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## HIBISCUS MICRANTHUS – AN OVERVIEW

Nekha Raj\*, Syed Asadulla, Ajith Kumar.P, Chinnu monichan

Department of Pharmacognosy, Malik Deenar College of Pharmacy, Seethangoli, Kasaragod, Kerala, India.

### ABSTRACT

*Hibiscus micranthus*, (Malvaceae) is a shrubby, erect, branched, slender and stellately hairy plant, widely distributed in hotter parts of India, Ceylon, Saudi Arabia and tropical Africa. The plant is reported to contain phytoconstituents such as phenolic acids, flavonoids,  $\beta$ -sitosterol, fatty alcohols, alkanes and acids. Its leaves, stem, flowers, root has been used in the Indian traditional system as a medicine to treat various diseases.. Traditionally the plant is considered as a valuable febrifuge in India and is used as antipyretic, anti-inflammatory, antifungal, antiviral, antitumor, hypoglycemic. Various research studies proved that the different parts of hibiscus micranthus possess diverse biological activities such as antipyretic, anti-inflammatory, antitumor, haematological effects, antimicrobial, antiviral, antifertility. The present paper is an overview on its pharmacognostical, phytochemical and pharmacological properties reported in the literature.

**Key words:** *Hibiscus micranthus*, pharmacognostical, phytochemical, pharmacological properties.

### Author for correspondence:

**Nekha Raj,**

Department of Pharmacognosy,  
Malik Deenar College of Pharmacy,  
Seethangoli, Kasaragod, Kerala, India.

### INTRODUCTION

Hibiscus comprises of more than 200 species, mainly in the tropics and subtropics; many of them grown as ornamentals. *Hibiscus micranthus* is a hibiscus species with one of the smallest flowers. In India, the plant is known by different vernacular names in different regions as Chalabharate in telugu, sittamutti in tamil, chanakbhindo in gujarati, okder in Sanskrit and as Oorikai in malayalam. *Hibiscus micranthus* is a bushy leafy shrub of around 45 cm height having white flowers on short pedicel with very distinctive pea-size fruit capsules. The fruits and flowers of *H. micranthus* are used as antidiabetic and anti-dandruff agent when applied topically and possesses laxative activity when taken orally. The plant has also been

approved for its hematological, antipyretic, anti-inflammatory, antimicrobial, antiviral, antitumor, female anti-fertility, viralizing and anabolizing effects. The antifungal and anti-tumor activity has been observed from roots of *H. micranthus* and also reported to possess good antiviral activity. Literature reveals that *H. micranthus* possesses a wide range of phytochemical such as phenolic acids, flavonoids,  $\beta$ -sitosterol, alkanes, fatty alcohols and acids. Chemical profiling of ethanol extract of *H. micranthus* roots by GC-MS revealed the presence of seventy nine compounds. Available literature revealed that a fingerprint profile has been developed by HPTLC and rutin was analyzed by HPLC in *H. micranthus* (stem) hydro alcoholic extracts but there is no evidence yet available on the quantitative analysis of biomarkers using validated HPTLC method in *H. micranthus* extracts(1).

In India the roots are used traditionally to cure head ache and chewed as a cure for cough. Used to cure venereal diseases in Sudan, applied as dressings on wounds and sores of humans and domestic

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animals. Used to cure bronchitis and pneumonia in Kenya and Tanzania. In Kenya the ash of burned roots is applied to boils, cure for ulcers and as a treatment for kidney problems. In Tanzania, the leaves are used for treating earache, the leaves sap is taken against dysentery, in which leaves are used against stomach-ache and leaf pulp is applied on swellings, used as an antidote for snakebites. In Tanzania and Zambia, the whole plant is used to treat convulsive fever in children. In Botswana pounded leaves are applied to boils on the buttock, or the root is boiled in water that is drunk as a cure. In Ethiopia, the leaves are used for treating skin burning (dermatological infections) and skeletal muscular disorders, inflammation, for wound healing. The plant is used as a febrifuge in the traditional medicine of Saudi Arabia, India and Sri Lanka (2).

### Description

Common name	: Tiny flower hibiscus
Botanical name	: <i>Hibiscus micranthus</i>
Malayalam name	: Oorikai
Synonym	: <i>Hibiscus ovalifolius</i>
Family	: Malvaceae (mallow family)



**Fig-1** *Hibiscus micranthus*

*Hibiscus micranthus* (Fig-1) is a Perennial herb or shrub up to 3 m tall; stem erect, longitudinally ridged with age, usually with stiff, rarely with soft, stellate hairs. Leaves are alternate, simple; stipules filiform, 2–6 mm long, stiff hairy; petiole 1–23 mm long; ovate, elliptical or lanceolate, base cuneate, rounded or truncate, apex acute, obtuse or rounded, margin serrate, both sides sparsely to densely soft-hairy. Flowers are axillary, solitary, bisexual, which opens only in direct sunlight, 5-merous, persistent; calyx

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lobes lanceolate or triangular, fused in lower half, persistent, green, densely stiff-hairy; petals free, white to pink; stamens numerous, filaments united into a column surrounding the style; ovary superior. Fruit a round capsule 5–10 mm in diameter, sparsely pubescent. Seeds reniform, black. Seedling with epigeal germination. Seeds are densely covered with white hairs, it flowers in the month of Jan–May and fruiting in the month of April (2, 3).

Flower	: Solitary; white.
Flowering from	March-May.
Fruit	: globose-capsule, puberulous-seeds.
Field tips	: Branchlets stellate-tomentose.
Leaves	nerved from base.
Leaf Arrangement	: Alternate-distichous
Leaf Type	: Simple
Leaf Shape	: Ovate, suborbicular or elliptic
Leaf Apex	: Acute
Leaf Base	: Subcordate
Leaf Margin	: Serrate

### Origin and geographic distribution

*Hibiscus micranthus* is distributed from Africa eastward to India. In tropical Africa it occurs from Mauritania and Senegal eastward to Eritrea, Ethiopia and Somalia, and from there southward to South Africa and Madagascar. It is very common in the land of tropical Africa, Arabia, India and Sri Lanka. In Kerala its distribution is found in Idukki, Palakkad. It is native to tropical Africa, Arabia, India, and Pakistan. *Hibiscus micranthus* occurs from sea-level up to 2100 m altitude in grassland and bushland on many different soil types. It is often found in waste places and as a weed of cultivation. It is very common on foothills, scrub jungles, road side thickets and wastelands from plains to 300m (2).

### Cultivation

*Hibiscus micranthus* is only collected from the wild. The 1000-seed weight is 4 g. Seeds store very well for long periods. Seeds stored in the United States for 40 years at –12°C had a germination percentage of 100%.

**Table-1 Phytochemical profile of *Hibiscus micranthus* leaves and stem**

Chemical constituents	Hibiscus micranthus stem				Hibiscus micranthus leaves
	Pet ether	chloroform	alcohol	water	Methanol
Alkaloids	-	-	-	-	+
Flavonoids	-	-	+	-	+
Saponins	-	-	-	-	+
Tannins	-	-	+	-	+
Steroids	+	+	-	-	+
Phenols	-	-	+	-	+
Diterpines	-	-	-	-	+
Anthraquinones	-	-	-	-	+
Terpenoids	-	-	-	-	-
Glycosides	-	-	-	+	-

#### Chemical constituents

The plant is reported to contain phytoconstituents such as phenolic acids, flavonoids,  $\beta$ -sitosterol, fatty alcohols, alkanes and acids. The seed contains 15.2% oil (dry weight basis). Fatty acids present in the seed oil include: palmitic acid 18.6%, stearic acid 3.5%, oleic acid 10.1% and linoleic acid 59.8%. The oil also contains malvalic acid (1.7%) and sterculic acid (3.1%), which are cyclopropenoid fatty acids known to cause physiological disorders in animals. Some compounds like phenolic acids, tannins, flavonoids,  $\beta$ -sitosterol, alkanes, carbohydrates, steroids, fatty alcohols and acids have been reported (2).

#### PHARMACOGNOSTIC STUDIES

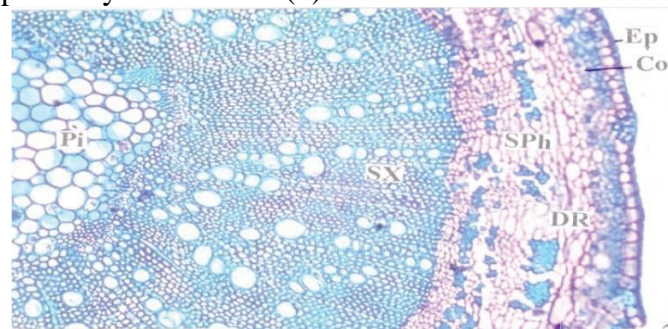
##### Macroscopy

Macroscopical study of dried stems are generally cylindrical, up to 1 cm thick, woody, upright, outer surface smooth in young stems and rough in old stems, greenish externally, yellowish internally, fracture splintery, taste is astringent and slightly bitter, odour without any characteristic aroma agreeable(4). Macroscopical study of roots the roots are generally cylindrical, up to 1 cm thick, woody, upright, , fracture splintery , taste is slightly bitter (5).

##### Microscopy

**Microscopical characters of the stem (Fig-2)-** Epidermal layer of squarish cells with thick cuticle; The epidermis is followed by a narrow zone of chlorenchymatous cortex and four or five layers of

parenchymatous inner cortex. Secondary phloem is wide and continuous all around the stem. It has wide dilated funnel shaped rays at certain places .In other regions, the secondary phloem has tangential blocks of phloem fibres alternating with narrow segments of phloem elements. Secondary xylem is a thick hollow cylinder and consists dense xylem fibres and radial files of vessels which are separated by wide gaps. The vessels are circular, thin walled and diffuse in distribution; they include both wide and narrow vessels, the wide vessels are 40  $\mu$ m in diameter; the narrow vessels are 20  $\mu$ m wide. The pith is wide and parenchymatous. It consists of angular, thick walled parenchymatous cells (4).



**Fig-2 T.S of stem**

##### Microscopical characters of root

The periderm is wide (Fig-3), comprising of 10-15 layers of narrow suberised tabular phellem cells. The periderm zone is nearly 150  $\mu$ m wide.



The secondary phloem is 200 µm wide. It has three or four, discontinuous tangential blocks of fibres. In the outer portion, occurs a narrow portion of crushed phloem and in the inner part, the phloem is intact. Secondary xylem is dense and solid cylinder of fibres and vessels. Vessels are diffuse in distribution. They are either solitary or as radial multiples. The solitary vessels are in clusters and the multiple vessels are in radial or oblique lines. The diameter of the vessels ranges from 50-150 µm. Xylem fibres are thick walled with wide lumen. Xylem rays are wide and have thick lignified walls. They have dense accumulation of starch grains. The calcium oxalate druses are abundant in the phloem and periderm. In the phloem and periderm, the druses are diffuse and densely crowded in the collapsed zone. They are 70 µm wide (5).

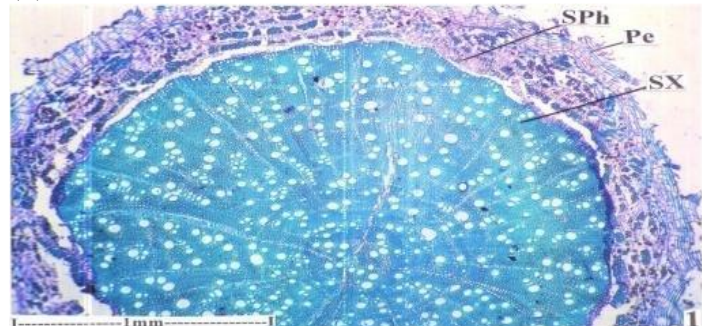


Fig-3 T.S images of root

**Stem powder analysis**

Revealed the presence of fibres and vessel elements abundant in the powder (Fig-4). The fibres are libriform type with lignified thick walls and pointed tips. They are 500-650 µm long. The vessel elements are cylindrical and elongated. They have perforations plate which may be horizontal or oblique. The vessel elements with oblique perforations plates have short, pointed tails. The lateral wall pits elliptical, multiseriate and alternate. The vessel elements are 200 µm long and 40 µm wide (4).

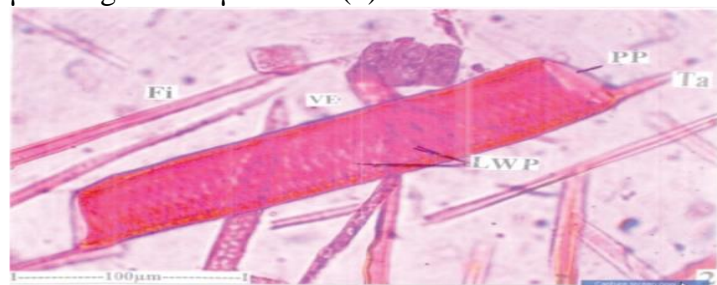


Fig-4 Powder microscopy showing lateral wall pits and fibres

**Note-** VE- vessel, PP-perforation plate, LWP- Lateral wall pits, Fi-Fibre, Ta-Tail, Ph: Phloem, PhS: Secondary phloem, SX: Secondary xylem, DR: Druses, Pi: Pith, Co: Cortex, Ep: Epidermis

**Root powder analysis**

Revealed the presence of Fibres and vessel elements abundant in the powder (Fig-5). The fibres are libriform type with lignified thick walls and pointed tips. They are 500-650 µm long. The vessel elements are cylindrical and elongated. They have perforations plate which may be horizontal or oblique. The vessel elements with oblique perforations plates have short, pointed tails. The lateral wall pits elliptical, multiseriate and alternate. The vessel elements are 200 µm long and 40 µm wide (5).

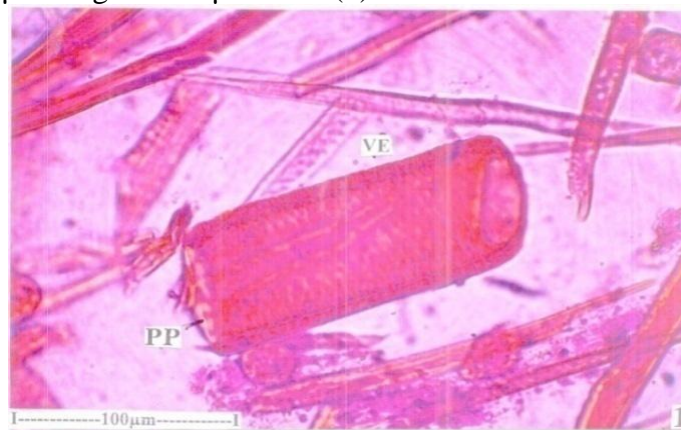


Fig-5 Powder analysis of root

**Physiochemical Parameters**

**Table 2: Physiochemical parameters of *Hibiscus micranthus***

Parameters	% constituents
% Loss on drying at 110°C	1-2.0%
% Ash content	2.5%
% Acid insoluble ash	0.5%
% water soluble ash	2.0%
% extractive values	
Pet ether(60-80°C)	1.5
Chloroform	3.4
Alcohol	6.6
Water	4.10

**Ayurvedic Uses-** Venomous stings, bites, Ear diseases, Kidney diseases, Stomach diseases, Insanity, Pulmonary diseases, Skin diseases, Mucosal diseases, Venereal diseases, Anti-inflammatory, Antipyretic and Neuromuscular blocking properties (6).

**Traditional Uses-** Antipyretic, Anti-inflammatory, Antifungal, Antiviral, Antitumor, Female antifertility, Viralizing, Hypoglycemic and Anabolizing (7).

**Reported Pharmacological Activity (8)**

Reported Pharmacological Activities is given in table-3.

**Table-3 Pharmacological activity studies conducted on *Hibiscus micranthus***

Sl. no	Therapeutic study	Part used	Medium	Activity	Author
1	Antibacterial activity	leaves	Methanol extract	Antibacterial Activity by Disc diffusion model	Berhan begashawetal
2	Wound healing activity	leaves	Methanol extract	Wound healing activity by rat excision model	Berhanbegashawetal
3	Pharmacological investigations of hibiscus micranthus	Whole plant	Ethanol extract	Anti-inflammatory activity By carrageenan induced paw edema and cotton pellet induced granuloma method Antipyretic significant neuromuscular blocking activity mild CNS stimulant activity	M.A-Al-Yahyaetal
4	Chemical constituents and & bioactivity studies on hibiscus micranthus	Aerial parts of Root	Ethanol Extract	Anti fungal Anticancer	Jain etal
5	Pharmacological study of aerial parts of two malvaceous Plants	Aerial parts	Ethanol Extract	Antifungal	Rekha Tripathi
6	Comparative Pharmacological study of aerial parts and roots of ethanolic extract of hibiscus micranthus	Aerial parts and roots	Ethanolic extract	Antimicrobial activity by disc diffusion method Antiviral efficacy by plaque inhibition method Antineoplastic activity by sarcoma 180A0 as test system	Dr. Rekha Tripathi

**CONCLUSION**

The reported phytochemical and pharmacological studies support its traditional uses and proven to have the potential to be developed as newer drugs in future. Introduction and commercial cultivation of its varieties in India is also recommended.

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