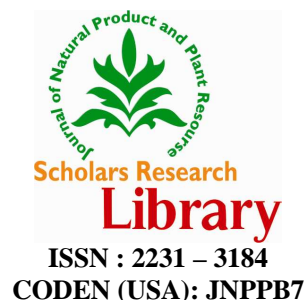




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Microscopic studies of *Madhuca longifolia*

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ABSTRACT

The present study deals with the microscopical and macroscopical investigation on leaves, petioles and stems of Madhuca longifolia Fam. Sapotaceae. Madhuca longifolia commonly known as 'Mahua' is an important plant used against various disorders in indigenous system of medicine such as hepatoprotective, antipyretics, anti-Inflammatory, antiulcer, analgesic, anthelmintic, anti-diabetic and in wound healing activity. The transverse section of leaf shows epidermis single layered on both the surfaces and covered with thin cuticle, cortex, pith, vascular region with xylem and phloem. Leaves consists uniseriate type of trichomes. The paracytic types of stomata are present in both lower and upper surface of leaves. The transverse section of Petiole shows single layered epidermis covered with cuticle, vascular bundles, xylem surrounded by the phloem. The transverse section of stem shows cork, cortex, xylem, phloem and pith. The powder microscopy shows paracytic stomata, uniseriate and covering type of trichomes, parenchymatous cells and fragments of vascular tissue. The quantitative microscopical studies of leaf were also carried out and various leaf content such as palisade ratio, vein islet number, vein termination number, stomata number, stomatal index.

Keywords: Microscopy, *Madhuca longifolia*, fam. Sapotaceae.

INTRODUCTION

Madhuca longifolia (Mahua) which belongs to family Sapotaceae. *Madhuca* commonly known as the Butter nut tree is a medium to large sized deciduous tree distributed in Nepal, India and Sri Lanka.[1] *Madhuca longifolia* is a large tree, about 17m high with a large top.[2] Mahua is a large, shady, deciduous tree dotting much of the central Indian landscape, both wild and cultivated. Mahua seeds are of economic importance as they are good source of edible fats.[3] The flowers have been traditionally used as cooling agent, tonic, aphrodisiac, astringent, demulcent and for the treatment of helminthes, acute and chronic tonsillitis, pharyngitis as well

as bronchitis.[4] *Madhuca longifolia* leaves are expectorant and also used for chronic bronchitis and Cushing's disease.[5] The distilled juice of the flower is considered a tonic, both nutritional and cooling and also in treatment of helminthes, acute and chronic tonsillitis, as well as bronchitis. The leaves are applied as a poultice to relieve eczema. The aerial parts are used for treatment of inflammation. The bark is a good remedy for itch, swelling, fractures and snake-bite poisoning, internally employed in diabetes mellitus. Previous phytochemical studies on *Madhuca indica* included characterization of sapogenins, triterpenoids, steroids, saponins, flavonoids and glycosides.[6]

MATERIALS AND METHODS

Authentication of the plant material: The plant material was collected and authenticated in the month of June 2011 from Katni (M.P). The fresh parts of plant were used for microscopic studies. The leaves were separated, dried, coarsely powdered passed through sieve no. 40 and stored in a closed container for further studies.

Macroscopic and microscopical characters were studied as described in quality control method. Thin projection microscope. Photograph at different magnification were taken by using Nikon digital camera.

Macroscopical studies: Macroscopic studies were carried out by using organoleptic evaluation method. The shape, size, colour, odour, taste, base, texture, margin and apex of leaves of *Madhuca longifolia* Linn were observed.

Microscopic studies: Microscopic studies were carried out by preparing thin section of leaf, stem, and petiole. The thin section were collected in watch glass and bleached with bleaching agent with little boiling, after that thin section were washed with water. Stained with safrannin and mounted in glycerin for observation. Thin sections were observed under binocular and projection microscope. Photograph at different magnification were taken by using Nikon digital camera 12 megapixel.

Powder microscopy: Powder microscopy of leaves of *Madhuca longifolia* Linn were carried out.

RESULTS AND DISCUSSION

Macroscopic characters of leaves, stem and seeds:

Leaf: Leaves are clustered at the ends of the branches; young branches, leaves and petiole pubescent or tomentose. Leaves are coriaceous, elliptic or oblong-elliptic, shortly acuminate, base cuneate. Petiole is short and easily fractured. Shown in Table.1.

Flower: Flowers numerous, near the ends of branches, drooping on pedicels. Calyx coriaceous, densely clothed rusty tomentum. Corollas are yellowish-white, tube fleshy. Stamens 20-30, usually 24 or 26, anthers are hispid at the back with stiff hair.

Fruits: Fruits are barriers, ovoid, fleshy and green.

Stem: Stem is cylindrical, decumbent and branched.

Seeds: Seeds are 1-4 and dark brown in colour.

Table.1. Macroscopy of *Madhuca longifolia*

Part of plant	Morphology of leaves	Observation
Leaf	Colour	Green
	Odour	Characteristic
	Taste	bitter
	Size	11-15 cm long, 5- 8 cm wide
	Shape	Lanceolate to ovate
	Texture	Short
	Fracture	Easy
	Apex	Acute
	Arrangement	Opposite
	Appearance	smooth
	Petiole	Short

Microscopical Character: Shown in Table.2.

Stem: The stems of *Madhuca longifolia* consists thin layered cell cork, cortex, epidermis, xylem, phloem, pith.


Petiole: Petiole consist vascular bundle, xylem, phloem, endodermis, pericycle and pith.

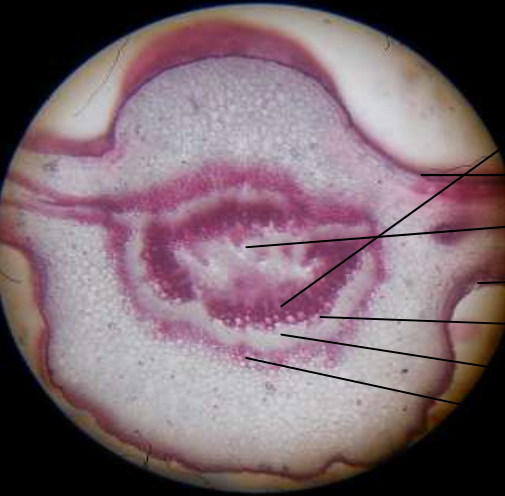
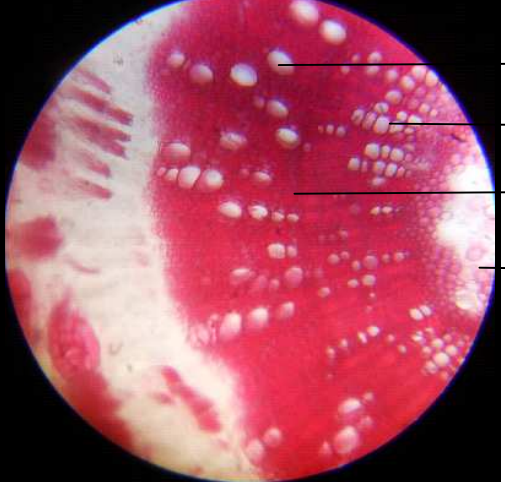
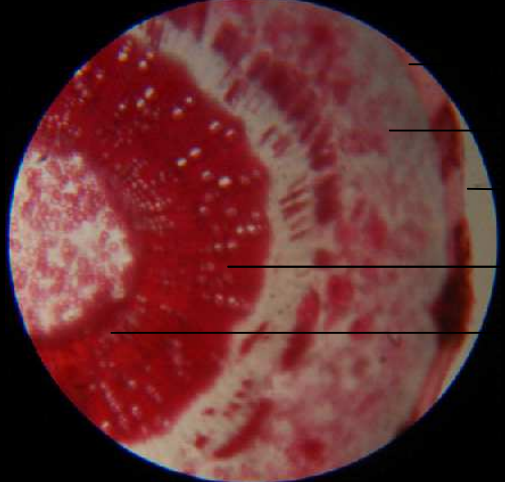
Leaf T.S.: leaf T.S. consist cork, upper and lower epidermis, xylem, phloem and pith.

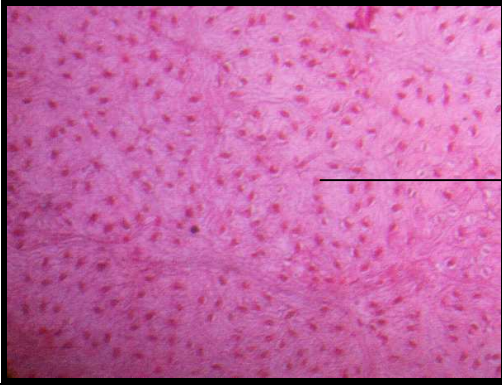
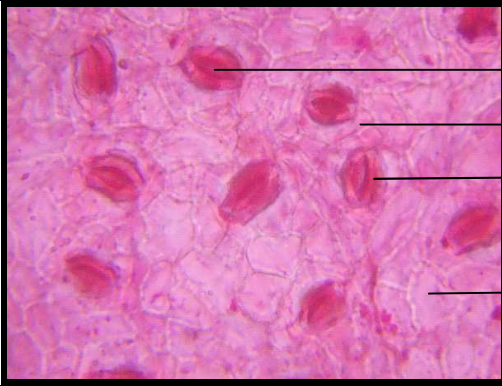
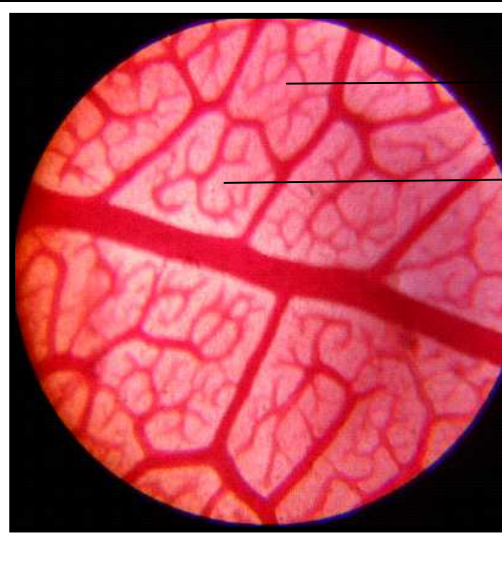
Trichomes: Leaves consists uniseriate type of trichomes and covering trichomes.

Stomata: Both lower and upper surface consist paracytic stomata.

Table. 2. Microscopy of *Madhuca longifolia*

S.No.	Photo	Observation
Fig. 1 Transverse section of petiole of <i>Madhuca longifolia</i> at 10×10		Endodermis Pericycle Vascular bundle Pith

<p>Fig. 2 Transverse section of leaf of <i>Madhuca longifolia</i> at 10×10</p>		<ul style="list-style-type: none"> → Vascular bundle → Upper epidermis → Pith → Lower epidermis → Phloem → Pericycle → Endodermis
<p>Fig. 3 Transverse section of stem of <i>Madhuca longifolia</i> at 10×45</p>		<ul style="list-style-type: none"> → Phloem → Xylem vassels → Cambium → Pith
<p>Fig. 4 Transverse section of stem of <i>Madhuca longifolia</i> at 10×10</p>		<ul style="list-style-type: none"> → Cork → Cortex → Epidermis → Xylem → Phloem

<p>Fig. 5 Upper epidermis of leaf of <i>Madhuca longifolia</i> at 10×10 showing paracytic stomata</p>		<p>Stomata</p>
<p>Fig. 6 Upper epidermis of leaf of <i>Madhuca longifolia</i> at 10×45 showing paracytic stomata</p>		<p>Paracytic Stomata Subsidiary cell Epidermal cells</p>
<p>Fig. 7 venation pattern in leaf of <i>Madhuca longifolia</i> at 10×10</p>		<p>Vein islet Vein termination</p>



Powder Microscopy: Shown in Fig.9.

The powder is dark green in colour, fine, odorless powder with slight bitter taste. Powder microscopy shows paracytic type of stomata, uniseriate and covering trichomes.

Fig.9. Powder microscopy of *Madhuca longifolia* leaves

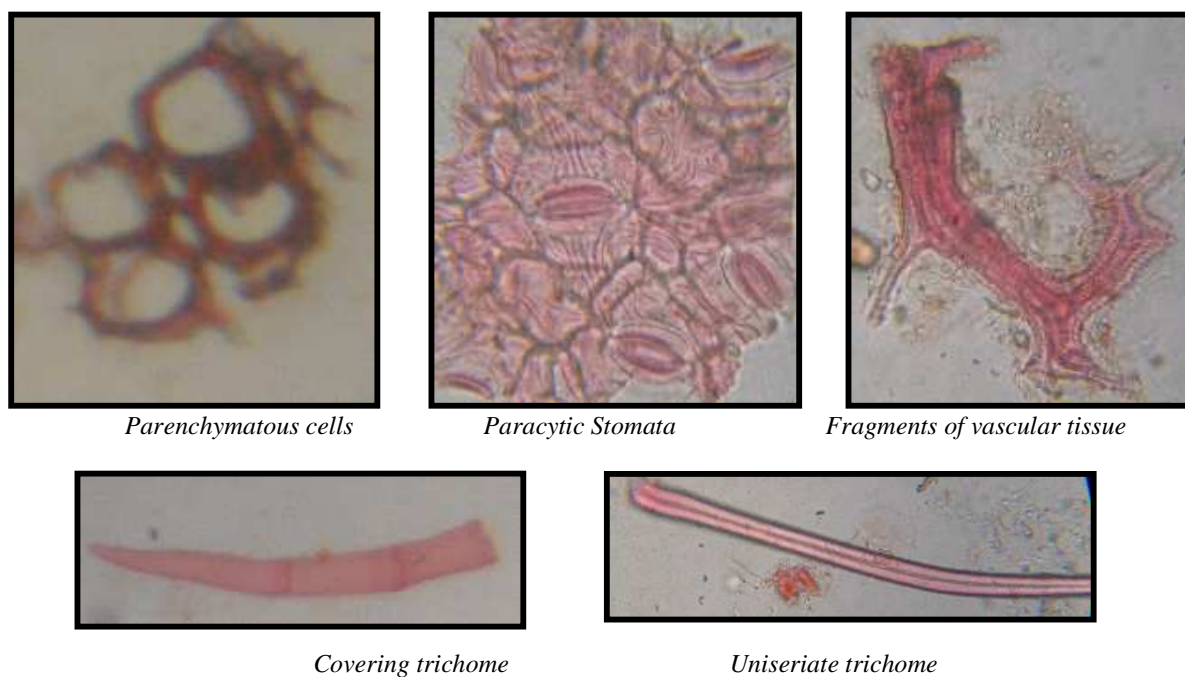


Table.3. Quantitative microscopy of *Madhuca longifolia* leaves parameters

Quantitative microscopy of <i>Madhuca longifolia</i> leaves parameters	Range
Vein islet number	5-7
Vein termination number	3.2-5.4
Stomatal number	10-14
Stomatal index	17.9-18.8

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