a comparatively thick small woody root-stock from which arise numerous closely prostrate but not generally rooting or twining, filiform or slender elongate angular branches bearing simple nearly sessile hastate oblong or subquadrate narrow leaves about or less than 2.5 cms long with their bases hastate or auricled and the apices obtuse, truncate or more commonly three-toothed like a trident; small pale yellow flowers on one or very rarely two or more flowered, slender, axillary peduncles about as long as the

* The plants equated as *Prasāraṇi* in Kerala are *Merremia tridentata* Hallier f. and *M. hastata* Hallier f.

leaf and globular four-seeded capsules. The plant is in flower during the rainy and cold seasons from June to November.

External morphology

Leaves. simple, small, alternate, exstipulate, subsessile or short-petioled, variable from 1.2 to 2.5 cms. or more long and 1.5 to 5 mm. wide linear, linear hastate, hastate-oblong, subquadrate or oblong-obovate or linear-oblong, the base narrow hastate or subcuneate and auricled with the lobes or auricles acutely dentate; apex obtuse or more commonly truncate or three or more toothed like a trident sometimes subemarginate (retuse) mucronate. *Petiole* - if present very short and filiform.

Flowers : short-pedicelled, pale or light yellow, small, regular, campanulate, usually solitary or rarely two or three together on short axillary peduncles 10 to 20 mm. long or about as long as the leaf and with a bract and two bracteoles. Buds acute. *Pedicels* - subclavate. Bracts minute, lanceolate. *Calyx* - of five elliptic, subequal mucronate glabrous sepals, about 5 mm. long of which the outer are slightly shorter than the inner. *Corolla* - gamopetalous, regular, campanulate 8 to 12 mm. long, light or pale yellow with pink eye; margin - slightly lobed; the limb - plicate in bud the lobes shallow and the vertical plaits of the limb sometimes marked by violet lines. *Stamens* - five; filaments epipetalous filiform often villous at base; *anthers* usually twisted; pollen with longitudinal folds but not spinulose. *Gynoecium* - bicarpellary, syncarpous. *Ovary* - superior two or four-chambered and four-ovuled with a filiform style and biglobose stigma.

Fruit: a two-celled. four-ovuled. one to four-seeded ovoid or globose glabrous capsule 4 mm. in diameter. *Seeds* - dull, glabrous, trigonous, with longitudinal ridge on the convex side. *Embryo* - with crumpled cotyledons.

Officinal part: The root or more often the entire plant.

Description of the root :

The roots resemble those of *M. hastata* but are very light brown in colour and comparatively less thick. 1 or 2 lateral roots

may also occasionally thicken as much as the taproot. Latex is present but the quantity of latex that exudes is comparatively less in this root.

Histology:

The root of *Merremia tridentata* resembles that of *M. hastata* in anatomical features. The number of secretory cells is however less. So also the starch grains and cluster crystals are less in quantity. The wood does not appear so widely furrowed, as in *M. hastata*. The xylem vessels have slightly larger diameter.



GARUDI

Source plant : *Aristolochia indica* Linn.

Family : Aristolochiaceae.

Sanskrit text

छिलिहिण्डो महामूलः पातालगरुडाह्वयः । (भावप्रकाशः)

Chilihiṇḍo mahāmūlah pātālagarudāhvayah
(Bhāvaprakāśaḥ)

योगेश्वरी सर्पगन्धा नाकुली भोगिगन्धिका ।
ईश्वरी च विषघ्नी च ज्ञेयाभीरितपत्रिका ॥ (अभिधानमञ्जरी)

Yoges'vari sarpagandhā nākulī bhogiganḍhikā
Īsvari ca viṣaghnī ca jñeyābhiritapatrikā
(Abhidhānamañjarī)

The following additional terms are included as the synonyms
of *Gārudi* in *Śaligrama nighaṇṭu*.

उत्सादनी, तार्क्षी, सौपर्णी, गारुडी,
दीर्घकाण्ड, दृढकाण्ड, महाबला,
दीर्घवल्ली, दृढलता, तिक्तांगा.

Utsādani, tārksī, sauparnī, gārudī, dīrgha kāṇḍa, dīrghakāṇḍa,
Mahābalā, dīrghavallī, dīrghalatā, tiktāṅgā.

Other terms mentioned in *Jyotsnika* (a Malayāḷam publication) are :

क्ष्वेलवेग, करलक, विषवेग.

Kṣvelavega, karalaka, and viṣavega.

Properties and uses.

छिलिहिण्डः परं वृष्यः कफघ्नः पवनपहः । (भावप्रकाशः)

Chilihiṇḍaḥ param vṛṣyaḥ kaphaghnaḥ pavanāpahaḥ
(Bhāvaprakāśaḥ)

गारुडी सर्वविषजित् कुष्ठघ्नी कफवातहा । (हृदयप्रियः)

Gārudī sarvaviṣajit kuṣṭhagnī kaphavātaḥ
(Hṛdayapriyaḥ)

उत्सादनी तु मधुरा पित्तदाहासदोषनुत् ।
वृष्या सन्तर्पणी रुच्या विषदोषविनाशनी ॥ (राजनिघण्टुः)

Utsādani tu madhura pitta dahāśra doṣanut
Vṛṣyā santarpanī rucyā viṣadoṣavināśanī
(Rājanighaṇṭuḥ)

Meanings of terms.

Mahāmūla, — *Mahā*, the opposite of *hṛṣva* indicates that its root is considerably long. *Pātālagārudī* meaning reaching to the netherland or innermost depths of the earth, also conveys the same meaning.

Dīrghakāṇḍa and *Dīrghalatā*, indicate the presence of a long twining stem, and *Dīrghalatā* that the latter is very strong.

Gārudī, *Sauparnī*, *Tārksī* meaning kite or eagle may indicate that the plant is an enemy of snakes (snake venom).

Nākulī The term *Nākulī* meaning the mongoose the enemy of the cobra also conveys the same idea.

Kṣvelavega and *Īsvari* indicate that this has the power to bring down (neutralise) or resist snake poison.

The terms *Karalaka* and *Viṣavega* also indicate the property of allaying or destroying the effects of the toxicity of poison.

Utsādani indicates its property of healing sores (ulcers) and *Tiktāṅga* that it is bitter.

Properties and uses

Gārudi is considered very useful in overcoming resisting or destroying the toxic effects of all poisons especially snake poison. It is an "*usradoṣajit*" or purifier of blood and hence useful in skin diseases. It heals wounds (*utsādani*) and dispels diseases due to morbidity of *vāta*, *pitta* and *kapha*. It is (*rucya*) appetiser and aphrodisiac. It relieves burning sensation and gives a feeling of relief and sense of well being. Though *Bhāvaprakāśa* has not specially mentioned its use as a drug against poison in actual practice in Kerala the plant is largely used in the treatment of poison cases especially snake poison.

ARISTOLOCHIA INDICA Linn.*

Synonyms : *A. lanceolata* Wight; *A. mysorensis*, Fisch;
A. pandurata Wall.

Family : Aristolochiaceae.

Sanskrit	...	Ahigandha, Rudrajata, Arkamula, Sunanda, Īswari
Malayālam	...	Garudakodi, Karanavalli, Karēlakam, Karukapulla, Iswaramūri, Iswarmūli, Iswarmulla
Tamil	...	Garudakodi, Perumarindu, Perimarindu Perimkizhangu, Ichchuramūli, Ichchur- amula.
Hindi	...	Rudrajata.

Distribution and habitat

The plant is distributed in all the provinces of India at low levels and up to 750 metres elevation in the hills from Nepal, Bengal and Assam in the North through the Deccan peninsula and Konkan southwards to Coromandal and Kerala. It grows under a variety of climatic and soil conditions however unfavourable, even in places where the soil is very poor and dry. It is usually found scrambling over hedges and bushes in copses and jungles but occasionally reaches to the heights of tall trees.

Habit and general features

Aristolochia indica Linn. is a glabrous perennial twiner with a long slightly tuberous or stout root that penetrates deep into the soil. The younger branches and tender shoots are slender striated and smooth while the stems and older branches are woody strong and flexuose and covered with corky bark. The former bear simple alternate short-petioled entire, membranous very variable three

**Aristolochia indica* according to some vydians of repute in Kerala is the botanical source of *Sarpagandhi* as this term occurs among the synonyms of *Gārudi* along with *Nākulī*.

nerved leaves, the shape varying from linear to obovate or subpan-duriform and from 10 x 1.2 or 1.8 cms. to 18 x 8 cms. in size. The flowers are irregular, greenish-white to light purplish and 2.5 cms. or more long. These have a tubular perianth with a swollen base a long narrow neck and an obliquely trumpet-shaped mouth or lip. The fruits are septiciidally dehiscent pendent capsules tightly packed with numerous flat triangular broadly winged or very thin seeds.

All parts of the plant have a bitter taste and emit when crushed a characteristic sharp nauseous odour.

External morphology

Leaves: simple, alternate, short-petioled; the *petiole* - from 6 to 8 mm. long, very slender with its base dilated and often with a stipule like pro-phyll or reduced leaf of the undeveloped axillary bud; *blade* somewhat wedge-shaped or obovate, very variable in shape and size: - the shape varies from linear to obovate oblong or subpan-duriform and the size in the narrowest forms is about 10 cms. by 1.2 or 1.8 cms. and in the larger and broader forms from 10 to 18 cms. by 7.5 cms. at the broadest part which may be at the base, middle or above the middle: - entire, membranous or thin, smooth, the base cuneate rounded or shallowly or slightly cordate and mostly three or occasionally five-nerved, and the tip obtuse or abruptly or gradually obtusely acuminate or even apiculate. Tender leaves are light purplish.

Inflorescence: One to three or more flowered axillary racemi-form scorpioid cymes shorter than the leaves.

Flowers: bracteate with the bract opposite the base of the pedicel and occur in fascicles of 1-3 or more together. They are bisexual epigynous and monochlamydeous. The perianth is gamophyllous, greenish-white or light-purplish and has a characteristic shape. It is up to about 3.8 cms. long including the tube and limb. Its basal part is swollen or inflated and globose with two small knob-like swellings on one side near the tube, the middle part is contracted to form a straight shortly and narrowly funnel-shaped tube and the distal or mouth region is expanded into a two-lipped or obliquely trumpet-shaped limb which gradually passes into a short oblong obtuse glabrous dark brownish or purplish

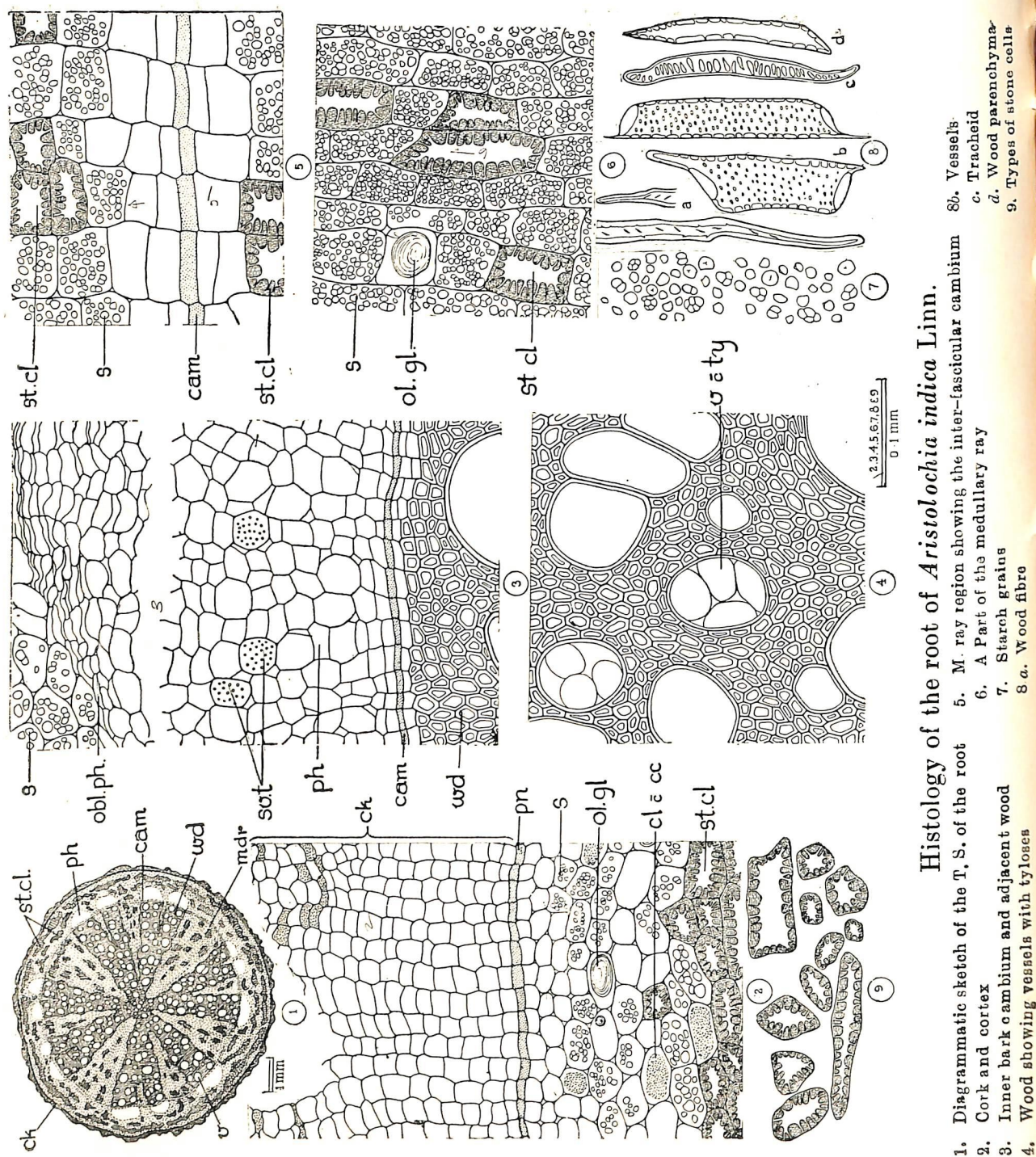


Aristolochia indica Linn.

1. A flowering branch

2. A dehiscent fruit

3 & 4. Two views of the seed



Histology of the root of *Aristolochia indica* Linn.

1. Diagrammatic sketch of the T. S. of the root
2. Cork and cortex
3. Inner bark, cambium and adjacent wood
4. Wood showing vessels with tyloses

5. M. ray region showing the inter-fascicular cambium
6. A part of the medullary ray
7. Starch grains
- 8a. Wood fibres

- 8b. Vessels
- c. Tracheid
- d. Wood parenchyma
9. Types of stone cells

brown lip. The narrow tube is provided with numerous downwardly pointed hairs. *Androecium* of six stamens that surround and are adnate to the short styler column each with two parallel anther cells. *Gynoecium* - six-carpellary, syncarpous. *Ovary* - inferior; inflower, about 1.2 cms. long, cylindrical, elongate grooved and six celled with numerous ovules arranged in two series or rows along six parietal placentae: it is surmounted by a short thick styler column that divides above the anthers into a three or six lobed somewhat conical stigmatiferous disc-like part with the stigmatic lobes incurved.

Fruit: A roundish or oblong-hexagonal shallowly grooved pendulous six-celled six-valved septicidal capsule 2.5 to 4 or 5 cms. long and slightly less broad, with a fairly long stalk. The dehiscent capsule appears like a basket hung by six strings formed as a result of the splitting of the fruit stalk. *Seeds*—numerous, horizontal, triangular, flat and thin or broadly winged, about 6 mm. long. They are endospermic: each seed has a minute embryo close to the hilum.

Part used — Chiefly the root.

Description of the root.

The root system consists mainly of a considerably long tortuous tap or main root and a few lateral branches. The main root goes deep into the earth (*mahāmula*). It may reach a length of two meters or more and varies from 5 to 20 mm. in diameter according to its age. It is somewhat cylindrical but has several irregular shallow depressions as a result of the impact of the soil particles. The young roots are light brown and fairly smooth whereas the older ones are comparatively rough on account of the development of cork and lenticels and the presence of scars of rootlets. There are only a limited number of lateral roots which bear wiry rootlets. Occasionally instead of one main root there may be two or more stout branches starting a few cms. below ground level. The cork layer is somewhat friable. In a fresh cut T. S. of the root the entire bark appears as a narrow cream coloured strip surrounding a wide woody core. The wood appears composed of a number of wedgeshaped radiating pieces or plates with their apices towards the centre. The pieces of wood are separated by or alternate with the medullary rays

of which four are broad and start near the centre and four or more narrower that do not reach the centre. The wood has a light yellow colour and appears highly porous, the pores being sufficiently large to be easily visible with the naked eye. The medullary rays are soft and cream-white in colour. There is no pith in the centre.

Histology

The T. S. of a root 8 mm. in diameter is nearly circular and the outline somewhat regular. The outermost layer namely the *cork* is thin. It varies in thickness from 240 to 350 μ and consists of 8 to 25 rows of cork cells. The cork cells are cubical to rectangular, the length in the case of the latter being about twice the width as seen in transverse section. They are thinwalled, arranged in regular radial rows and measure 15 x 15 μ to 30 x 15 μ . Some of the cells of the peripheral rows are slightly compressed and a few are found exfoliating. A few of the peripheral cells are filled with brownish contents. A *phellogen* consisting of a single row of narrow thinwalled cells is evident just within the cork. The *cortex* has 2 to 3 times the width of the cork. The cells are all thinwalled but the outermost rows of cortical cells just inner to the phellogen are somewhat rounded or isodiametric while those towards the interior are slightly tangentially elongated. Some of the cortical cells contain contents of an orange red colour probably resinous in nature which dissolve when treated with alcohol. The vast majority of the cells of the cortex are loaded with starch grains. The starch grains are simple as well as compound, the latter consisting of 2 to 6 components. The simple grains are somewhat rounded to plano-convex while the compound grains are almost oval in outline. The starch grains measure 3 to 12 μ in length. A few cortical cells possess large globules of an oily nature which almost fill the cells. A narrow incomplete ring of stone cells composed of 3 to 6 rows of cells is present about the middle of the cortex. This stone layer is not uniform in thickness. Groups of stone cells also occur in scattered irregular patches within this layer, each group consisting of five to twelve cells. The stone cells vary in size and shape from rounded or oval to rectangular and elongated and measure 18 to 15 μ by 18 to 45 μ . The cells are fairly thickwalled and show distinct radiating pits in their walls.

There is no pith, but the centre of the root is occupied by wood which is composed of six to eight or ten wedgeshaped radiating strips, with their wider ends towards the outside and capped with thin patches of phloem. In young roots only four such radiating strips of xylem are present each appearing bifurcated about half way from the distal wider region. So in the young root there is only a lesser number of groups of phloem present. In very old roots 12 to 16 groups of phloem are present with as many or half as many corresponding wedges of the wood. The older elements of phloem situated at the outer convex side are seen in a much compressed condition. The phloem parenchyma cells are slightly tangentially elongated at the outer region but regular and polygonal in the inner region. Sieve tubes and companion cells are very distinct. A complete ring of cambium is present in between the phloem and xylem.

The xylem consists of many vessels, a smaller number of tracheides wood fibres and wood parenchyma. The individual vessels vary considerably in shape and size. Some are short and very wide while others are narrow and elongated. Most of them have tail-like ends. They measure 100 to 260 μ in length and 30 to 120 μ in diameter. In very old roots some of the vessels are occluded with tyloses. Tracheids are present but they are few in number. They are narrow, not much elongated and have tapering ends. The wood fibres are many in number. They are narrow elongated and thickwalled and measure from 250 to 700 μ in length and 20 to 39 μ in width. The wood parenchyma is comparatively less than the fibres. They are also thickwalled though the thickness varies and possess several simple pits on their walls. They are mostly rectangular—3 to 4 times as long as broad—or slightly elongated. The centre of the wood is occupied by four groups of primary xylem.

Medullary rays.

Generally eight to ten in number alternating with the radiating arms of wood. They are multi-seriate and broadly wedgeshaped with the wider ends towards the periphery, but the four primary rays starting from the centre are the broadest. Towards the centre they measure 160 μ in width and consist of 6 to 8 radial rows of cells while at the outermost region

they measure 1120μ in width and consist of 30 to 36 radial rows of cells. A few of the secondary medullary rays are nearly as long as the primary rays but slightly narrower. As the root becomes older and increases in thickness new secondary rays develop. Within the wider rays are present scattered groups of stone cells. Many large sized groups consisting of 20 to 30 cells are found at the wider region of the rays and smaller groups consisting of 2 to 6 cells at the narrower end towards the centre of the root. The stone cells present on the wider region are generally square to tangentially rectangular as seen in T. S. their length being slightly less than twice the width, but those found towards the inner part of the rays are slightly radially elongated.

The cells of the medullary rays are thinwalled, almost square to rectangular at the wider region, and measure $50 \times 54\mu$ to $60 \times 75\mu$ whereas they are slightly radially elongated towards the interior and measure $21 \times 60\mu$ to $45 \times 80\mu$. Most of these cells are packed with starch grains similar to those present in the cortical cells. Some of the cells contain large globules of an oily nature like those present within the cortex. These globules are found in large numbers in very old roots but in very young roots they are comparatively very few.

Distinguishing features.

1. The presence of a narrow irregularly thick incomplete ring of stone cell within the cortex in addition to other small groups.
2. The formation of wood in the form of wedge-shaped pieces radiating from the centre.
3. The presence of four broad wedge-shaped many-seriate medullary rays starting near the centre and four or more similar or narrower shorter secondary rays.
4. The occurrence of scattered groups of stone cells within the broad medullary rays
5. The presence in abundance of simple and compound starch grains in the ray cells as well as in the cortical cells.
6. The presence of large globules of an oily nature in some of the ray cells as well as in some cortical cells.

IKSURA

Source plant* *Asteracantha longifolia* Nees.

Family: Acanthaceae.

Sanskrit Text:

कोकिलाक्षस्तु काकेक्षुरिक्षुरः क्षुरकः क्षुरः ।

दिक्षुकाण्डेक्षुरप्युक्त इक्षुगन्धेक्षुवालिका ॥ (भावप्रकाशः)

Kokilākṣastu kakekṣurikṣurāḥ kṣurakaḥ kṣurāḥ
Dikṣuhkāṇdekṣurapyukta ikṣugandhekṣuvalika
(Bhāvaprakāśaḥ)

इक्षुगन्धातु काण्डेक्षुः कोकिलाक्षे क्षुरक्षुरः (अमरकोशः)

Ikṣugandhātu kāṇdekṣuh kokilākṣe kṣurakṣurāḥ
(Amarakosaḥ)

कोकिलाक्षः सृगाली च शृङ्खला रणकस्तथा ।

सृगालकण्ठी वज्रास्थि शृङ्खली वज्रकण्टकः ॥

इक्षुरः क्षुरको वज्रः शृङ्खलिका पिकेक्षणा ।

पिच्छिला चेक्षुगन्धा च ज्ञेया भुवनसम्मिता ॥ (राजनिघण्टुः)

Kokilākṣaḥ sṛgālī ca śṛṅkhala raṇakastathā
Sṛgālakaṇṭhī vajrasthi śṛṅkhālī vajrakāṇṭakaḥ
Ikṣurāḥ kṣurako vajraḥ śṛṅkhalikā pikekṣaṇā
Picchilā cekṣugandhā ca jñeyā bhuvanasammitā
(Rajanighaṇṭuḥ)

नादेयी चेक्षुरः पुण्ड्रः कण्टकी कोकिलाक्षकः ।

प्रोक्तः कोकिलपर्यायरक्षिपर्यायपूर्वगैः ॥ (अभिधानमञ्जरी)

Nādeyī cekṣurāḥ puṇḍraḥ kaṇṭakī kokilākṣakaḥ
Proktaḥ kokilaparyāyairakṣiparyāyapūrvagaiḥ
(Abhidhānamañjarī)

* There is not much controversy on the identity of the botanical source of *Iksura*. However three other plants namely *Barleria buxifolia*, *B. longiflora* and *Artanema sesamoides* are found equated with the Sanskrit term *kokilākṣa* or its synonyms. These plants also commonly bear the same local names as are applied to *Asteracantha ongifolia* vide Rama Rao's Flowering plants of Travancore pages 290 and 305.

Properties and uses

क्षुरकः शीतलो वृष्यः स्वाद्वम्लः पिच्छिलस्तथा ।

तिक्तो वातामशोश्वाश्मत्तृष्णादृष्ट्यनिलास्रजित् ॥ (भावप्रकाशः)

Kṣurakaḥ sītalo vṛṣyaḥ svādvamlaḥ picchilastathā
Tikto vātāmas'othāsmatṛṣṇādṛṣṭyanilāsrajit
(Bhāvaprakāśaḥ)

कोकिलाक्षस्तु मधुरः शीतः पित्तातिसारनुत् ।

वृष्यः कफहरो बल्यो रुच्यः सन्तर्पणः परः ॥ (राजवल्लभः)

Kokilākṣastu madhuraḥ sītaḥ pittātisāranut
Vṛṣyaḥ kaphaharo balyo rucyaḥ santarpanaḥ paraḥ
(Rājavallabhaḥ)

कोकिलाक्षो मधुः शीतो रुच्यो बल्यो गुरुः स्मृतः ।

वृष्योऽम्लस्तर्पणस्तित्तः स्वादुः स्निग्धश्च चिकणः ॥

आद्यवातामवातातिसारतृष्णाश्मरीरुजः ।

वातास्रमेहशोथामरक्तरुद्धनाशनो मतः ॥

पित्तं च दृष्टिरोगं च नाशयेदिति कीर्तितः ।

पर्णं च स्वादु तित्तं स्याच्छोथशूलविषापहम् ॥

आनाहवातमुदरं पाण्डुरोगं च नाशयेत् ।

बन्धं च मलमूत्राणां वातमेवं च नाशयेत् ॥

वृद्धस्य कोकिलाक्षस्य गुणास्त्वस्य समा मता ।

कोकिलाक्षस्य बीजं तु शीतं खदुषायकम् ॥

तिक्तं वृष्यं गुरुर्बल्यं ग्राहकं गर्भस्थापनम् ।

कफवातकरं चैव मलस्तंभकरं तथा ॥

रक्तदोषं च दाहं च पित्तं चैव विनाशयेत् ।

(शालिग्रामनिघण्टुः)

Kokilākṣo madhuḥ sīto rucyo balyo guruḥ smṛtaḥ
Vṛṣyomlastarpanāstiktāḥ svāduḥ snigdhas'ca cikkaṇaḥ
Ādhyavātāmaavatātisāratṛṣṇāsmarī rujaḥ
Vātāsrameha sothāmarataruñnās'ano mataḥ

Pittam ca dṛṣṭirogam ca nās'ayediti kīrtitah

Parṇam ca svādutiktam syācchothas'ulaviśāpaham

Ānāhavātātamudaram paṇḍurogam ca nās'ayet

Bandham ca malamūtrāṇām vātamevaṁ ca nās'ayet

Vṛddhasya kokilākṣasya guṇāstvasya samā matā

Kokilākṣasya bijam tu sītam svādu kaṣāyakam

Tiktam vṛṣyam gururbalyam grāhakam garbhasthāpanam

Kaphavātākaram caiva malstambhakaram tathā

Raktadoṣam ca dāham ca pittam caiva vinās'ayet

(Sāligraṁmanighaṇṭuḥ)

Special uses

(1) कोकिलाक्षकनिर्यूहः पीतस्तच्छाकभोजिना ।

कृताभ्यास इव क्रोधं वातरक्तं नियच्छति ॥ (अष्टांगहृदयम्)

Kokilākṣakaniryūhaḥ pītastacchākabhojinā

Kṛtābhyāsa eva krodham vātaraktom niyacchati

(Aṣṭāṅghṛdayam)

(2) शोथहृत् कोकिलाक्षस्य भस्म मूत्रेण वांभसा । (चक्रदत्तः)

S'othahṛt kokilākṣasya bhasma mutreṇa vāmbhasā

(Chakradattaḥ)

(3) सितया चर्वणं कृत्वा कोकिलाक्षस्य मूलकम् ।

तत् कर्णपूरणेनाशु सुखं नारी प्रसूयते ॥ (वङ्गसेनः)

Sitayā carvaṇam kṛtvā kokilākṣasya mūlakam

Tat karṇapūraṇerāśś' sukham nārī prasūyate

(Vaṅgasenaḥ)

(4) (उदरे) परिजातेक्षुरकाऽपामार्गं क्षारं वा तैलसंसृष्टं ।

पाययेत् ।

(सुश्रुतः)

(Udare) parijāteḥkṣurakāspāmārga kṣāram va tailasamsṛṣṭam
pāyayet".

(Susrutaḥ)

Meanings of terms

S'riṅkhala, *S'riṅkhali* and *S'riṅkhālika* are terms that indicate the presence of several nodes or joints on the plant or shoot. These terms literally mean 'chained' together. This may refer also to the gregarious habit of the plant as a result of formation of several new plants from the procumbent branches of the parent plant.

Vajrakāntaka and *Kaṇṭaki* mean having sharp thorns. Six sharp thorns are found at each node.

Kokilākṣa may refer to the likeness of its deep blue flowers to the eyes of the Kokila or 'Kuyil'.

Iksugandha, *Kaṇḍeṣu* and *Iksura* indicate the resemblance of this plant to *Iksu* namely Sugarcane.

Nādeyi - may indicate that the plant grows in marshy or watery areas.

According to *Sāligrāma nighaṇṭu*, there are two varieties namely one with white flowers and the other with blue (red?) flowers. The one with blue flowers is the common type here.

Properties and uses.

Iksura is sweet, sour and bitter. It is cold, aphrodisiac, heavy, roborant, demulcent and (*picchila*) mucilaginous. It promotes strength and appetite and overcomes *āma* and *pitta*. It cures oedema, ascites, thirst, dysentery on account of *pitta*, calculus or stones in the bladder, eye-diseases, haemoneuritis and pain due to impurity of blood. Its leaves cure toxocosis, flatulence and anaemia. Its seeds are sweet and astringent. They promote sexual vigour and strength. They arrest abortion, augment *kapha* and *vaṭa* and cure impurity of blood and burning sensation.

Special uses.

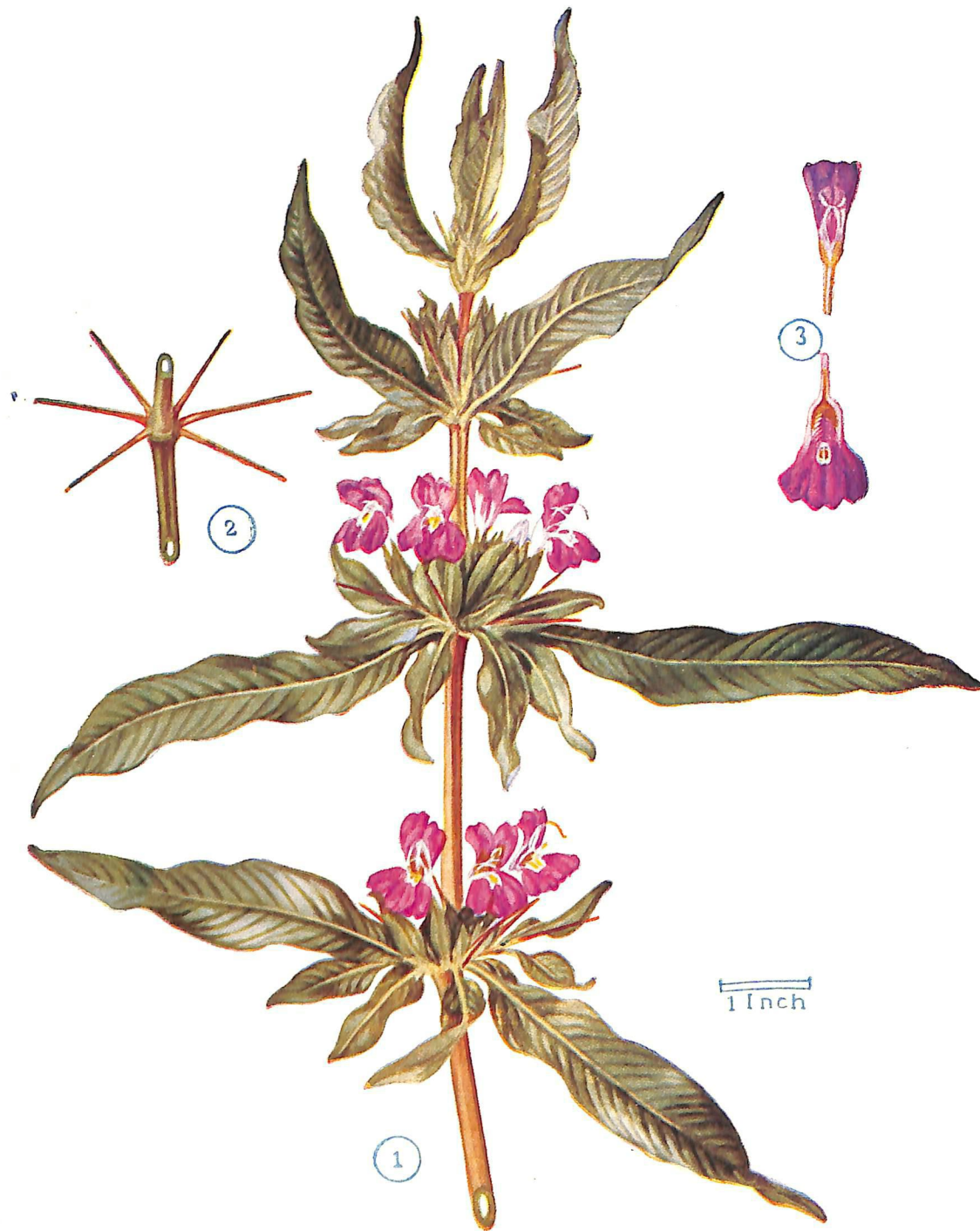
1. The juice of *Iksura* and its leaves taken in daily subdues Arthritis.

2. Oedema is cured by the internal use of the ash - *kṣara* or *Bhasma* - of the shrub with cow's urine or hot water.

3. The juice of the root of *Iksura* and sugar got by chewing them dropped into the ears causes quick and easy delivery (child birth)

4. The ash (*kṣara*) of *Pārijāta*, *Iksura* or *Apāmārga* used internally cures ascites.





Asteracantha longifolia Nees.

1. Flowering twig. 2. Top view of the spines to show the star-shaped arrangement.
3. Corolla of the flower

ASTERACANTHA LONGIFOLIA Nees.

- Synonyms: *Hygrophila spinosa* T. Anders. *Hygrophila longifolia* Kurz. *Barleria longifolia* Linn. *Barleria hexacantha* Moeres. *Ruellia longifolia* Roxb.
- Family: - Acanthaceae.
- Sanskrit - Kokilakṣa, Ikṣugandha, Triṣura, Gecandaka.
- Malayalam - Vayaleculli, Vayalschulli, Bahel-schulli.
- Tamil - Nirmulli, or Neermulli, Nirmalli.
- Hindi - Kantakalia, Tālmakhāna, Kailaya, Gokshuro, Goksura, Gokhulakanta,

Distribution and habitat.

The plant is found throughout the plains districts of India from the Himalayas to Cape especially Bombay, Bengal, Konkan, the West coast of India from Bombay southwards and in the Coromandel. It is an inhabitant of damp or swampy areas such as ditches, the wet or marshy margins of banks and slow flowing canals, in and about paddy fields etc.

Habit and general features.

Asteracantha longifolia Nees. is a stout erect hispid annual semi woody herb 30 to 90 cms. or more high most often growing gregariously with several straight generally unbranched bluntly quadrangular or slightly flattened jointed stems thickened at or near the nodes bearing at each node apparent whorls of 2 to 6 or more long narrow leaves from 7.5 to 18 cms. or more long and up to 2.5 cms. broad and in the axils of the leaves conspicuous sessile bracteate and bracteolate bright bluish-purple or rose coloured or occasionally whitish flowers as well as six long spreading slightly recurved sharp yellowish white spines 18 mm. to 3.7 cms or more long disposed in the form of a star. The plant is in flower during the rainy and cold seasons (July to December).

External morphology.

Stems many, stout erect hispid or with long hairs especially at or below the nodes, jointed, semi woody or herbaceous and

bluntly quadrangular or a little flattened. These stems are mostly unbranched. Branches when present are opposite and also grow erect.

Leaves: simple, subsessile, opposite, but often seemingly occurring in whorls of six at the older nodes of which the outer or nodal leaves are larger. They are narrowly lanceolate or linear-lanceolate oblong—lanceolate or ob-lanceolate attenuated or tapering at both ends, the margins slightly serrulate often revolute and ciliated or hairy or even bristly with both the surfaces sparsely hispid with long white hairs. The two outer or nodal leaves are usually subsessile oblong-lanceolate or oblanceolate and 10 to 17 cms. long and 2.5 cms. broad with one long spine in the axil of each; the inner four are shorter about 3.7 cms long each with a simple sharp straight or more often a little recurved yellowish awl shaped spine 2.5 to 3.7 cms. long in its axil; there being thus generally six radiating spines at each node.

Flowers: many, usually occurring in apparent whorls of eight, large sessile of a bright bluish-purple or rose tint or occasionally whitish located in the axils of the leaves in the midst of the dense verticil composed of leaves spines bracts and bracteoles at each node. Each flower has a bract and two bracteoles. *Bracts* leafy 1.2 to 2.5 cms. long lanceolate with the surface and margins bristly; *bracteoles* - 6 to 8 cms. long linear-lanceolate. *Calyx* - clothed with soft hair, deeply four partite: the lobes or sepals lanceolate, unequal 8 mm. to 1.2 cms. long; the upper lobe the broadest and largest, the lower obtuse emarginate or shortly bifid. *Corolla* - gamopetalous, about 3.1 cms. long nearly glabrous, pale to bright-bluish purple or rose tinted widely and distinctly deeply two-lipped, the lips nearly equal; the upper two partite, with the divisions oblong truncate or emarginate and the lower three lobed (the divisions here also emarginate) with two crested longitudinal folds or callosities on the palate; the tube of corolla cylindric below, suddenly enlarged above and bicallose at the origin of the segments. *Stamens* - four, didynamous, the second pair larger; *filaments* connate in pairs at base; *anthers* two celled, the cells parallel, subequal, glabrous, oblong or sagittate and mucous. *Ovary* - two celled with four ovules in each cell; *style* - filiform pubescent; *stigma*, simple, subulate or acuminate, involute and with a fissure on the upper side.

Fruit: a two celled linear-oblong compressed capsule about 8 mm. long containing four to eight seeds on small hard retinacula. *Seeds* - ovate, flat or compressed, truncate at the base, white hairy but appearing smooth. When wetted they immediately become coated with a large quantity of somewhat agreeably aromatic glutinous extremely tenaceous mucilage.

Parts used: chiefly the roots and seeds.

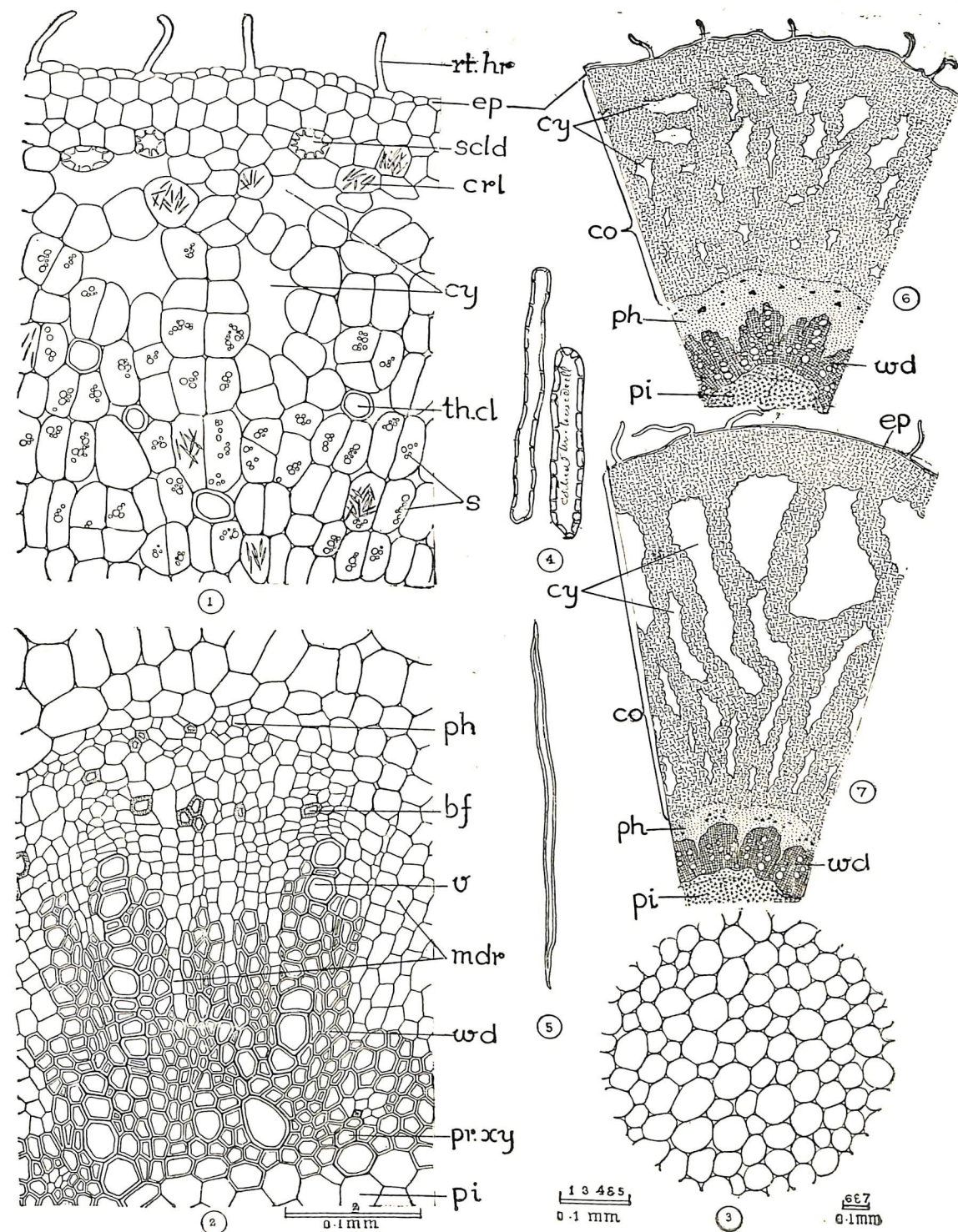
Histology of the root.

The transverse section of a root 3 to 4 mm. in diameter is circular. It shows an outer cortical tissue with well developed lacunae surrounding an inner cylinder of wood less than 1 mm. in diameter and a central pith. The epidermis consists of a single row of thinwalled small sized almost rectangular or cubical cells, some of which are produced into root hairs. Inner to the epidermis there are three or four rows of compactly arranged thinwalled polygonal cells forming a subepidermal band or layer 125 to 160 μ in thickness. The cells of this layer are almost uniform in size and a few of them contain short acicular crystals. A few thickwalled cells are scattered within this layer. They appear rounded in transverse section. Their diameter varies from 30 to 35 μ . These thickwalled isolated cells are long and measure 200 to 250 μ in length. Many large radially disposed air cavities are present in the cortex just inner to this layer. These cortical lacunae are very well developed in the plants of watery habitats. The cortical cells are thinwalled and almost rounded or oblong in T.S. but of varying sizes. The diameter of these cells varies from 90 to 135 μ . A characteristic feature of these cells is the formation of radial and tangential walls within the cells, resulting in the division of the cells into four to six or more parts. Most of the cortical cells contain small simple spherical or rounded starch grains which vary from 3 to 6 μ in diameter. A few other cells contain small acicular crystals of calcium oxalate 12 to 18 μ in length. These crystals are found scattered within the cell without any regular arrangement. Towards the inner region of the cortex the cells become gradually smaller in size and are more or less arranged in regular radial rows. The air cavities also become less and smaller towards the inner region. Scattered among the thinwalled cells of the cortex are a few small sized thickwalled cells. The walls of these cells are not so much thickened as those present

in the subepidermal zone. Isolated cells of these thickwalled cells are comparatively long – varying in length from 300 to 370 μ and in diameter from 15 to 25 μ . The cortex is limited on the inside by a row of cells in the form of a ring, the cells of which are thin-walled slightly rectangular in shape and much smaller than the inner cortical cells.

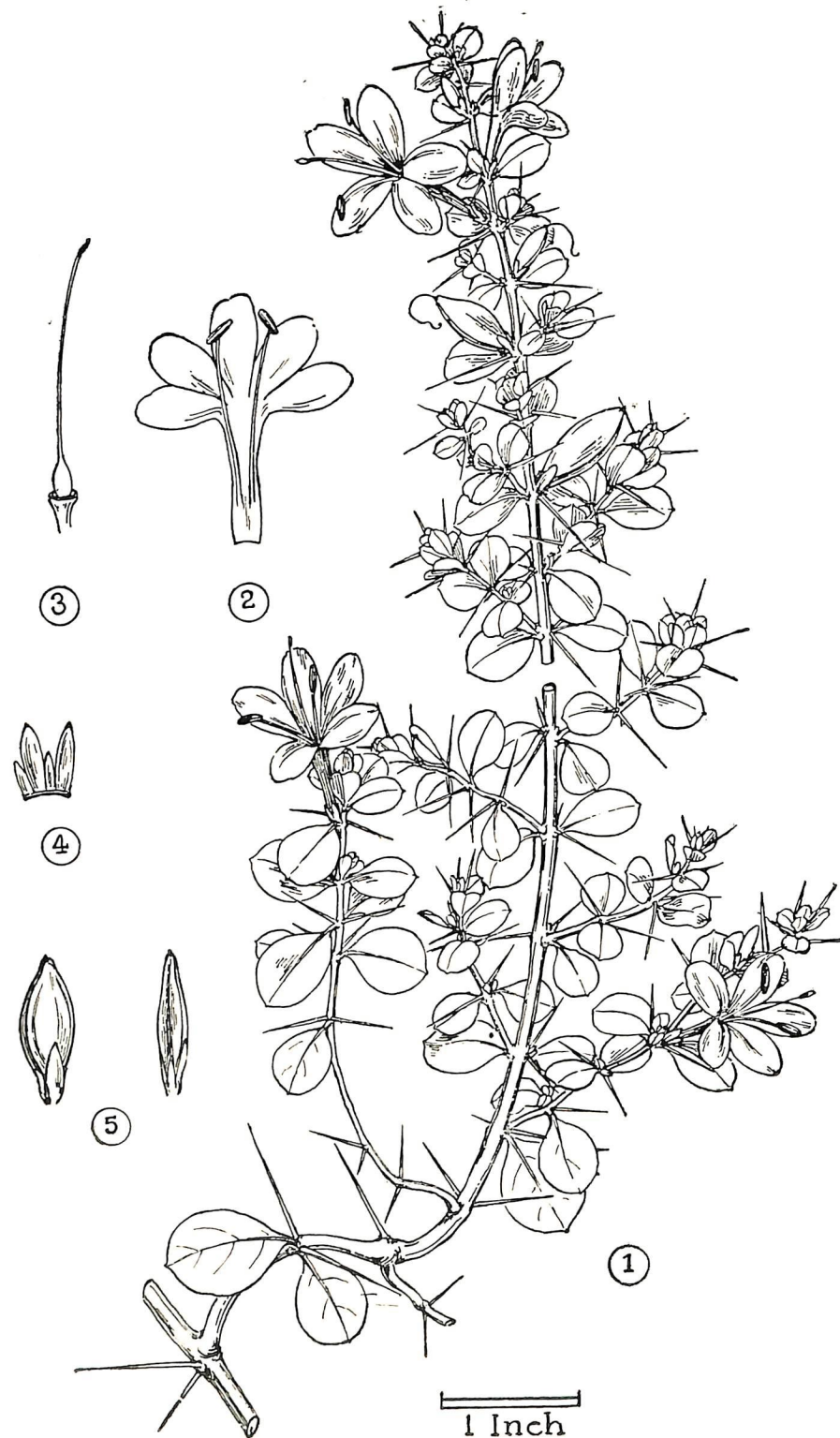
Inner to the cortex is a broad vascular cylinder. The *phloem* is a very narrow zone consisting of very small, thinwalled polygonal cells. Sieve tubes and companion cells are not distinct. There are a few fibre cells within the phloem which are scattered in small groups of two or three. These fibre cells have a diameter of 9 to 15 μ and a length of 300 to 400 μ and are much thickwalled with tapering ends. *Wood* is present in the form of a cylinder inner to the phloem the outer border of which is slightly raised into eight to ten projections by the development of secondary wood tissue. There are many vessels and most of them are arranged in radial rows. There are about 2 to 3 such radial rows of vessels in each projecting region of the wood. The diameter of the vessels varies from 20 to 36 μ and most of them are of the spiral type. These vessels are surrounded by wood fibres and thick walled wood parenchyma cells. At the inner border of the wood are present 8 to 10 groups of primary xylem arranged almost at equal intervals.

Medullary rays: About 8 to 10 multiseriate rays occur extending from the primary xylem groups up to the inner end of the cortex. The multiseriate rays are 6 to 8 rows wide and are prominent. Short uniseriate rays are also present within the wood and extend up to the cortex. The ray cells are thinwalled and radially elongated at the inner end but they gradually become tangentially elongated at the distal ends of the rays. The central region of the root is occupied by pith which is about 300 to 400 μ in diameter. It is composed of thinwalled rounded cells with intercellular spaces. These cells vary in size and have a diameter from 30 to 70 μ in T.S.



Histology of the root of *Asteracantha longifolia* Nees.

- | | | |
|---|----------------------------------|---------|
| 1. Epidermis and the cortex | 2. Details of structure of stele | 3. Pith |
| 4. Two thickwalled cells of the cortex | 5. A phloem fibre | |
| 6. Diagrammatic sketch of T. S. of the root of a plant growing on fairly dry soil | | |
| 7. Diagrammatic sketch of the T. S. of the root of plant growing in marsh soil | | |

*Barleria buxifolia* Linn.

1. A flowering twig 2. Corolla 3. The pistil 4. Sepals 5. Two views of the fruit

BARLERIA BUXIFOLIA Linn. *

- Synonym: *Dicranacanthus buxifolius* Oerst.
 Family - Acanthaceae.
 Sanskrit - Adyanda, Ekakambaka, Goshuraka, Kokilakṣa, Suryabhia.
 Malayalam - Caraschulli or Karacculli, Vayalcculli.
 Tamil - Pūccimullu or Poochimullu

Distribution and habitat:

The plant is found in the districts of Konkan, South Deccan, Mysore, Malabar (Kerala) Coromandel, and southwards in Kanyakumari district from sea level to about 1200 metres elevation. It is a plant of the dry localities and grows chiefly on roadsides as well as in waste lands. Flowering time - the hot season February to April or May.

Habit and general features.

Barleria buxifolia Linn. is a small sized very prickly ramous spreading hairy undershrub 30 to 45 cms. high with scarcely any stem but having several slender variously bent branches, the young shoots round and downy-bearing small opposite broadly elliptic-ovate to orbicular leaves up to about 1.3 cms. long with pairs of simple axillary slender white sharp spines (longer than the leaves and generally four to each node) and solitary sessile or variously long pedicelled, blue or pink or occasionally white axillary flowers.

External morphology:

Leaves: simple, opposite, small, subsessile (with hardly any petiole) broadly elliptic, to ovate or near orbicular, from 8 to 18 mm. long and nearly as broad 7-17 mm. acute at base, obtuse and spinously mucronate at apex, entire, leathery and villous or hairy on both sides. In the axil of each leaf there are two slender white sharp spines that are usually longer than the leaves and forming in the older branches a verticil of four at each node.

* *Barleria buxifolia* also bears the Malayalam name *Vayalcculli* but is doubtful whether it is used as *Iksura*.

Flowers: fairly large, of a beautiful pink tinged with violet, or rarely white, solitary, sessile or pedicelled in the forks of the spines but with two spinous bracteoles. The pedicels exhibit remarkable variation in length ranging from 3 mm. to 3.7 cms. *Bracteoles* 6 to 18 mm. long simple axillary paired divaricate and usually alternately one flowered and sterile. *Calyx* - gamosepalous, deeply four partite, the lobes which are shorter than the spines occur in opposite pairs. Of these the outer pair are the larger, with the anterior lobe emarginate or more or less bifid (apparently of two connate lobes) or sometimes with one or two spinous teeth. These are also ciliate pubescent oblong or obovate at first i. e. in the flower, 7 mm. long, but enlarges in the fruit becoming longer, oblong-lanceolate, obtuse, scarious and somewhat glabrate. The inner two are smaller, *Corolla* large, up to 2.5 cms. long, the tube or basal part more or less elongate and the limb funnel-shaped above; *lobes* - five, subequal, ovate or elliptic and imbricate in bud. *Androecium* of two fertile stamens and three staminodes. The filaments of the fertile stamens are considerably longer than the tube of the corolla and bear oblong two-celled anthers. Of the three sterile stamens two are small and one the posterior rudimentary. *Disc.* - a large cupular (often toothed) persistent disc is present half enclosing the ovary. *Ovary* - two celled with two ovules in each cell, with a long style ending in a bifid or subentire stigma.

Fruit: an oblong or ellipsoid two-celled capsule, about 18 mm. long with a beak that is not solid and containing two seeds in each cell. *Seeds* - compressed, ovate; usually clothed with wavy silky adpressed hairs.



Artanema sesamoides Benth,

1. A twig

2. Fruits

3. L. S. of a flower

ARTANEMA SESAMOIDES Benth*

Synonyms : *Columnea longifolia* L.; *Diceros longifolius* Pers.

Family : Scrophulariaceae.

Sanskrit Kokilakṣa

Malayālam Vathomvaretti, Kolivalen
(Kozhivalen) Vayalcculii.

Tamil Neermulli,

Distribution and habitat

Deccan peninsula on the west side from the Konkan southwards, west coast of Kerala from near sea level to about 900 metres, in Wyanad and Coorg. It is common in marshy localities like margins of lakes or ponds and along the low lying banks of rivers where the flow has subsided.

Habit and general features

Artanema sesamoides Benth. is a sparingly branched stout erect herb or undershrub 60 to 90 cms. or more high with acutely four angled or tetragonal stems – scabrid on the angles – bearing opposite lanceolate acuminate, usually serrate leaves up to 10 cms. long and 18 to 25 mm. broad and terminal racemes of large violet purple flowers that in shape or form somewhat resemble those of *Sesamum*. Flowering throughout the year, if growth conditions are favourable.

External morphology

Leaves : opposite, short petioled, usually lanceolate, or ovate-lanceolate, rarely oblong, entire or shortly serrate, acuminate, slightly thick, 5 to 10 cms. long and 1.8 to 3.7 cms. broad.

Flowers : fairly large, short-stalked, pretty, blue or lilac, bisexual, zygomorphic, solitary in the upper leaf axils or in terminal

* *Artanema sesamoide* is also known in certain parts of Kerala as *vayalcculli*. It is doubtful whether this plant is used as *Iksura*.

bracteate racemes, the bracts especially the lower being foliaceous. Bracteoles absent. The pedicels which are about 8 mm. long are shorter than or nearly equal to the calyx. *Calyx*-6 mm. to 8 mm. long, five partite, with the lobes or segments somewhat leafy acuminate imbricate and persistent. *Corolla* - gamopetalous, blue or lilac, sub-campanulate, two lipped, the tube long and broad, the upper lip which is outer in bud is erect, broad and notched or emarginate and the lower scarcely longer spreading and threefid or lobed. *Stamens* - four, didynamous, all perfect, the upper or posterior pair shorter with filaments decurrent on and included within the tube of the corolla with a small scale at the base of each filament, the two lower or the anterior pair are much longer; their filaments are arched upwards, dilated, and broadly appendiculate, or furnished with a short obtuse appendage at the base with the anther cells connivent at the top under the upper lip. *Ovary*-superior spherical two chambered with many ovules in each loculus on thick axile placenta; style-slender, ending in a bilamellate stigma.

Fruit: a septicidally dehiscent globose capsule 6 to 8 mm. in diameter with the valves when ripe separating from the broadly winged placentiferous axis. *Seeds*-many, small, truncate, papillose or rugose.

DURALABHĀ*

YAVĀSĀ (YĀSĀ) AND VRISCCIKĀLI

Introductory note

The terms *Durālabha*, *Duspars'a*, *Kāsaghinnie*, or *Kāsaghni*, *Yavasā*, *Vrichikāli* or *Vriscikāli*, *Kachchūra*, *Kāncchoora* etc. all appear to be synonyms of the same drug and therefore should refer to the same plant. However plants of three different genera belonging to different families namely *Alhagi maurorum*, *Fagonia arabica*, and *Tragia involucrata* along with their closely allied species are accepted as the botanical sources in different parts of India.

Tragia involucrata Linn. and other species of *Tragia* belonging to Euphorbiaceae locally known as *Kodittūva*, *Koḷittūva*, *Koduttūva*, *Valli coriāṇam* *Kanchoorie* (Tam) etc. are the commonly accepted botanical sources of *Durālabha* in Kerala. The plant occasionally also goes under the name of *Vrichikāli* or *Vriscicāli*.

Khorey and Khatrak in page 147 of their *Materia Medica* of India equate *Duspars'a* with *Fagonia arabica* Linn., *F. bruguieri* DC. and *F. cretica* Linn. all belonging to Zygophyllaceae. They also equate in page 554 *Dustparisha* and/or *Kasāghinnie* with *Tragia involucrata* and again in page 188 equate *Duralabha* and *Yavosa* synonyms of *Dusparna* (manna) with *Alhagi maurorum* and *A. camellorum* belonging to Leguminosae.

Kirtikar and Basu in their *Indian Medicinal plants* (2nd edn.) p. 743 equate the Sanskrit synonyms *Dusparsha*, *Yavasa* and *Yavasaka* with *Alhagi camellorum* and in page 4260 equate *Durālabha* and *Duspars'a* along with several other Sanskrit synonyms with *Fagonia cretica* Linn. (a synonym of *F. arabica*) and *F. bruguieri*. Again on page 2280 they equate *Durālabha* and *Duspars'a* along with other Sanskrit synonyms such as *Samudrante*, *Kachchura*, *Kasaghni*, *Virupa*, *Vrichikali* and *Vrishikapatri* with *Tragia involucrata* Linn. Nadkarni in his *Indian Materia medica* (p 1226) gives the names *Vriscikāli* and *Kasaghni* to *Tragia involucrata*.

Rama Rao in *Flowering plants of Travancore* page 92 equates *Tragia involucrata* with *Dusparsha* giving its local names as *Coriyanam* and Tamil names as *Kotithuva* and *Kanchoorie*.



According to Col. Sir R. N. Chopra *Tragia involucrata* is the botanical source of *Vrichikali*. (p 527. Indigenous Drugs of India and page 246 – Glossary of Indian medicinal plants.)

In Kerala, however *Vriscikali* is commonly equated with *Heliotropium indicum* belonging to Boraginaceae probably on the assumption that *Vrichikali* is a separate drug.

It has to be noted that the term *Vriscikāli* is not found to occur in the sanskrit slokas pertaining to *Durālabha*, *Duspars'a* and *yavasa*. It may therefore be a different drug.

It has also to be noted that the local Malayalam names *Valliacoriam* and *Coriyanam* meaning stinging plants causing intense itching sensation, are also applied to species of *Girardinia*, *Laportea*, *Fleurya* and others belonging to Urticaceae, as well as to *Cayratia pedata* and as a result these latter are also often as confounded with the accepted botanical sources.

It has further to be noted that though in the case of *Alhagi* and *Fagonia* the stems and branches are the parts used in medicine in Kerala it is mostly the root system of *Tragia involucrata* or occasionally the entire plant that is used.

DURĀLABHĀ*

Source plant in Kerala: *Tragia involucrata* Linn. and other species of *Tragia*

Family: Euphorbiaceae.

Sanskrit Text:

यासो यवासो दुस्पर्शो धन्वयासः कुनाशकः ।

रोदनी कच्छुरानन्ता समुद्रान्ता दुरालभा ॥ (अमरकोशः)

Yāso yavāso duspars'o dhanvayāsaḥ kunāśakaḥ

Rodanī kacchurānantā samudrāntā durālabhā

(Amarakośaḥ)

यासो यवासो दुस्पर्शो धन्वयासः कुनाशकः ।

दुरालभा दुरालम्भा समुद्रान्ता च रोदनी ॥

गान्धारी कच्छुरानन्ता कषाया हरिविग्रहा । (भावप्रकाशः)

Yāso yavāso duspars'o dhanvayāsaḥ kunāśakaḥ

Durālabhā durālabhā samudrāntā ca rodanī

Gāndhārī kacchurānantā kaṣāyā harivighrahā

(Bhāvaprakāśaḥ)

दुरालभा दुरालम्भा समुद्रान्ता च रोदनी ।

गान्धारी कच्छुरानन्ता कषाया दुरभिग्रहा ॥ (शालिग्रामनिघण्टुः)

Durālabhā durālabhā samudrāntā ca rodanī

Gāndhārī kacchurānantā kaṣāyā durabhigrahā

(Śaligrāmanighaṇṭhuḥ)

यासो यवासकोनन्ता बालपत्रोधिकण्टकः ।

दूरमूलः समुद्रान्तो दीर्घमूलो मरुत्भवः ॥ (शालिग्रामनिघण्टुः)

Yāso yavāskonantā bālapatrodhikaṇṭakaḥ

Dūramūlaḥ samudrānto dīrghamūlo marūtbhavaḥ

(Śaligrāmanighaṇṭhuḥ)

धन्वयासो दुरालम्भा ताम्रमूली च कच्छुरा ।

दुरालम्भा च दुस्पर्शा यासो धन्वयवासकः ॥

प्रबोधनी सूक्ष्मदला विरूपा दुरभिग्रहा ।

दुर्लभा दुष्प्रधर्षा च स्याच्चतुर्दश संज्ञकाः ॥ (निघण्टुरत्नाकरः)

Dhanvayāso durālabhā tāmramūlī ca kacchurā
Durālabhā ca Dusparsā yāso Dhanvayavasakah
Prabodhani suksmadalā virūpā durabhigrahā
Durlabhā duṣṭpradharṣa ca syāccaturdaśa samjñikāḥ
(Nighaṇṭuratnākaraḥ)

यासो यवासो बहुकण्टकोल्पकः ।

क्षुद्रेणुदी रोदनिका च कच्छुरा ॥

स्यात् बालपत्रोधिक कण्टकः खरः ।

सुदूरमूलो विषकण्टकोपि सः ॥

अनन्तस्तीक्ष्ण कण्टश्च समुद्रान्तो मरुत्भवः ।

दीर्घमूलस्सूक्ष्मपत्रो विषध्नः कण्टकालुकः ॥

त्रिपर्णिका च गान्धारी चैकविंशतिनामभिः । (राजनिघण्टुः)

Yāso yavāso bahukantakolpakah
Kṣudreṅgudī rodanikā ca kacchurā
Syāt bālapatrodika kaṇṭakah kharah
Sudūramūlo viṣakantakopi sah
Anantastikṣṇakantāśca samudrānto marūtbhavaḥ
Dirghamūlassūksmapatro viṣaghnaḥ kaṇṭakālukah
Triparnikā ca Gāndhārī caikaviṁśati nāmaḥ
(Rājanighaṇṭuḥ)

DURALABHA (white)

कथितानन्ता याषा यवाषका दुरालम्भा च ।

सैव समुद्रान्ता स्यान्मरुत्भवा दीर्घमूला च ॥ (अभिधानमञ्जरी)

Kathitanantā yaśa yavaśakā durālabhā ca
Saiva samudrāntā syānmarutbhavā dirghamūlā ca
(Abhidhanamañjari)

DURALABHA (red)

अपरा दुस्पर्शाख्या दुरालम्भा कच्छुरा दुरालम्भा ।

धन्वयवाषकसंज्ञा ताम्रजटा धन्वयाषा स्यात् ॥ (अभिधानमञ्जरी)

Apara dusparsākhyā durālabhā kacchurā durālabhā
Dhanvayavaśakasamjñā tāmrajatā dhanvayaśasyāt
(Abhidhanamañjari)

Properties and uses

उष्ट्रभक्ष्या मरुच्छ्वासविषध्नी बोधकृत्परा ।

कषायाज्वरहृच्छीता तथातीसारनाशिनी ॥ (धन्वन्तरिनिघण्टुः)

Uṣṭrabhakṣyā marucchvāsa viṣaghni rodhakṛtparā
Kaṣāvā jvarahṛcchitā tathātisāra nāsinī
(Dhanvantari nighaṇṭuḥ)

दुरालम्भा कटुस्तिका सोष्णा क्षारात्मिका तथा ।

मधुरा वातपित्तघ्नी ज्वरगुल्मप्रमेहजित् ॥ (राजनिघण्टुः)

Durālabhā katustikta soṣṇā kṣārātmikā tathā
Madurā vātapittagnī jvaragulmapramehajit
(Rāja nighaṇṭuḥ)

दुरालम्भा कटुस्तिका मधुरा रक्तशुद्धिकृत् ।

शीता चोष्णा विसर्पघ्नी विषमज्वरनाशिनी ॥

तृद्वर्द्धिर्मेहगुल्मघ्नी मोहरक्तरुजापहा ।

वातं पित्तं कफं कुष्ठं ज्वरं चैव विनाशयेत् ॥ (निघण्टुरत्नाकरः)

Durālabhā katustiktā madhurā raktasudhikṛt
Sītā soṣṇā visarpaghni viṣamajvaranāsinī

Tr̥chardirmehagulmaghnī moharaktaruḥpāḥ
Vātaṁ pittaṁ kaphaṁ kuṣṭhaṁ jvaraṁ caivavināśayet
(Nighaṇṭuratnākaraḥ)

यासः स्वादुरसस्तिक्तस्तुवरशीतलो लघुः ।
कफमेदोमदभ्रान्तिपित्तासृक्कुष्ठकासजित् ॥
तृष्णाविसर्पवातास्रवमिज्वरहरः परम् ।
यवसस्य गुणैस्तुल्या बुधैरुक्ता दुरालभा ॥ (भावप्रकाशः)

Yāsaḥ svādurasastiktastuvarasītalō laghuḥ
Kaphamedomadabhrāntipittāsṛkkuṣṭhakāśajit
Tr̥ṣṇāvisarpavātāsravamijvaraharaḥ param
Yavāsasya guṇaistulyā budhairuktā durālabhā
(Bhāvaprakāśaḥ)

यासस्तु मधुरस्तिक्तो बल्यश्चाग्निप्रदीपकः ।
सरः शीतलघुश्चैव तुवरः कफपित्तजित् ॥
रक्तरूक्कुष्ठवीसर्पभेदभ्रममदापहः
वातरक्ततृष्णां छर्दीं कासं दाहं ज्वरं जयेत् ॥ (निघण्टुरत्नाकरः)

Yāsastu madurastikto balyaschāgnipradīpakah
Saraḥ sītalaghuḥcaiva tuvaraḥ kaphapittajit
Raktarūkkuṣṭhavisarpamedabhrāmamadāpahah
Vātaraktam tr̥ṣṇam chardīm kāsam dāham jvaraṁ jayet
(Nighaṇṭuratnākaraḥ)

Special use

द्राक्षायासाभया कृष्णाचूर्णं सक्षौद्रसर्पिषा ।
लीढं श्वासं निहन्त्यासु कासश्च तमकं तथा ॥ (चक्रदत्तः)

Drākṣāyāsābhayākṛṣṇācūrṇam sakṣaudrasarpiṣā
Līḍam svāsam nihantyaśu kāsam ca tamakam tathā
(Cakradattaḥ)

Meanings of terms.

Bahukaṇṭaka; *Adhikaṇṭaka*, *Kaṇṭakāluka*, *Viśakaṇṭakaḥ*, and *Tikṣṇa* – *kantaka* indicate the presence of numerous (*Bahu*) sharp (*Tikṣṇa*) and/or poisonous (*Viśa*) thorns.

Duspars'a or *Duṣpars'a*, *Dūrālabhā*, *Durālabhā* *Durabhigraha*, *Duṣpradarsa* (not easily grown or propagated) as well as *Durlabha*, *Yāsā* or *Yāsa* and *Yāsu* indicate that in gathering the plant or plant material great caution is required on account of the difficulty not only in handling it, but even to approach it evidently due either to presence of sharp thorns or harsh stinging hairs or both.

The terms *Kachura* meaning that which creates or causes itching; *Rodani* and *Rodanika* meaning making one cry (on account of pain); *Khara* – harsh to touch and *Prabodhani* meaning giving instantaneous knowledge (of its presence) on account of the sharp or acute pain it gives on contact, all convey the idea that the plant because of the pain it gives should be approached with care.

Yavāsa or *Yavāsa* (Yu – misrane) means that which spreads all over or extensively; *Kunās'aka* means making the ground untroddable (on account of the extensively spreading habit and the presence of sharp thorns or stinging hairs); *Marūtbbhava* and *Dhanvayāsa* indicate that it is an inhabitant of semi-arid or sandy or desert regions where there is scarcity of water.

Ananta, *Samudrānta*, *Duramula*, *Dirghamūla* and *Sudūramūla* indicate that the roots are considerably long or that there is an extensive root system - features normally associated with plants of dry regions.

Tāmramūla means copper coloured or reddish roots; *Sūkṣmadala*, *Sūkṣma-patra*; and *Bālapatra* indicate the small size of the leaves and *Tripaṇṇika* that the leaves occur in threes or that there are three leaflets.

The terms *sūkṣma* and *alpa* also indicate the small size (of the leaves)

Gāndhāri means a native of *Gāndhāra* desa; *Uṣṭrabhakṣia* (a synonym mentioned in *S'aligrama nighaṇṭu*;) means that it is liked or eaten by camels; *Prāhladina* – that which is cordial; and *Phanihari* – that which expels snake poison.

It may be seen from the above that the plant is an inhabitant of arid or semi-desert areas, and that it has to be very cautiously

handled for collection on account of the presence of sharp and/or poisonous thorns or hairs. That camels are fond of the plant indicates that the latter grows where camels are found.

Properties and uses

According to Nighaṇṭuratnākara and Bhāvaprakāśa there are two kinds of *Durālabha*. These are respectively named *Durālabha* and *Yavasa* or *Yāsa*. One is considered bigger in size and it has sharp thorns (*Tikṣṇakanṭaka*). The synonyms are so intermingled in the different texts that it is not possible to clearly demarcate the two types. The authors of the texts however, consider that both possess the same or similar properties.

According to the texts *Durālabha* is astringent, pungent and sweet. It is neither too hot or too cold. It creates purification of blood and should be considered to be cold rather than to be hot. It is light. It cures asthma, toxicosis, all kinds of fevers, diarrhoea, phantom tumour, excessive urinary secretion, erisipelas, excessive thirst, vomiting, senselessness and dermatosis. In short, it cures diseases caused by the discordance of *vāta*, *pitta*, and *kapha*. The properties attributed to *Yāsa* are that it is sweet, bitter and astringent. It promotes gastric fire and bodily strength. It is extremely 'cold', laxative and light. It cures whirling sensation in the head, craziness, diseases caused by the impurity of blood and fat, cough, dermatosis, extreme thirst, vomiting, pyrexia and burning sensation.

Both correct the diseases caused by the discordance of the three doṣās.

Some of the special uses.

Dried grapes, *yāsa*, *haritakī* and long pepper in equal parts powdered well and mixed with honey and ghee cures dyspnea and cough.

An extract obtained by evaporating the decoction of *Yāsa* (not from *Tragia involucrata*) is called "*Yāsa-sarkara*" i. e. sugar obtained from *yāsa*.

The drug is commonly used as a paste to be smeared on the forehead for Hemisrania.

TRAGIA INVOLUCRATA Linn.

Synonym: *Tragia hispida* Willd.

Family: Euphorbiaceae.

Sanskrit	...	Dusparsa, Vriscikāli or Vṛccikāli
Malayālam	...	Coriyaṇam, Koduttūva.
Tamil	...	Koṭittūva, Kanchoorie, Kancūri
Hindi	...	Barhanta, Canchoore, Bichhute

Distribution and habitat.

The plant is found distributed throughout India from Punjab and lower Himalayas (Kumaon) eastward to Bengal and Assam and southward to Deccan, N. Circars, S. Konkan, Carnatic, the Western ghats and Kerala. The plant grows well in somewhat sheltered shady places wherever the soil is good. It is occasionally also met with in dry barren grounds.

Habit and general features.

Tragia involucrata Linn. is an evergreen perennial or occasionally annual climbing herb with a short stem and one or more elongate twining branches covered all over especially when young, with tomentose pubescence as well as hispid hairs along with scattered stinging bristles. Its foliage is very variable; the leaves are usually alternate, simple, linear-oblong to broadly ovate-cordate acuminate and sometimes deeply 3-lobed: the flowers are small monoecious and apetalous and the fruits three-celled capsules with a conspicuously spread out hairy persistent calyx.

Flowering time - most part of the year.

External morphology.

Leaves: simple, alternate, petioled, stipulate, - 3.5 cms. to 10 cms. long and 2 to 5 or more cms. broad, very variable in form, the shape varying from linear-oblong to broadly ovate-cordate or oblong-lanceolate, the outline entire or sometimes deeply palmately three-lobed or partite, three to five nerved and often cordate at base, acute or acuminate at apex; edge or margin coarsely sharply serrate,

texture rather thick and the surface closely covered with stinging hairs. *Petiole* - of varying length - 3 to 15 cms. or more long. *Stipules* - prominent, about 6 mm. long, ovate, acute, somewhat auricled or cordate at base and falling off early.

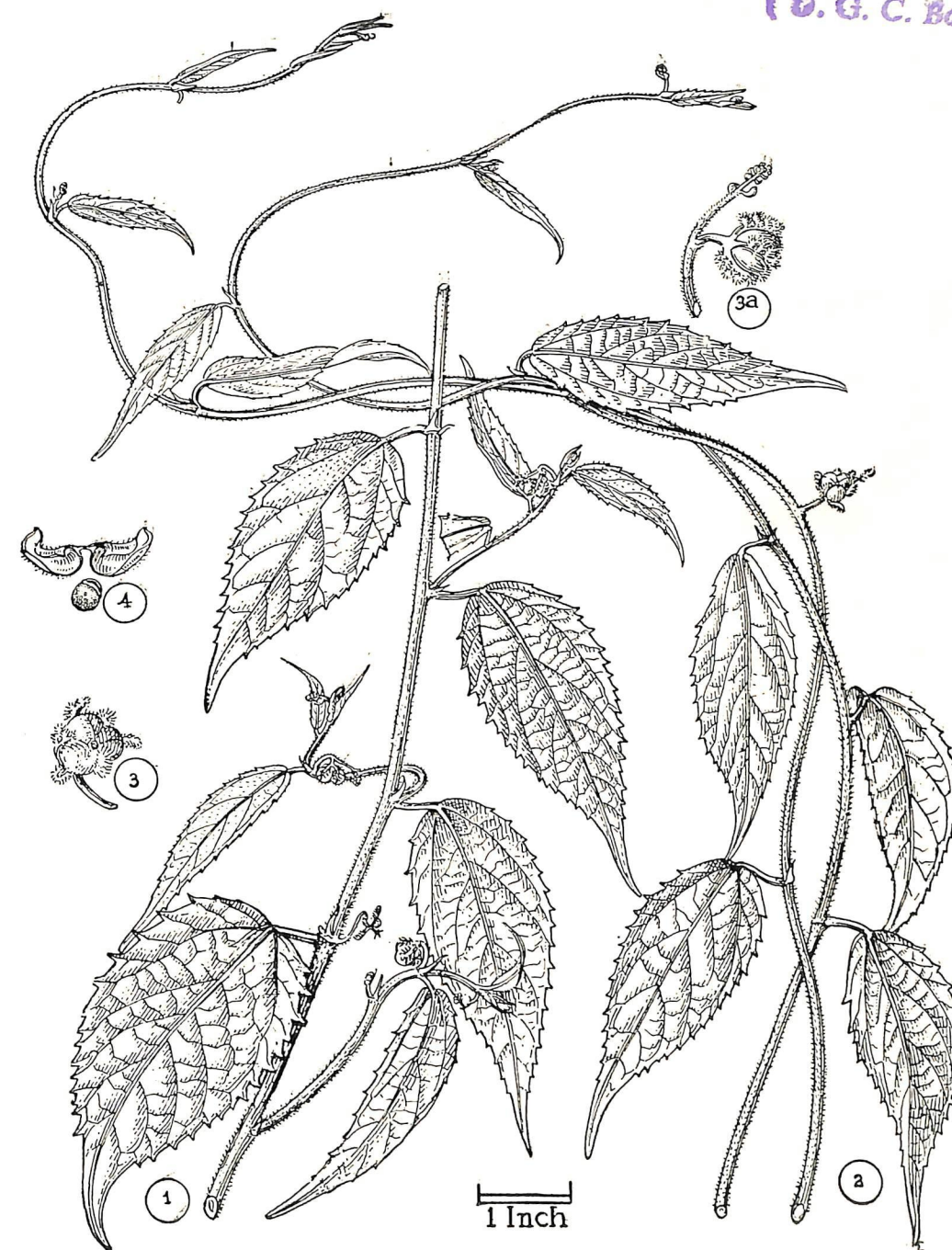
Flowers: small monoecious greenish shortly pedicellate and apetalous, in terminal or leaf-opposed as well as axillary, androgynous. hispid to rarely glabrous racemes 2 to 5 cms. long, the pistillate few or only one and borne towards the base and the staminate flowers towards the top of the inflorescence. *Bracts* about 2.5 mm. long, lanceolate, acute, *Pistillate flowers*: *Calyx* - gamosepalous, 6-lobed; the lobes or sepals ovate or oblong about 3 mm. long, usually pinnatifid, very hispid with stinging hairs, and imbricate in bud. It is persistent becoming rigid or hardened, enlarged and stellately spread out in fruit. *Pistil* - tricarpeal, syncarpous: *ovary* - superior, hispid, 3-lobed, and 3-chambered with one ovule in each chamber; *styles* three, circinate revolute, united below into a stout cylindric column about as long as the styles or stylar branches and spreading above. *Staminate flowers*: pale yellowish *Calyx* - globose or obovoid 3 or rarely 5 - partite, the lobes or sepals broadly elliptic or orbicular, concave, valvate, in bud - 1 to 2 mm. long and glabrous. *Stamens* - usually 3, rarely less, i. e. 1 or more only and centrally placed or inserted around a very small 3-fid pistillode: *filaments* - free or connate; *anthers* - ovate or oblong, dorsifixed, two-cleft, the cells parallel adhering to each other and dehiscing lengthwise.

Fruit: a three-lobed, whitish, somewhat hispid capsule about 6 mm. in diameter of three, two-valved cocci with crustaceous endocarp. *Seeds* - globose smooth carunculate, with a broad tumid or swollen chalaza and fleshy albumen. Testa mottled and crustaceous. Embryo with flat broad cotyledons.

Part used in medicine: The root system.

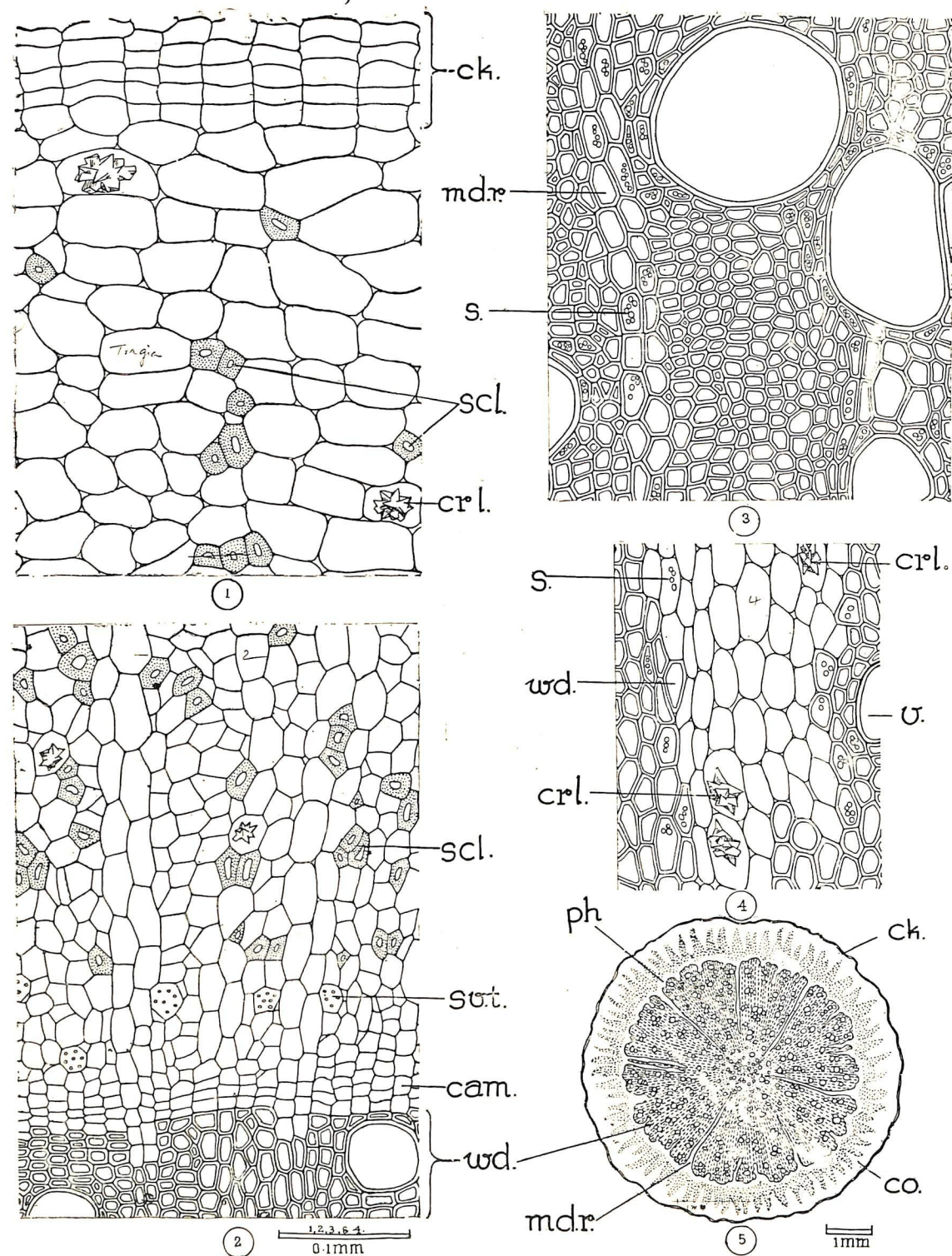
Description of the root.

The root system consists chiefly of a fairly long tap root and a few lateral roots starting from its upper or basal end. The tap root attains a length of 25 to 60 cms. and a diameter of 7 to 18 mm. while the lateral roots are 20 to 45 cms. long and 2 to



Tragia involucrata Linn.

1 & 2, Older and younger branches 3 & 3 a Two views of a fruit
4. Seed and portion of dehiscent fruit wall



Histology of the root of *Tragia involucrata* Linn.

1. Cork and cortex
2. Phloem and cambium and adjacent xylem.
3. Wood
4. Distal end of a medullary ray
5. Diagrammatic sketch of the T. S of the root

10 mm. in diameter. The lateral roots have many narrow branches which bear wiry rootlets. The roots are woody and strong. The outer surface of the root is light brown in colour and more or less smooth except for the presence of a few small wiry rootlets and the scattered small rounded scars of the rootlets. The bark is thin and can be easily separated from the woody part that comprises the major part of the root. The inner surface of the bark is very smooth and greyish white in colour. The wood has a light cream colour. On drying the surface turns darker in colour, the bark gets closely appressed to the wood and many narrow longitudinal streaks appear on the surface of the root.

Histology

A transverse section of the root having a diameter of 7 mm. is almost circular in outline. The bark has a thickness of 1 mm. and encloses a central woody region. The outer border of the wood is not regular but appears wavy.

The outermost tissue is the *cork*. It is very narrow and consists of only 3 or 4 rows of thinwalled rectangular to slightly tangentially elongated cells. The *phellogen* is distinct only in certain specimens. The *cortex* is also narrow and the cortical cells are fairly large polygonal and thinwalled with well defined intercellular spaces. A limited number of cells contain large clusters of calcium oxalate measuring 15 to 18 μ in length. Sclerenchymatous elements both solitary as well as in small groups occur towards the inner part of the cortex. The *bast* appears in the form of conical strips with their apices towards the periphery. Within the bast, bast fibres are present in small groups of 2 to 4 cells. These are arranged in tangential rows alternating with the regular phloem elements but the disposition is not quite regular. The fibres are very thickwalled and in transverse section appear polygonal. Sieve tubes and companion cells are distinct and the regular phloem parenchyma thinwalled. Some of the latter cells contain small sized crystals of calcium oxalate.

The *wood* forms the major part of the root. There are many vessels scattered in the wood which occur either solitary or in small groups. The diameter of the vessels vary from 80 to 150 μ . The xylem parenchyma cells are also thickwalled and those surrounding

the vessels contain small simple rounded starch grains. The wood fibres are abundant and are arranged in regular radial rows. Several uni - and bi - seriate medullary rays are present. The ray cells within the wood are radially rectangular to radially elongated, and thickwalled. Some of them contain rounded simple starch grains 4 to 9 μ in diameter. The ray cells in the phloem region are also slightly radially elongated but thinwalled. At the distal ends of the rays the cells become slightly larger and appear polygonal to slightly tangentially elongated. These do not usually contain starch grains.

The outer edge or outline of the wood is not regularly circular there being a limited number of shallow clefts or depressions composed of thin walled radially oblong parenchymatous cells with rounded corners and large intercellular spaces. Some of these cells contain starch grains and a few others cluster crystals of calcium oxalate.

TRAGIA BICOLOUR Miq*

Synonym: - *Tragia miqueliana* var. *bicolour*.
Family: - Euphorbiaceae.

Distribution and habitat

Nilgiri and Pulney hills at 1500 to 1800 metres elevation, growing in the shola forests.

Habit and general features.

Tragia bicolour Miq. is a slender twining hispid stinging herb or undershrub somewhat resembling some tomentose forms of *Tragia involucrata* but with bright golden tomentum on the younger portions larger flowers and smaller fruiting calyx. The plant turns often rusty villous when dry. The older branches are covered with long shaggy hairs and the upper (younger) branches and leaves with dense fulvous brown tomentum.

External morphology

Leaves: simple, short-petioled, (at least the younger) stiff, up to about 13 cms. long and 7 cms. broad, ovate-lanceolate, (lower leaves ovate-cordate), cordate at base, acuminate, regularly serrulate and tomentose on both surfaces. The apices of the branches and the younger leaves at first rusty or fulvous tomentose then paler. Mature leaves firm, densely tomentose beneath but later on only hairy pubescent or slightly hairy. *Petiole* - generally much shorter than the blade.

Flowers: small, monoecious on rather stout racemes with very long lanceolate bracts about 3 mm. long, those of male flowers being sub-linear, and tawny villous. *Staminate flowers*: stamens three. *Pistillate flowers*: sepals or segments of calyx 10-12, lacinate strigose, fulvous hispid, enlarged and hardened in fruit, with the midrib hispid within. *Ovary* very shortly tomentose or very sparingly hairy but not hirsute; *styles* - connate for over half their length into a slender cylindric column with the free portions revolute.

Fruit: a tomentose and setose or bristly capsule. *Seeds* - scaly, tumidly bilabiate at the apex.

*An occasional substitute or adulterant for *T. involucrata*.

FAGONIA ARABICA Linn. *

Synonyms : *Fagonia mysorensis* Roth., *F. cretica* var. *arabica* Linn.,

Family : Zygothylaceae.

Sanskrit ... Duspar'sa, Dhanvayāsa,
Durālabha

Hindi ... Ustargar, Ustarkhar.

Distribution and habitat.

The plant is recorded as occurring throughout northwest India, West Khandesh, W. Rajputana, Sindh, Punjab and Kutch; the upper Gangetic plain, Deccan, Bombay, Mysore, Kurnool and Ananthapur. It is an inhabitant of dry localities. It is common on the grain fields as well as the black cotton soil of the Deccan.

Habit and general features

Fagonia arabica Linn. is a small green, very thorny or spiny much branched suffrutescent or woody plant or undershrub covered with glandular hairs. The branches when old are stiff and erect or more or less prostrate or spreading. The younger branches which are tender terete and striate bear opposite, simple or three-foliate leaves having small entire, linear or linear-oblong leaflets and subulate or thorny stipules (the spines straight 4 in a whorl at each node and exceeding the linear leaflets) -, solitary small pale rose coloured or whitish flowers on peduncles arising between the stipules of the opposite leaves, and globular capsular fruits which on account of the recurving of the peduncles appear immersed in, or in the midst of the cluster of thin straight spines. The wood of the stem is white, very hard and covered with a ragged light brown bark which becomes shiny and mucilaginous when moistened and has a mucilaginous taste.

External morphology

Stem and branches covered with glandular hairs.

Leaves: opposite, 1 to 3 foliate, petioled, the petioles variable often foliaceous, stipulate; the *stipules* - subulate usually spiny appearing in whorls of 4 at a node, longer than the leaves, at first about 1 cm. long but continuing growth even after the fall of the leaf; the *leaflets*: - small entire, elliptic oblong or linear, acute, mucronate or cuspidate.

Flowers: solitary, small, pale rose coloured or whitish on one flowered pseud-axillary peduncles 4 to 12 mm. long which arise from between the spiny stipules of the opposite leaves. *Sepals* - five about half the length of the petals, oblong or lanceolate, imbricate in bud, deciduous. *Petals* - five about 6 mm. long, spathulate, clawed or unguiculate, imbricate in bud and caducous. There is a small short and not conspicuous disc. *Stamens* - 10 inserted on the disc; *filaments* free, filiform naked bearing oblong anthers. *Gynoecium* five carpellary, syncarpous; *ovary* - sessile, hairy, acutely five angled or cornered, or five-cleft, five chambered and tapering into a subulate or five angled persistent style ending in a simple or five furrowed stigma: *ovules* - two in each cell, collateral pendulous on funicles ascending from the base of each cell.

Fruit: a five cornered schizocarp nearly as long as the recurved peduncle (8 or 9 cms.) composed of five compressed two-valved one seeded cocci that later dehisce along the ventral suture. *Seeds* - erect, ovate or broadly oblong, compressed, punctulate and with a mucilaginous testa; *embryo* - straight with broad flat ovate cotyledons embedded in fleshy (horny) endosperm.

* The botanical source of *Durālabha* or *Duspar'sa* according to many authorities.

ALHAGI MAURORUM Baker.*

Synonyms : *Alhagi camelorum* Fisch., *Hedysarum alhagi* Linn.

Family : Leguminosae - (Papilionatae)

Sanskrit	...	Yavāsa, Yāsa, Durālabha, Girikarṇika
Telugu	...	Girikarṇika
Hindi	...	Jawasa, Juwasa, Taranjabin
Bengali	...	Dulal labha

Distribution and habitat

The plant is found in the deserts of the N. E. region of India, chiefly in (former) N. W. Provinces, (now part of Pakistan), Upper Gangetic plain, Delhi, Sind, and Gujerat, (where it is said to be very common), Konkan, United Provinces etc. It grows generally extensively in dry rather barren sandy soil in the plains as well as to about 900 metres elevation in the hills.

Habit and general features

Alhagi maurorum Baker. is a low erect thorny shrub armed with numerous subpatent hard pungent (or poisonous) spines 1.2 to 3.9 cms. long - one to each leaf - with terete striate glabrous greenish branches that for the most part are herbaceous and hence frequently eaten down to the ground by the cattle - especially goats or sheep - bearing simple alternate leaves drooping from the base of the spines or branches, fascicles of short stalked flowers arising from the spines and small sized pods about 2.5 cms. or less long with several irregular joints. Flowering time - the hot season.

External Morphology

Leaves: simple, alternate, stipulate, very short petioled, or sessile, small, 3 to 4.5 mm. long, the *stipules* very minute and ensiform blade rigidly coriaceous to rather fleshy, oblong or obovate-oblong, cuneate at base, obtuse apiculate or mucronate at tip, glabrous or puberulous and glaucous.

* *Alhagi maurorum* Baker and *Fagonia arabica* are the accepted botanical sources of *Durālabha* according to most books on Indian materia medica

Flowers: papilionaceous, small reddish or purplish with short slender pedicels, on short racemes that end in bristly points. They usually occur in bunches of 1 to 6 or occasionally 5 to 8 on each spine. *Calyx* - gamosepalous, campanulate 2 to 3 mm. long, glabrous with 5 distinct minute triangular teeth. *Corolla* reddish, exserted, about 3 times or a little over twice the length of the calyx, the petals nearly equal in length; the *standard* - broad, 8 mm. long and 4 mm. broad, obovate oblong auricled at the base above the short claw and glabrous; *wings* - falcate oblong, free; *keel* petals - straight, or incurved obtuse, about equalling the standard and wings *Stamens* - 10, diadelphous. *anthers* - uniform. *Pistil* - monocarpellary, *ovary* - shortstalked or sessile, linear, glabrous 6 to 8 or rarely many ovulate with a filiform incurved glabrous style ending in a minute terminal capitate stigma.

Fruit: A stalked linear falcate or straight subcontinuous or irregularly moniliform, (contracted here and there irregularly) jointed, turgid, somewhat thick, subterete or compressed, smooth indehiscent pod about 2.5 cms. or less long, with the joints irregular oblong and not separating; *seeds* - kidney shaped, very hard blackish brown to greenish gray.

"The eatable substance known as *manḥa* is an exudation from the leaves and branches of this shrub. The substance exudes from the plant after the spring rains in hot weather and is gathered by merely shaking it off".

HELIOTROPIMUM INDICUM Linn*.

- Synonyms: *Heliotropium cordifolium* Moench.
H. velutinum D. C., *H. anisophyllum* Beauv.
Tiardium indicum Lehm., *Tiardium anisophyllum*
- Family: Boraginaceae
- Sanskrit ... Vriccikāli, Vriscikāli, Srihastini
or Shreehustinee Bhurundi
- Malayalam ... Benapatsja, Vena pacca, Telkottuka
or Telkotukku, Thelkada, Thekkada,
Teliyanni
- Tamil ... Telkuduk, Nakkipoo, Telmani
- Hindi ... Hattajurie, Hattasura, Siriari

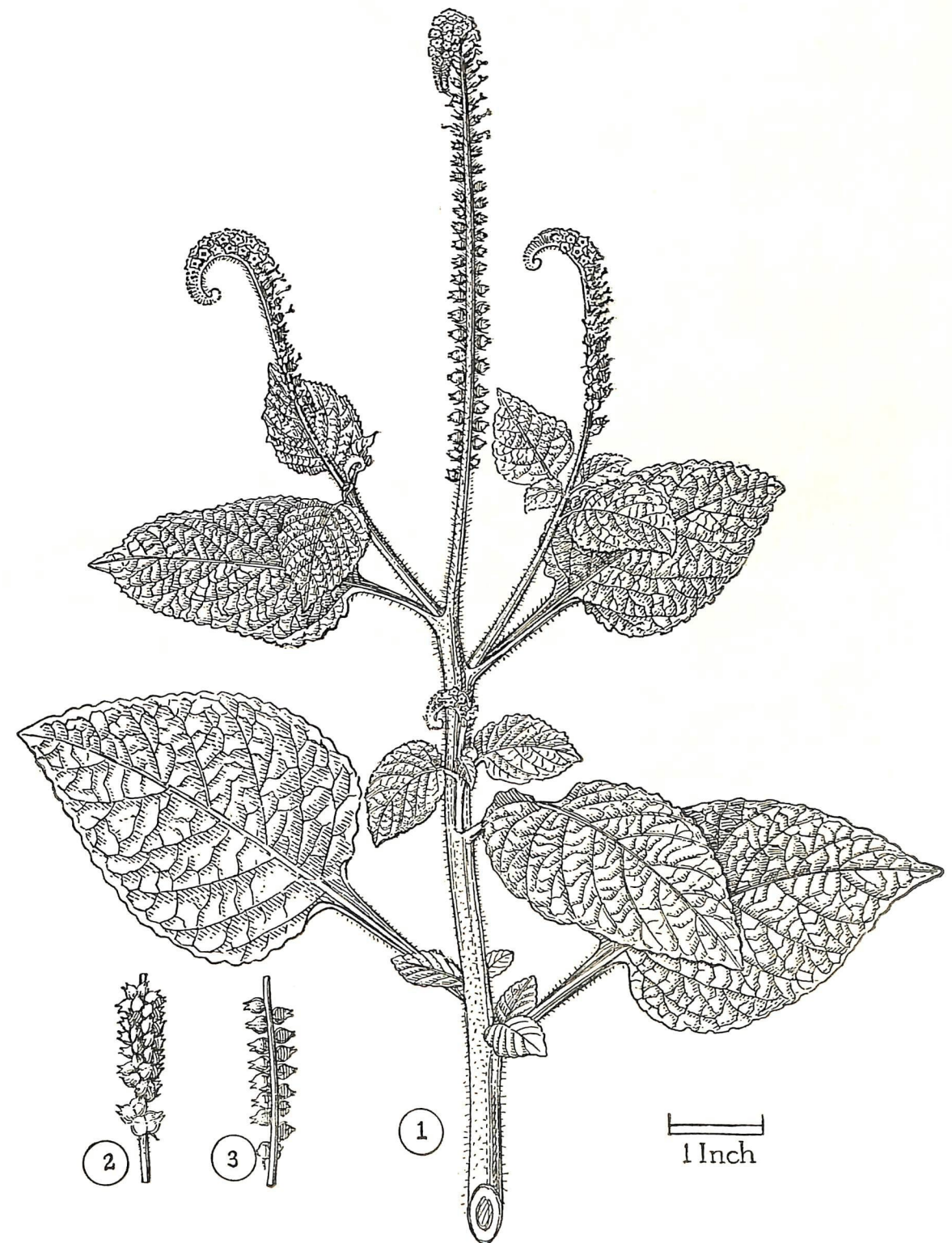
Distribution and Habitat.

The plant is found throughout the hotter parts of India in the plains districts. It is one of the most common plants found growing on roadsides, waste places, and other out of the way corners where rubbish heaps are found, tank beds or borders of tanks and other places where the soil is rich and somewhat moist or slightly swampy.

Habit and general features.

Heliotropium indicum Linn. is a coarse hirsute or hairy branched erect or diffuse spreading annual herb growing 15 to 60 cms. or more high with a fairly stout erect somewhat succulent herbaceous stem half to 1 cm. thick slightly woody at base and ascending dichotomous branches clothed with stiff spreading hairs, bearing simple, alternate or sub-opposite ovate or cordate more or less ooly wrinkled or rugose leaves with the margins subserrate and the base decurrent or running into the petiole and very small somewhat

* *Heliotropium indicum* Linn. is equated as *Vriccikāli* by Rama Rao in his "Flowering plants of Travancore". Kirtikar & Basu equate it with *Srihastini* *Hastisunda* and *Bhurundi*. *Srihastini* and *Vriccikāli* are synonyms. Kirtikar & Basu equate *Tragia involucrata* also with *Vriccikāli*, *Duspars'a*, *Duralabha* and *Kasagni*. According to Khorey & Katrak also, *Heliotropium indicum* is *Hastisunda* and *Srihastini*. They equate *Tragia involucrata* also with *Duralabha* and *Vriccikāli*. In Kerala *Vriccikāli* and *Duralabha* (*Duspars'a*) are by some considered different drugs; *H. indicum* being equated with the former and *Tragia involucrata* with the latter.

*Heliotropium indicum* Linn.

1. A flowering branch

2. & 3. Two views of the inflorescence to show the arrangement of fruits

white lilac or pale violet flowers arranged compactly in two alternating rows up one side on simple, elongate terminal or leaf opposed e-bracteate spikes with their tips curved outside, and glabrous two-cleft mitre-shaped drupaceous fruits that easily separate into two two seeded two pointed pyrenes.

The plant comes up during the rainy season.

External morphology

Stem - stout, 1 cm. or more in thickness, somewhat succulent or herbaceous, but woody at base: branches ascending; both more or less densely clothed with stiff spreading hairs.

Leaves: simple, green or dark green, petioled, - the *petioles* 18 to 35 mms. long, more or less winged, - alternate, or sub-opposite, exstipulate, often unequal sided, ovate ovate-oblong or ovate-cordate, obtuse, or subacute, the margin undulate or curled and subserrate, the base, rounded or cordate and most often suddenly contracted and decurrent on the long petiole, surface wrinkled or rugose and sparsely hairy with few scattered hairs above, minutely pilose and with the nerves and veins conspicuous beneath, from 2.5 to 10 cms. long and 2.5 to 5 cms. broad: taste bitter.

Inflorescence: a solitary simple or very occasionally forked terminal or leaf opposed or extra axillary peduncled ebracteate bristly spike considerably longer than the leaves—from 5 to 15 cms. or more long - with the flowers arranged compactly in two alternating rows in a zigzag (scorpioid) manner at the top on the upper side of the spike, its tip circinately coiled and uncoiling or opening out in such a way that the open flowers always face the same side.

Flowers: minute or small, numerous rigidly sessile, ebracteate, white, pale violet, or blue lilac, bisexual and hypogynous. *Calyx*: 2.5 mm. long, persistent but not enlarging in fruit, gamosepalous deeply five lobed, the lobes or segments unequal narrow linear or lanceolate acute 1.5 mm. long and sparsely bristly with a few long hairs outside. *Corolla*: small, longer than the calyx - 5 mm. long, gamopetalous funnelshaped, tube 3 mm. long slender or narrowly cylindric, hairy outside, base slightly gibbous, throat contracted, (not hairy) limb funnelshaped, five lobed or rayed, the lobes small

0.5 mm. long, hairy outside, broadly-or orbicular-oblong, crenate, and very shortly pointed, usually incurved and plicate in bud and spreading in flower. *Stamens*: five, epipetalous, inserted below the middle of the corolla tube, included, with the filaments very short free and bearing ovate or lanceolate usually acuminate anthers, about 0.5 mm. long. *Pistil*: bicarpellary syncarpous: *ovary*: superior completely or imperfectly four celled and four ovuled: *style*: terminal, about 0.6 mm. long, its apex depressed conical and with a horizontal frilled ring or disc towards the tip surmounted by the entire or rarely bifid stigma which is shorter than the style being about 0.4 mm. long.

Fruit: an ovoid mitriform or mitre-shaped two-cleft or deeply 2 lobed subacutely four pointed glabrous, ribbed indehiscent nearly dry drupe about 4 mm. long separating when ripe into two mitre-like segments each segment two pointed or divaricate compressed bluntly four ribbed and containing two angular beaked hard one-seeded pyrenes each with one empty cavity on the inner side, in addition to the seed bearing chamber. Taste - bitter. *Seeds* - with little endosperm, the *embryo* with a short radicle and 2 planoconvex cotyledons.

Uses: The plant is used as a local application to boils, sores and the stings of insects and reptiles.

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