



PHARMACOGNOSTICAL STUDIES ON THE ROOT OF “*HIBISCUS MUTABILIS*”

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ABSTRACT

Pharmacognostical studies on the root of *Hibiscus mutabilis* were carried out to establish diagnostic standards for its identification, authentication, and quality control as a medicinal crude drug. The study included detailed macroscopic, microscopic, physicochemical, and phytochemical evaluations of the root. Macroscopically, the root was observed to be cylindrical, brownish in color, fibrous, and characteristic in odour and taste. Microscopic examination revealed the presence of cork cells, parenchymatous cortex, lignified xylem vessels, medullary rays, and abundant starch grains, which serve as distinguishing anatomical features. Powder microscopy of the dried powdered drug exhibited diagnostic characters including cork cells, thin-walled blunt end fibre with broad lumen, thin-walled pointed end with broad lumen, reticulate vessels, Pitted parenchyma, calcium oxalate which are useful for identification and adulteration, Physicochemical parameters such as ash values, extractive values, moisture content, and fluorescence analysis were determined according to standard pharmacopoeial procedures. Preliminary phytochemical screening indicated the presence of alkaloids, flavonoids, tannins, saponins, glycosides, and phenolic compounds, suggestion significant therapeutic potential. These pharmacognostical characteristics provide valuable standards for the proper identification and prevention of adulteration of the root drug and may support its further pharmacological and phytochemical investigations.

KEYWORDS: *Hibiscus mutabilis* Macroscopy Microscopy Physicochemical parameters.

1. INTRODUCTION

Traditional medicine(TM) is defined as indigenous medicine that is used to maintain health and aim to prevent, diagnose and treat physical and mental illness differently from allopathic medicine based on theories, beliefs, and experiences. One of the well – known traditionally valued medicinal plant is *HIBISCUS MUTABILIS* LINN.,^[1] *mutabilis* is an important ornamental plant from the Malvaceae family that originated in china and has been cultivated in china for more than 2000 years and also called as Fu rong flower, Ju Shuang flower, Zui jiu rong and Hua mu.^[2] As a ornamental plant, it has spread to Japan, Korea and other countries in asia.^[3] It is an important late autumn flowering plant becoz of its small of its large, bright

flowers. It has the following characteristics: flowers solitary in the axillae, eight small bracts, linear, base connate; calyx bell shaped, five lobes, ovate, pointed; white or reddish flowers becoming dark red, petals suborbicular, bearded base, flowering in August to October; capsule flat globose; seed kidney shaped, pilose on the back (Editorial Board of Chinese Academy of Sciences China Floral Citation 1984).^[4]

Hibiscus mutabilis/Cotton rose is a large shrub or small multi-stemmed tree that grows to 15 ft (4.6 m) high with about a 10 ft (3 m) spread. It is neither a true hibiscus nor a rose (it is in Malvaceae, the hibiscus family). *H. mutabilis* is downright conspicuous when in full bloom starting in late winters. The flowers open pure white and

change color over a 3-day period until they are deep pink and then as they die, assume a dark “blue-pink” hue. The most notable characteristic of this flowering shrub is that flowers of 3 distinct colors appear on the bush simultaneously, as the blooms' color cycle is independent of one another. Single and double flowered varieties are available, both having quite large blossoms that are 3–5 in (8–13 cm) across. After flowering, a round, hairy capsule forms which dries and releases fuzzy seeds, a trait that inspired one of the plants common names, rose cotton as the buds resemble the ball of that famous member, *Gossypium*, also of the hibiscus family. The large leaves are 5–7 in (13–18 cm), bright green, hairy on the undersides and deeply lobed. They impart a coarse texture that gives the plant a distinctive eye-catching appeal. There is always a great demand in garden centers for the cotton rose when it is in full bloom, for it is one of the most imposing and unusual of flowering trees. Little to no care is required.^[5] This shrub truly takes care of itself and is adaptable to most locations and soil conditions and *under* sun or light shifting shade. This shrub thrives on regular watering but this is optional as it is very drought tolerant. Propagated by cuttings, it is easy to root.^[6] Other than these *Hibiscus mutabilis* has a useful ecological function, playing a very significant role in slope protection. This tree provides very good garden greenery, and is often grown in parks and gardens and on road sides.^[7] In addition, the various parts of this plant have been known to contain numerous medicinal properties like anti-hypolipidemic, anti-proliferative, antioxidant, anti-microbial, -anti-inflammatory and other pharmacological properties and also contains medicinal properties and have been used in clearing the lungs, cooling the blood and detoxification.^[8]

TAXONOMY

Kingdom - Plantae

Phylum- Tracheophyta (Vascular Plants)

Division- Magnoliophyta

Class- Magnoliopsida

Order- Malvales

Family - Malvaceae

Genus- *Hibiscus*

Species- *HIBISCUS MUTABILIS*

Botanical name- *HIBISCUS MUTABILIS* LINN...,^[9]

VERNACULAR NAME

English- Confederate rose, changeable rose or rose mallow.

Kannada- Charate, Neladavare, Bettadavare, Chandrakanti.

Malayalam- Chinappratti, Sthalapadmam.

Bengali- Sthal padma.

Hindi- Gul-e-ajab, Sthalkamal, Sadafuli.

Telugu- Patthi Mandaram.

Chinese- Mu fu rong, Fu rong hua, Shan fu rong.

Oriya- Sthalpadmo.

Japanese- Fuyoo, Fuyoo.

Spanish- Rosa agodon, Palo de la reina.

Indonesian- Ngali-nagali.

Thai- Phuttan

Korean- Bu yong.

German- Veranderlicher Roseneibisch.

France - Rosa de coton.

Portuguese- Rosa louca.^[10]

MATERIALS AND METHODS

Collection and Plant materials: The plant material was from nearby surroundings Mandya district, Karnataka, India in the month of December 2025. The plant was identified and authenticated by Dr. Thejash kumar M.P. co-ordinator, Dept of botany post graduate a research centre, Bharathi college (autonomics), Bharthinagara. An herbarium voucher specimen was preserved in the department of Pharmacognosy, Bharthi College of Pharmacy, Bharthinagara.

Drying and size Reduction of Root: The root of *Hibiscus mutabilis* was subjected to shade drying and further crushed to powder and further stored in a air tight container.^[11]

Experimental Procedure

Macroscopical Studies: Root of *Hibiscus mutabilis* was studied macroscopically for examining its color, taste, size, odour, fracture and texture. Macroscopic examination of crude drug was carried out by naked eye by placing the individual raw materials on a white paper surface.^[12]

Microscopical Studies: Microscopical study has been carried out by taking free-hand sections of fresh root. After being cleaned with water, thin-sections were stained with saffranin and examine under a microscope. Additionally, be dried root powder with water was examined under a microscope and stained with a saffranin, microphotographs were captured.^[13]

Physicochemical constants: Physicochemical constants such as the percentage of moisture content, total ash, acid insoluble ash, water soluble ash, sulphated ash, water and alcohol soluble extractives, Fluorescence analysis, loss of weight on drying, were calculated based upon standard procedures prescribed in Indian Pharmacopoeia.^[14]

Preliminary Phytochemical studies: Preliminary phytochemical test for root of *Hibiscus mutabilis* were performed and chemical constituents were determined by using standard procedures described by Kokate C.K., Purohit A.P., and Gokhale S.B.^[15]

RESULTS AND DISCUSSION

Macroscopical Studies



FIG-1: ROOT.

Table 1: Macroscopical Character of root of *HIBISCUS MUTABILIS* INCLUDES.

Colour	Creamy-White (Light brown as they mature)
Odour	Characteristic
Taste	Fleshy yet Woody
Size	4-5 ft tall,2-3ft width(varies)
Shape	Cylindrical
Fracture	Fibrous
Texture	Tough

Microscopical Character

Transverse Section of Root: The Transverse section preparation of the root was studied under the microscope and the following inclusions were recorded.it shows cork consisting up to 10 layers of compressed rectangular cells filled with brownish content, cortex region with cell layer ranging from 20 layers to 50 layers of parenchyma in root section. The cortex region consists of parenchyma cells filled with abundant starch grains and few cluster crystal of calcium oxalate. Few patches of cell contents are observed Co be scatter over the cortex region. The

Phloem region found below the cortex layer this region comprises of fibres, medullary rays and stone cells. The fibers are observed to be in parallel with medullary rays. Medullary rays are uni to bi seriate. filled with starch grains and patches of cell contents. The medullary rays emerge from the xylem region. Xylem region is differentiated from the phloem region by a single layer of crushed parenchyma cells. Medullary rays emerges from the centre region and radiates into a phloem and xylem region. Xylem vessels are observed in groups which run parallelly with medullary rays.

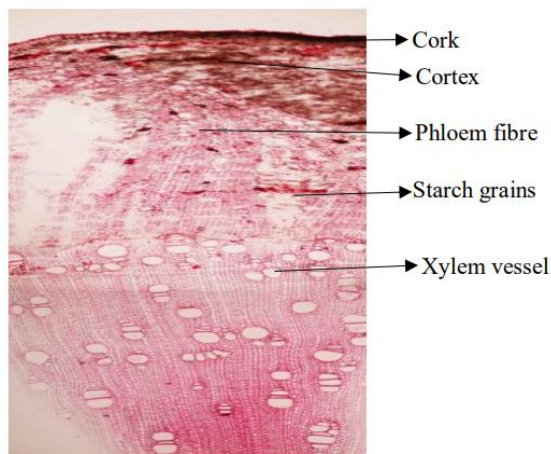
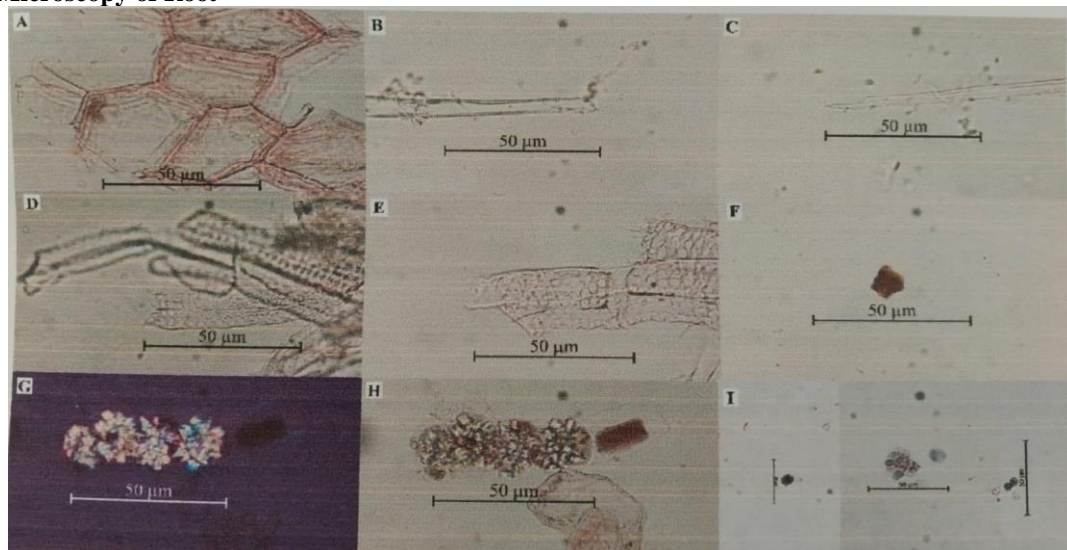


Fig-2: Hibiscus Mutabilis Root.

Physicochemical Parameters: The results were reported in **Table 2 & 3**. Moisture content determination is important for maintaining the Pharmacopoeial standards and it indicates stability of the drug. Equally important in the evaluation of crude drugs is the total ash values. The total ash is particularly important in the evaluation of

purity of crude drugs, i.e. the presence or absence of foreign inorganic matter such as Metallic salts and/or silica. The alcohol yielded higher extractive value (14.2% W/W) when compared with water (10.7% W/W). The alcohol and water-soluble extractives were indicators of the total solvent soluble component.

Powder Microscopy of Root



A. Cork cells, **B.** Thin-walled blunt fibre with broad lumen, **C.** Thin-walled pointed end with broad lumen, Reticulate vessel, **E.** Pitted parenchyma, **F.** brownish content, **G.** Cluster crystal of calcium oxalate under polariser light, **H.** Cluster crystal of calcium oxalate in visible light, **I.** Simple to multi compound starch grain.

Table 2: Showing Results of Quantitative Evaluation of The Root of *Hibiscus Mutabilis*.

Evaluation parameters(%W\W)	Root(%W\W)
Moisture content	9.5%
Total ash value	4.2%
Acid insoluble ash value	3.2%
Water insoluble ash value	5.2%
Sulphated ash	2.3%

Table 3: Extractive Value of Root of *Hibiscus Mutabilis*.

Evaluation parameters(%W\V)	Root(%W\V)
Alcohol soluble extractive value	14.2%
Water soluble extractive value	10.7%

Table 4: Fluorescence Analysis of Root Powder of *Hibiscus Mutabilis*.

Solvents/Reagents	Ordinary light	254nm	366nm
Distilled water	Light-Brown	Light Blue	Light Blue
Concentrated. HNO ₃	Yellowish orange	Bright purple	Violet
1%. KOH	Yellowish brown	Black	Green
1N. aqueous. NaOH	Yellowish orange	Light Black	Green
50% H ₂ SO ₄	Light-Brown	Sky blue	Grey
50% HNO ₃	Brown	Dark purple	Violet
Methanol	Dark Brown	Purple	Cream
50% HCL	Light-Brown	Black	Brown
Benzene	Light-Cream	Dark purple	Light-Cream

Preliminary Phytochemical Studies: The preliminary phytochemical investigation of the Petroleum ether, chloroform, ethyl acetate, methanol extract root of *Hibiscus mutabilis* showed the presence of alkaloids,

glycoside, flavanoid, carbohydrates, fat and oil, proteins and amino acids, steroids, triterpenoid presented in **Table 4**.

Table 4: Qualitative Analysis Evaluation of Phytochemicals In Root of *Hibiscus Mutabilis*.

Phytoconstituents	PE	CL	EA	ME
Alkaloids	-	-	-	+++
Glycosides	-	-	++	++
Saponin	-	-	-	+
Flavanoid	-	-	++	++
Carbohydrates	-	-	+++	+++
Fat & oil	++	-	-	-
Proteins and amino acids	-	++	++	+++
Steroid	-	-	-	+
Triterpenoid	-	-	+	-

NOTE: + = Present, - = Absent

PE= Petroleum Ether, **CL=** Chloroform, **EA=** Ethyl-acetate, **ME=** Methanol.

CONCLUSION

Pharmacognostical studies on the root of *Hibiscus mutabilis* establish important standards for its correct identification, authentication, and quality control as a medicinal plant drug. The root exhibits characteristic macroscopic features such as a cylindrical shape, rough outer surface, fibrous fracture, and distinct coloration, while microscopic examination reveals diagnostic tissues including cork cells, cortex, lignified xylem vessels, medullary rays, and abundant starch grains and also reveals powder microscopy characteristic like cork cells, lumens, reticulate cells, pitted parenchyma, calcium oxalate which are useful for identification. Physicochemical parameters including ash values, extractive values, moisture content, and fluorescence analysis provide standardized reference data for evaluating the quality and stability of the crude drug. Preliminary phytochemical screening of the root indicates the presence of biologically active constituents such as flavonoids, tannins, saponins, glycosides, phenolic compounds, and carbohydrates, which may contribute to its traditional therapeutic uses. These pharmacognostical and phytochemical findings support the medicinal significance of the plant and form a scientific basis for further pharmacological, toxicological, and formulation studies. Overall, the pharmacognostical evaluation of the root of *Hibiscus mutabilis* serves as an essential step toward the development of reliable herbal medicines and helps ensure the authenticity, safety, and efficacy of the crude drug in herbal pharmaceutical applications.

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CONFLICTS OF INTEREST: No conflicts of interest.

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