

A REVIEW ON MANDUKAPARNI**Ashalatha M¹,****L.N.Shenoy.^{2*}**¹ Professor and HOD; Department of Dravyaguna, Government Ayurveda Medical College, Bengaluru,² Ph.D Scholar, Department of dravyaguna, Government Ayurveda medical college, Bengaluru, Karnataka, India**ABSTRACT**

Mandukaparni (Centella asiatica (L.) is one of the important medicinal and nutraceutical herbs being used by ethnic people since prehistoric times. It accumulates large amount of pentacyclic triterpenoid saponins which forms the major store house of secondary metabolites providing active compounds stimulating cell rejuvenation, improving physical and mental health. C. asiatica also serves dietetic purpose in the form of green leafy vegetable and in the preparation of juice, drink and other food products. The present review is an attempt to review the literature that emphasize its ecology, phytochemistry, traditional and pharmacological applications of C. asiatica.

Keywords: Centella asiatica L, review, cognitive impairment, pharmacology, therapeutic uses.

INTRODUCTION

Plants have been enumerated as an eminent basis of medicine since immemorial past. Drugs based on the plants are of prime importance for several remedies in traditional and conventional medicine throughout the world and serves as a substitute for drug supply in modern medicine. Nowadays world markets are turning towards plants as the source of ingredients in manufacturing health care products. Secondary metabolites obtained from the plants are found to be an important source of various phytochemicals that could be used directly or as an intermediate for the production of pharmaceuticals, in food or drink supplements as well as in the form of preservatives. In the developing countries, approximately 80% of the populations still rely on the traditional medicine derived from the plants for health care needs. Thus the demand for herbal medicines is continuously increasing day by day due. *Mandukaparni* is one such valuable

medicinal herb. The literal meaning of the term *Mandukaparna* is a plant having leaves resembling the shape of frogs. And it also means, the stolons grow in the manner of jumping frog. *Centella asiatica* is the accepted source of this herb. It is a stoloniferous creeping herb, rooting at nodes. The whole plant is reported to be a nervine and cardiogenic, astringent and diuretic. *Charaka* includes this under *Vayasthapana varga*, the group of drugs that are capable of maintaining the youthful vigour and strength. It is widely distributed throughout tropical and subtropical regions of world. The use of *Centella* in food and beverages has increased over the years basically due to its beneficial functional properties. Its potential antioxidant, antimicrobial, cytotoxic, neuroprotective and other activities have been widely claimed in many reports and basically is very much related to its properties and mechanism of action of the plant's bioactive constituents namely the triterpenic acid (asi-

atic acid madecassic acid), triterpenic saponin (madecassoside and asiaticoside), flavanoids and other phenolic compounds. The present review is a comprehensive literature analysis of the classics and various health beneficial functional properties of Mandukaparni.

HISTORICAL REVIEW:

- In Atharvaveda, Mandukaparni is mentioned as medhya rasayana .
- In Matsya purana, Mandukaparni is mentioned among the medicinal plants that beneficial for brain.
- In Agnipurana, it is placed with the plants that are used as sterilizers i.e. poison killers (Ag.Pu.222.7,8,9) and for curing Kamla(Ag.Pu.300.34). Besides these it is also used in Churna form with milk as Anupana to rule out Vali, Palita (Ag.Pu.286.5).Among the eight brahmanas, Mandukaparni is described in Shathpathabrahmana.
- In Kaushikasutra, it is described as an Aushadhi that resembles manduka.

SAMHITA PERIOD¹⁻³:

- In Charaka samhita it has been told in Vayastapana mahakashaya, Tikta skandha, shaka varga, Medhya rasayana ,Brahmarasayana.

- Sushruta Samhita it is mentioned in Pathya Shaka, Mahapanchmoolasava, Kushtha Chikitsa, Medhayushkamiya Rasayana.
- Ashtanga Hridaya it is mentioned in Shaka varga, Kasa Chikitsa and Rasayana Prakarana.

NIGHANTU KALA:^{4,5,6,9,7,8}

- All Nighantus make a mention of Mandukaparni synonymous to Brahmi.
- Priya nighantu mentions mandukaparni in shatapushpadi varga.
- Nighantu adarsha mentions mandukaparni under jeerakadi varga
- Botanically it is identified as *Hydrocotyle asiatica / Centella asiatica* of family Apiaceae

PARYAYA PADAANI:⁹

Mandukaparni : A leaf whose overall shape gives the impression of a frog.

Mahushadhi : An herb having many uses.

Divya : This plant is superior

Bhekaparni : Leaves appear like frog shape.

Supriya : Having attractive feature.

Table 1 : Showing Synonyms of Mandukaparni : ^{8,9,10,11,4,7,23,24}

Name	B.P	P.N	S.N	K.N	M.N	R.N	A.N	D.N	H.D	P.R	N.S
<i>Saraswathi</i>	-	-	-	+	+	+	-	+	-	-	-
<i>Satyavathi</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Smarini</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Brahma charini</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Satya nama</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Brahma soma</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Brahmi</i>	-	+	-	+	+	+	+	-	-	-	-
<i>Brahmasuvarchala</i>	-	-	-	+	-	-	+	-	+	-	-
<i>Mandookaparni</i>	+	+	-	+	+	-	+	+	+	+	+
<i>Manduki</i>	+	-	+	+	+	+	-	+	+	+	+

<i>Brahmani</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Dadrucchada</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Sunama</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Munika</i>	-	-	-	+	+	-	-	-	-	-	-
<i>Twastri</i>	+	-	-	+	+	-	-	-	-	-	-
<i>Divya</i>	+	-	-	+	+	+	-	-	-	-	-
<i>Medhya</i>	-	-	-	+	-	+	-	-	-	-	-
<i>Mahaushadi</i>	+	-	-	+	+	+	-	-	-	-	-
<i>Kapotavanka</i>	-	-	-	+	-	-	-	-	+	-	-
<i>Lavanya</i>	-	-	-	+	+	-	-	-	-	-	-
<i>Vayastha</i>	-	-	-	+	-	-	-	-	-	-	-
<i>Somavalli</i>	-	-	-	+	+	-	-	-	-	-	-
<i>Brahmamanduki</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Mandukabrahmi</i>	-	-	+	-	-	-	-	-	-	-	-
<i>Saraswathaprada</i>	-	-	+	-	-	-	-	-	-	-	-
<i>Brahmaputrika</i>	-	-	+	-	-	-	-	-	-	-	-
<i>Supriya</i>	-	-	+	-	-	-	-	-	-	-	-
<i>Hrdya</i>	-	-	+	-	-	-	-	-	-	-	-
<i>Shleshmavinashini</i>	-	-	+	-	-	-	-	-	-	-	-
<i>Soumya</i>	-	-	-	-	-	+	+	-	-	-	-
<i>Surashresta</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Suvarchala</i>	-	-	-	-	-	+	+	+	+	-	+
<i>Kapotavega</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Vaidhatri</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Divyateja</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Swayambuvi</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Somalatha</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Surejya</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Brahmakanyaka</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Mandukamata</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Mastyakshi</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Surasa</i>	-	-	-	-	-	+	-	-	-	-	-
<i>Veera</i>	-	-	-	-	-	+	-	-	-	-	-

VERNACULAR NAMES:¹⁷

Table 2: Showing Vernacular names of Mandukaparni

Arabic	<i>Artaniyachindi, jharniba</i>
Assam	Manimuni.
Bengali	<i>Brahmamanduki, Tholkuri, Dhulkudi</i>
Bihar	<i>Chokiora</i>
Bombay	<i>Karinga, karivana</i>

Burma	<i>Minkuabin.</i>
Canarese	<i>Vandelaga</i>
Deccan	<i>Vallari</i>
English	<i>Indian pennywort, Thick leaved pennywort</i>
French	<i>Bevilaque,</i>
German	<i>Wassernabel</i>
Gujarati	<i>Barmi, Khandbrahmi</i>
Hindi	<i>Brahmamanduki, Khulakudi, Brahmi</i>
Indo china	<i>Ban dai ayeh</i>
Kannada	<i>Vandelaga, Urage</i>
Malay	<i>Pegaga</i>
Malayalam	<i>Kodagam, Kutakam, Muthal, Muttil, Kutannal</i>
Marathi	<i>Brahmi, karivana, karinga</i>
Megalaya	<i>Batmaina</i>
Mundari	<i>Cokeara</i>
Persian	<i>Sardetürkastan</i>
Philippines	<i>Rabasa</i>
Sanskrit	<i>Brahmaman- duki, Divya, Mahaushadhi, Manduki, Supriya, Saraswathi, Tvashti, Bhekaparni, Bheki, Darduchhada.</i>
Tamil	<i>Vallari, Vallarikiri, Ballau</i>
Telugu	<i>Mandukabrahmi</i>
Tripura	<i>Thankuni, Thunimankuni</i>
Urdu	<i>Barhmi</i>

GANNA/VARGA: ^{1,2,3,4,5,6,7,8,9,24,26}

Table 3: Showing the classification according to various authors

Classical Text	<i>Gana /Varga</i>
<i>Charaka samhita</i>	<i>Tikta skandha, shaka varga, vayasthapana gana,</i>
<i>Sushruta samhita</i>	<i>Tiktha varga, shaka varga</i>
<i>Astanga hrudaya</i>	<i>Shakavarga</i>

Nighantu	Varga
<i>Bhavaprakasha Nighantu</i>	<i>Guduchyadi varga</i>
<i>Dhanwantari Nighantu</i>	<i>karaveeradi varga</i>
<i>Kaiyadeva Nighantu</i>	<i>Oshadi varga</i>
<i>Raja Nighantu</i>	<i>Parpatadi varga</i>
<i>Priya Nighantu</i>	<i>shatapushpa varga</i>
<i>Madanapala Nighantu</i>	<i>Abhayadi varga</i>

Nighantu adarsha	Jeerakadi varga
Shodala Nighantu	karaveeradi varga
Dravyaguna vignana(P.V.sharma)	Medhyadi varga

RASAPANCHAKA^{1,2,3,9,8,7,11,5,6,10}

Table 4: Showing Rasapanchaka of Mandukaparni

Name	Rasa	Guna	Veerya	Vipaka	Doshagnata
C.S	Tikta	-	Sheeta	Katu	Kapha pittahara
Su.S	Kashaya,	Laghu ,hima	Sheeta	Madhura	Pittahara
A.S	Tikta	-	Sheeta	Katu	-
A.H	Tikta	-	Sheeta	Katu	Kapha pittahara
B.N	Kashaya, madhura, tikta	Laghu,hima sara	Sheeta	Madhura	-
K.N	Madhura, Tikta, Kashaya	Laghu	Sheeta	Madhura	-
R.N	Kashaya, Tikta	Hima	-	-	Vatapittahara
N.A	Madhura, Tikta, Kashaya	-	Sheeta	Madhura	-
S.N	-	Laghu	Sheeta	Madhura	-
M.N	Madhura	Laghu , Sara	Sheeta	-	-
P.N	Tikta	Laghu	Sheeta	-	-

KARMAS^{1,2,3,4,5,7,8,6,10,9,11}

Table 5: Showing Karmas of Mandukaparni

Karmas	C.S	Su.S	A.H	D.N	S.N	R.N	K.N	M.P	P.N	N.A	B.N
Medya	+	-	-	-	-	+	+	+	+	-	+
Rasayani	+	-	-	-	-	-	+	+	+	-	+
Swarya	-	-	-	-	-	-	+	+	-	-	+
Hrudya	-	+	-	-	+	-	+	-	+	-	-
Kushtagna	-	-	-	-	-	-	+	+	-	-	+
Kandugna	-	-	-	-	-	-	+	-	-	-	-
Mehagna	-	-	-	-	-	-	-	+	-	-	+
Jwaragna	-	-	-	-	-	-	+	+	-	-	+
Shothagna	-	-	-	-	-	-	-	+	-	-	+
Raktapit-tashamaka	-	+	-	-	-	-	-	-	-	-	-
Agnivardaka	-	-	-	-	+	-	-	-	-	-	-
Ayushya vardaka	-	-	-	-	-	+	-	-	-	-	-
Grahi	-	-	+	-	-	-	-	-	-	-	-
Smriti prada	-	-	-	-	-	-	-	+	-	-	+
Vishagna	-	-	-	-	-	-	-	+	-	-	+

ROGAGHNATA^{1,2,3,4,5,7,8,6,10,11,9}

Table 6: Showing Rogagnata of mandukaparni according to various authors

Roghagnata	C.S	Su.S	A.H	D.N	Sh.N	R.N	K.N	M.P	P.N	N.A	B..N
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Jwara	-	+	-	-	-	-	+	-	+	-	+
Kshataksheena	+	-	-	-	-	-	-	-	-	-	-
Kushta	-	+	-	-	-	-	+	+	+	-	+
Kandu	-	-	-	-	-	-	+	-	-	-	-
Udara	+	-	-	-	-	-	-	-	-	-	-
Shopha	-	-	-	-	-	-	+	-	+	-	+
Aruchi	-	+	-	-	-	-	+	-	-	-	-
Shwasa	-	+	-	-	+	-	+	-	-	-	-
Kasa	-	+	+	-	-	-	+	+	-	-	+
Pandu	-	-	-	-	-	-	+	+	+	-	+
Meha	-	+	-	-	-	-	-	+	+	-	+
Smritiprada	-	-	-	-	-	-	-	-	-	-	+
Visha	-	-	-	-	-	-	+	+	-	-	+
Moha	-	-	-	-	-	-	+	-	-	-	-
Shleshmavikara	-	-	-	-	+	-	-	-	-	-	-
Raktipitta	-	+	-	-	-	-	-	-	-	-	-

YOGAS OF MANDUKAPARNI^{1,27}

Table 7: Showing some of the Yogas of Mandukaparni

Name of yoga	Adhikara	References
Brahma rasayana	Rasayana	Cha.chi
Medhya rasayana	Rasayana	Cha.chi
Paneeya vatika	Jwaradikara	B.R
Achintyashakti rasa	Jwara	R .rajasundara
Trailokya sundara rasa	Jwara	B.R
Abhravatika	Jwaraatisara	R .Sa.Sam
Amaparpatika	Grahani	B.R
Rasabravati	Grahani	B.R
Mahabravati	Grahani	B.R
Purnakalavatika	Grahani	R .Sa.Sam

THERAPEUTIC USES

- * The swarasa of mandukaparni is applied over skin which cures pidaka. (GN 4/1-119)
- * Mandukaparni swarasa is indicated in Kamala. (VD.10/2).
- * The swarasa of mandukaparni is indicated as medhya rasayana followed by a diet rich with milk.

TAXONOMY²²

- Kingdom -Plantae

- Division -Angiospermae
- Subdivision-Spermatophytina
- Class -Dicotyledonae
- Order -Umbelliferae /Apiales
- Family -Apiaceae
- Genus -Centella
- Species - *asiatica*(Linn)

CENTELLA ASIATICA MORPHOLOGY¹⁷ *Centella asiatica* Linn. [Syn: *Hydrocotyle asiatica* Linn.]

Etymology - Centella-many, asiatica – of asia

- ❖ **HABIT:** A slender herbaceous creeper, faintly aromatic plant.
- ❖ **STEM:** long, herbaceous, weak, cylindrical, prostrate coming off from the leaf-axials of a Vertical root stock, fili-form, often reddish and with long internodes, rooting at the nodes.
- ❖ **LEAVES:** Leaves are 1.5-6.5cms in diameter, simple, arising in groups from nodes, orbicular or reniform, crenate and often lobed, glabrous, shining, petiolate, petioles 7.5-15cms in length, stipulate, stipules adnate to petioles.
- ❖ **INFLORESCENCE:** Racemose, simple umbels, 3-6 flowered cymosely fascicle at the end of a very short axillary pubescent or glabrous green or pinkish peduncle about 0.5 cm long with 2 small ovate acute concave involucre bracts 3 to 4mm long at the top that embrace the flower.
- ❖ **FLOWER:** Pedicellate, small pedicels, bracteate, bracts small, ovate, embracing the flowers, hermaphrodite, actinomorphic, regular, complete, epigynous.
- ❖ **CALYX:** 5 sepals, minute, connate, valvate. A mere thin nearly truncate ridge at the top of the ovary with 5 minute triangular teeth.
- ❖ **COROLLA:** 5 petals, polypetalous, valvate, free small pinkish, reddish or rarely white ovate obtuse or acute entire petals imbricate in bud.
- ❖ **ANDROECIUM:** 5 stamens, polyandrous, alternate to petals, filament short, anther ditheous, introrse.
- ❖ **GYNOECIUM:** 2 carpels, syncarpous, ovary inferior, 2-celled, disk 2-lobed, vittae present in ovary wall, axile placentation, one ovule in each locule.

❖ **FRUIT: Cremocarp, laterally compressed, 1/8-1/6 in.**

DISTRIBUTION¹⁷: Centella asiatica is distributed in temperate, subtropical, and tropical region of both the hemispheres.

- ❖ Mainly found in the wet areas in India, Sri Lanka, Malasia, Pakistan, Indonesia, Africa, Australia, China, Philippines etc.
- ❖ Plant occurs almost throughout India from the base of Himalaya to celon (upto 2,000ft altitude).
- ❖ It grows abundantly along streams, rivers –beds, tanks or ponds, also in the borders of the rice fields and usually during rainy season

PROPAGATION AND CULTIVATION¹⁵

Propagation- It can be propagated from seeds or stolons and can be grown on variety of soils. However moist locations are more suitable. It can be grown in shady places as well.

1. **Seed propagation**-fresh seeds are collected during February and march .seeds are sown in nursery beds or can be directly sown in fields. seed germination takes about 10 days and has about 60 percent success.
2. **vegetative propagation**-direct planting of cutting, with 3 to 4 nodes or rooted plants, in fields or polybags can be taken up. sprouting takes about 7 to 10 days and nearly 100 percent establishment is obtained.

Micropropagation

It can be micro propagated by culturing leaf explants on MS medium containing 3.0mg/1BAP +0.05 mg /1 NAA. Rooting is obtained on MS+1.0 mg/ 1IBA. The rooted plants when transferred to pots containing a soil and sand mixture (2:1), 89% survival

rate was observed under glasshouse condition.

Agroclimatic requirements for cultivation

Cold and humid climate is more suitable. but it can be successfully grown in most of the region, on fertile land with sufficient water availability. sandy, sandy loam and black cotton soils are especially suitable for this crop. it can be grown in shady places as well.

IDENTITY, PURITY AND STRENGTH¹⁴

Foreign matter - Not more than 2 per cent.

Total Ash - Not more than 17 per cent.

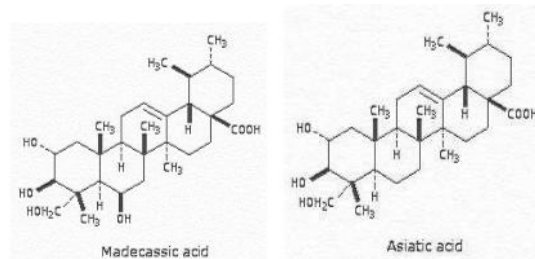
Acid-insoluble ash - Not more than 5 per cent

Alcohol-soluble extractive- Not less than 9 per cent

Water-soluble extractive - Not less than 20 per cent

CHEMICAL CONSTITUENTS^{20,30}

Plant contains triterpenoid-Asiaticoside-A and Asiaticoside-B, triterpene acid, madasia



Acid.

Two triterpene acids –brahmnic acid, Iso-brahmic acid .

Two saponins-brahmoside and brahminoside is isolated.

A triterpene glycoside-thankuniside acid, thankunic acid isolated. Fresh leaves contain essential oil, fatty oil, sitosterols, tannin and resinous substance, leaves and roots contains resin, bitter principle vellarine, pectic acid.

Dried plant contains alkaloid hydrocotylin glycoside asiaticoside.

SUBSTITUTES AND ADULTERANTS¹⁵

Centella asiatica and bacopa monnieri often get substituted for each other in the market as both are commonly sold under the same vernacular name, BRAHMI, but ayurvedic texts and related literature are clear in mentioning the name brahmi to Bacopa monnieri. comparative anatomical features can differentiate two species. chemically both species are rich in saponins. medecassoside and asiaticoside are important saponins of centella asiatica whereas bacopa monnieri contains bacoside A and bacoside B.

According to kirthikar and basu, Hydrocotyle javanica is used as a Substitute for Centella asiatica in Ceylon and Malay archipelago .

PHENOLOGY²² Flowering : June –October, Fruiting : July-November

PART USED : Whole plant, leaves

POSOLGY^{15:} Swarasa 10-20ml, Choorna- whole plant powder-3-5gm, Root powder-0.5-1.5gm

RESEARCH WORKS:^{12 22}

- The alcoholic extract produced tranquilising effect in rats. It was found that the alcoholic and aqueous extracts have antagonized the barium chloride induced spasm and reduced spontaneous contractions and also caused relaxation of musculature of isolated ileum of rats. The alcoholic extract was also effective against acetylcholine induced spasm unlike the aqueous extract. (Aithal & Sirsi, 1961)
- The alcoholic extract was found to have depressant effect in rats in toxic doses. the glycosidal fraction had a sedative effect in rats. It decreased the tone and diminished the amplitude of contractions of isolated ileum of rabbit and albino rat. (Mahotra et al., 1968)

- Brahmoside were found to possess sedative action in rats equivalent to that of a minor tranquilizer. The action appeared to be mainly on the cholinergic mechanism (Ramaswamy et.al.,1970)
- **Ancient and pharmacological review on centella asiatica (mandukaparni): a potential herbal panacea**
Since long time it has been used traditionally as a remedy for several skin disorders, it is used by the cosmetic industries in preparing skin care products but this aspect is still untouched by Ayurvedic researchers. In recent times, focus on plant research has increased all over the world. Centella asiatica is an important medicinal herb that is widely used in the orient and is becoming popular in the West. Triterpenoid, saponins, the primary constituents of Centella asiatica are mainly believed to be responsible for its wide therapeutic actions.
- **Pharmacognostic studies on centella asiatica (I) urban s. jelani, f. jabeen, m. prabhakar and p. leelavathi**
plant anatomy and taxonomy laboratory, department of botany, osmania university hyderabad 500 007, india.
- **Comparative pharmacognostic and phytochemical investigation of two plant species valued as medhya rasayanas.**
Trivedi Manisha N*, Khemani Archana, Vachhani Urmila D. Shah Charmi
P.Santani D.D. and ROFEL, Shri G M

Bilakhia College of Pharmacy. Vapi.
396191. Gujarat. INDIA.

DISCUSSION

The main object of Ayurveda is to live full length of life which is free from physical and mental disorders. *Medhya rasayana* drugs have been claimed to exert a pronounced effect on the mental capability of a person. The potential role of these drugs is on intellectual function and mental performance. Brahmi and *Mandukaparni* are the two most popular drugs which are restorative with a specific effect on the intellectual functions. *Charaka* considers both these drugs as promoters of general mental ability (*medhya*). Inclusion of these two drugs in *Ashtanga ghruta* a formulation mentioned in *Asthanga hridaya* clearly implies these as two distinct drugs. *Brihatrayees*, the three classical texts of *Ayurveda* even supports the same.

CONCLUSION

Mandukaparni has been in use since time immemorial to treat wide range of indications. It has been subjected to quite extensive phytochemical, experimental and clinical investigations. The dynamic nature of indigenous knowledge has led to its survival through centuries. Many research studies have demonstrated its different functional properties. By its long popular use as a natural product, *Mandukaparni* can be a potential herbal plant in many healthcare applications.

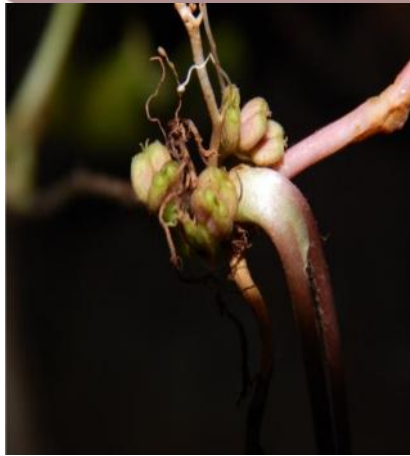
MORPHOLOGY



Mandukaparni plant



Mandukaparni leaves



Mandukaparni flower



Mandukaparni fruit

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