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PHARMACOGNOSY, PHYSICOCHEMICAL STUDY OF LEAVES OF MADHUKA INDICA

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ABSTRACT

Madhuca indica (Fabaceae) is native to India and is found throughout the country. It is known as Mahuda in Gujarati and madhuka in Sanskrit. The use of natural products as medicinal agents presumably predates the earliest recorded history. The whole plant is medicinally important. The aim of the present study was focused on the pharmacognostical and physicochemical were carried out, which would like to facilitate quick identification and selection of the drug from various adulterates. Pharmacognostical study includes morphology, microscopy, quantitative parameters like palisade ratio, stomatal index, stomatal number, vein termination number and vein islet number. Similarly physicochemical evaluation of the leaves of *Madhuca indica* includes extractive value, ash value, moisture content, Foaming index and foreign matter were determined.

KEYWORDS: *Madhuca indica*, macroscopy, microscopy, quantitative microscopy, physicochemical parameters.

INTRODUCTION

To cure human disease, medicinal plants have been a major source of therapeutic agents since ancient times. The revival of interest in natural drugs started in last decade mainly because of the wide spread belief that natural medicine is healthier than synthetic product. Nowadays, there is manifold increase in medicinal plant based industries due to the increase in the interest of use of medicinal plant throughout the world which is growing at a rate of 7 to 15% annually. Despite the major advances in the modern medicine, the development of new drugs from natural products is still considered important. Since 1980, World Health Organization (WHO) has been encouraging countries to identify and exploit traditional medicine and

phytotherapy. The main Indian traditional system of medicine namely Ayurveda and Siddha, are primarily plant based system. The evaluation of new drugs especially phytochemically obtained materials has again opened a vast area for research and development. As per WHO, about 80% of the population in the world relays on the traditional medicine for the treatment of various diseases. Therefore, the evaluation of rich heritage of traditional medicine is essential. In this regards one well- known tree *Madhuca indica* is found in mixed deciduous forests, usually of a somewhat dry type, often growing on sandy soil and thriving on the Deccan trap. It is common throughout Central India, Gujarat, Bombay, Andrapradesh, Western Ghats, dry Sal forests of Madhya Pradesh. According to Ayurveda plant is *madhura, sheeta*, pacifies deranged *pitta*; alleviates burning sensation and relieves fatigue; aggravates *vata*; anthelmintic, permatopoitic and nutritive. Some of noted uses of leaves are as mentioned, the leaves are coated with sesame oil is heated over fire and applied on the affected area to get relief from eczema, leaf ash is mixed with ghee and is used for curing burns and scalds, roasted leaves of tree are mixed with oil and applied on swelling and inflammation. Jaggary is diluted in some water and applied on leaves and kept overnight. Next day it is licked thrice a day to cure mouth ulcer. [1-5] Literature revealed that pharmacognostic studies have not been reported for the leaves of this plant. Therefore the main aim of the present work is to study the pharmacognosy and Physico-chemical standards of aerial parts of *Madhuca indica* which could be used to authentify this plant.

MATERIALS AND METHODS

2.1 Collection of Plant Material

Fresh and fully grown aerial parts of *Madhuca indica* J. F. Gmel. were collected from A.R. College of Pharmacy and it was authentified by Taxonomist, Bioscience Dept., Sardar Patel University, Vallabh Vidyanagar, Gujarat, India. A voucher specimen (**SHD/Mi-1/23/ARGH-11**) was deposited to Dept. of Pharmacognosy, A. R. College of Pharmacy, Vallabh Vidyanagar.

Pharmacognostic evaluation

Macroscopy

Macroscopic evaluation of the fresh plant of *Madhuca indica* J.F Gmel were studied and were identified by comparing their morphological characters mentioned in the literature [1, 4]

Microscopy

Microscopic evaluation of the fresh leaf was carried out and the transverse section of the leaf was taken and various parts of it were observed under the microscope for further confirmation and identification of the plant. Further, the histological examination of the clear powder of the leaf was carried out using reported method.[6] Results are shown in figure 1 to 3. In quantitative microscopy stomatal number, stomatal index, vein termination number and vein islet number were also performed. Results are shown in Table no. 1

Physico-chemical evaluations

Physicochemical parameters of *Madhuca indica* plant parts powder were determined and reported as total ash, water-soluble ash, acid-insoluble ash, determination foreign matter, alcohol and water-soluble extractive values were determined to find out the amount of water and alcohol soluble components.[7, 8] The moisture content was also determined. Results are shown in Table No. 2

RESULT AND DISCUSSION

Macroscopy

Phyllotaxy is whorled; shape of leaf is elliptical or elliptic- oblong, margin is acute having length of 7.5 -15 cm and width of 6 -11 cm, texture is hard and firm, base is acute and color is dark green.

Figure 1: External morphology of *M. indica* leaf.

Microscopy

Transverse section of leaf

The leaf was dorsiventral in nature. Upper epidermis was single layer, polygonal and covered with cuticle. Lower epidermis was Similar to upper epidermis but showed thick cuticle.

Anomocytic stomata were present. Midrib showed 3-5 layers of collenchyma below the upper epidermis. It also shows 6-9 layers of collenchyma above the lower epidermis. It showed the presence of an arc shaped vascular bundle in the centre of the midrib. Xylem consisted of lignified vessels and parenchyma. Phloem consisted of unlignified parenchyma. Vascular bundle was surrounded by lignified pericyclic fibres. Prisms of calcium oxalate were abundant in the collenchyma tissue above the lower epidermis. In Mesophyll the palisade cells were present up to the midrib in 2 to 3 layers. Below palisade cells, 2 to 3 layers of spongy parenchymatous cells were present, which contained longitudinally cut vessels and prisms of calcium oxalate. Results are shown in figure 2.

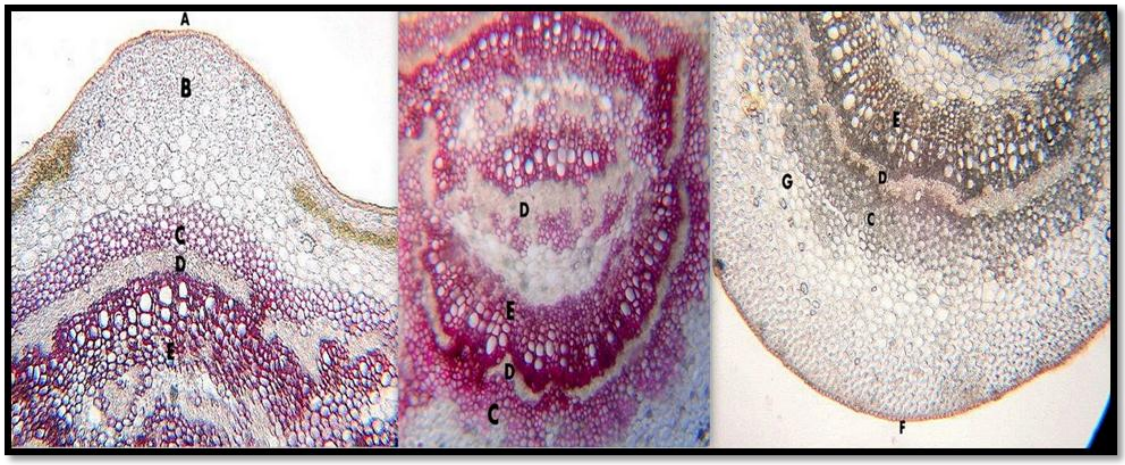

Figure 2: Microscopical view of. *M. indica* leaf [A- Upper epidermis, B- upper collenchyma, C- pericylic fibres, D- phloem, E- Xylem, F- lower epidermis, G- prism calcium oxalate crystals].

Surface preparation of leaf

The lower surface showed epidermal cells which were wavier in outline than upper surface. Anomocytic stomata and prisms of calcium oxalate were also seen. Stomata were absent on the upper surface of the leaf.

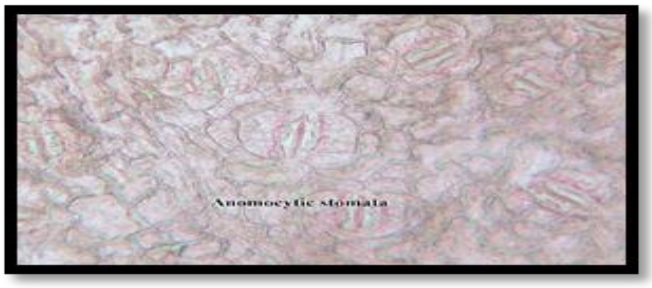

Figure 3: Anomocytic stomata in lower surface of leaf.

Powder microscopy of dried powder of leaves of *M. indica*

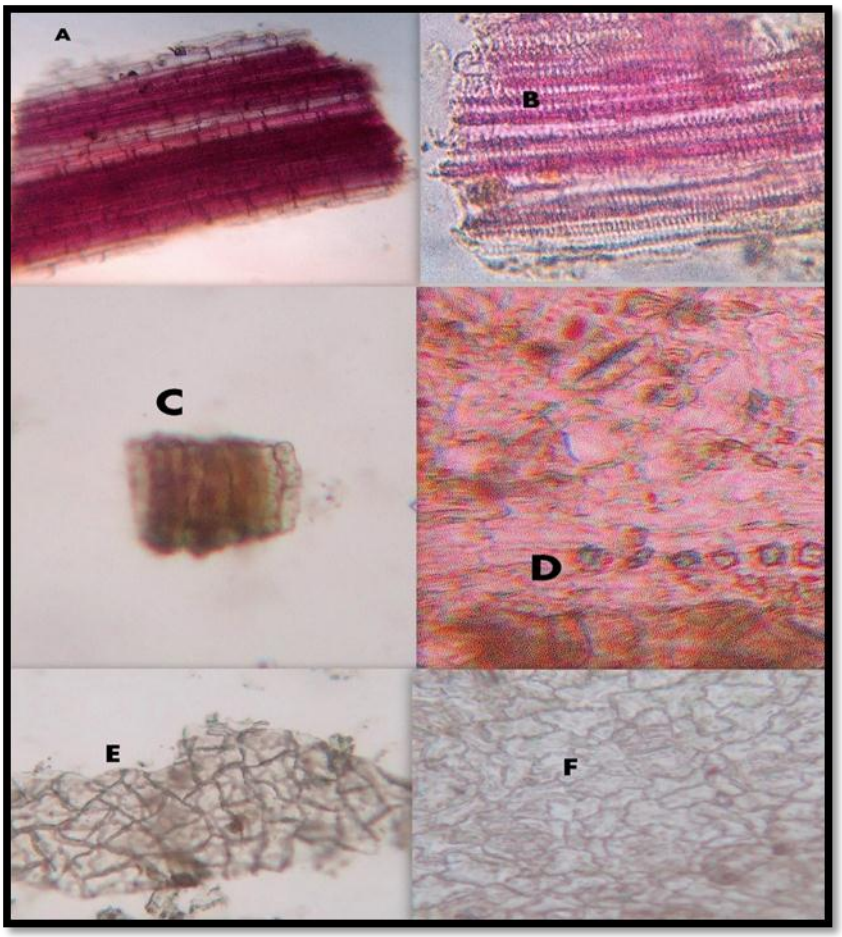

Figure 4: powder study of leaves of *Madhuca indica* [A: lignified pericylic fibres, B – spiral xylem vessels, C: palisade cells, D: prism calcium oxalate crystals, E: Epidermal cells F: Anomocytic stomata].

Quantitative microscopy

The surface parameters of the leaf were measured in order to assess the purity and for proper identification of the plant. Quantitative microscopy of leaf was done and stomatal index, vein-islet number, vein termination number, palisade ratio was determined.

Table 1: Quantitative microscopy of Leaf of *Madhuca indica* J.F. Gmel.

Sr. No.	Determination	Value per square mm
1.	Stomatal number (Lower surface)	200
2.	Stomatal index (Lower surface)	7.5
3.	Vein islet number	24
4.	Veinlet termination	53
5.	Palisade ratio	12:1

Physico-chemical evaluations

Proximate analysis aids to set up certain standard for dried crude drugs in order to avoid batch to batch variation and also to judge their quality. Their studies also give an idea regarding the nature of phyto constituents present in the crude drug.

Table 2: Physico-chemical evaluations of leaves of *Madhuca indica*

Sr. No.	Determination	% W/W
1.	Total Ash	7.25
2.	Acid insoluble Ash	0.92
3.	Water Soluble Ash	5.26
4.	Alcohol Soluble Extractive value	16.56
5.	Water soluble Extractive value	18.08
6.	Moisture content	9.8
7.	Total solid content	90.2
8.	Foaming index	100

w/w - weight/weight

CONCLUSION

The present study on botanical pharmacognosy of *Madhuca indica* provides useful information for quality control parameters for the crude drugs. Macro, microscopic, powder, quantitative microscopic parameters discussed here can be considered as identifying parameters to substantiate and authenticate the drug. Phytochemical analysis, TLC study and Column chromatography helps in standardization and also for undertaking work on isolating and identifying the bioactive compounds.

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REFERENCES

1. *Validation of Analytical Procedures: Methodology*, ICH Harmonised Tripartite Guidelines, 1996.
2. http://www.homolaicus.com/scienza/erbario/utility/botanica_sistematica/hypertext/1220.htm#000000.
3. Nadkarni KM. Indian Materia medica, 3rd Ed. vol. 1. Mumbai: Popular Prakashan, 1954; 179-181.
4. Anonymous. The Ayurvedic Pharmacopoeia of India. 1st ed. vol. 2. Ministry of Health and Family welfare, Department of health, Government of India, 1986; 102-103.

5. Rastogi RP, Mahrotra BN. Compendium of Indian medicinal plants. Vol. I, II, III, IV. Lucknow: Central Drug Research Institute, 259, 432-434, 402-403, 450.
6. Khandelwal K.R., *"Practical Pharmacognosy",* Nirali Prakashan, Pune, 1998; 146-160.
7. Shethi PD. HPTLC – High Performance Thin Layer Chromatography. 1st ed. New Delhi: CBS Publishers, 1996; 1-68.
8. Bailey LC. Chromatography in the Science and Practice of Pharmacy (Remington). 14th ed. Vol.1. Pennsylvania: Mark Publishing Company, 1995; 534-538.