

Ethnopharmacological And Pharmaceutical Potential of *Madhuca Indica* (Sapotaceae) “Mahua”

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ABSTRACT

This analysis explores *Madhuca indica*'s ethno-pharmacological and pharmaceutical potential. *Madhuca indica* belongs to family Sapotaceae. 'Mahua' is an essential herb in the Indigenous Medicine System for use against many diseases such as the hepatic, antipyretic, antimycin, analgesic, anthelmintic, antidiabetic and wound healing systems. The cross section of the leaf reveals single epidermis, surrounded by thin cuticles, cortex, piths and xylem vascular regions. Leaves are made up of standardised trichomes of sort. In lower and upper surfaces of leaves the paracytic forms of stomatas are present. The transverse region of Petiole is composed of a single epidermis, surrounded by cuticles, xylem, and the phloem. Cork, cortex, xylem, phloem and pith are shown in the cross section of the stem. The powder microscopy reveals paracytic stomatas, trichome type united and covered, parachutine cells and vascular tissue fragments. Quantitative leaf microscopy experiments have also been carried out with different leaf contents such as palisade, vein number, vein number, stomata number, and stomatal index.

Key- words- Microscopy, *Madhuca indica*, family:Sapotaceae.

INTRODUCTION

Madhuca indica or mahua is well known Indian medicinal plant. Plants of Mahua are called sacred plants and adored as mothers. In the security of human health and the quality of life these plant played a major role over a decade. The field of herbal medicine has expanded in the last couple of years exponentially and both developing and developed countries are gaining popularity due to their source and less side effects. In Ayurveda medicine, *Madhuca indica* is well recognised as a universal panacea. In Indian, Sri Lankan and Nepalese countries, *Madhuca*

indica is a major evergreen tree. Mahua or butternut tree is commonly known as *Madhuca*, 17m high and with a wide top. In tribal culture, it plays an important role. The bark is yellowish and dark brown and milky. The seal is recommended for plegm and the seal is heated slightly and fastened to rheumatic joints. Bark is an excellent treatment against scratching, swelling, fractures and snake-bite toxicity. Starch, terpenoids, proteins, mucilage, anthraquinone glycosides, cardiac glycosides, saponins and tannins were detected in previous phytochemical studies with ethanol, water, and Chloroform extract. (Yadav and Mallik, 2011).

SCIENTIFIC CLASSIFICATION OF MADHUCA INDICA:Table-1

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Ericales
Family	Sapotaceae
Genus	<i>Madhuca</i>
Species	<i>Madhuca longifolia</i> , <i>Madhuca indica</i>

SYNONYMS:


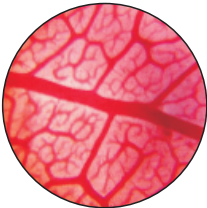



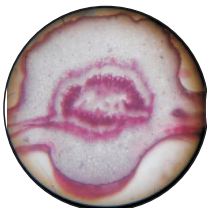
- ✦ **Other names of botany:** *Bassia longifolia* L, *B. latifolia* Roxb. *Madhuca indica* J.F. *M. latifolia* (Roxb) J.F. Macbr, *Illipelatifolia* (Roxb) F. Muell, *Illipemalaborum*
- ✦ **Varieties:**
 - ☞ *M. longifolia* var. *latifolia*
 - ☞ *M. longifolia* var. *longifolia*
- ✦ **Vernacular names**
 - ☞ English: Honey tree, Butter tree
 - ☞ India: Moha, Mahua, Madhuca, Illuppai, Kuligam, madurgam, mavagam, nattiluppai, Tittinam, mahwa, mowa, moa, mowrah


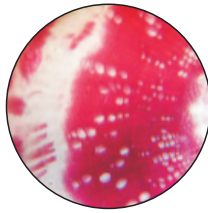

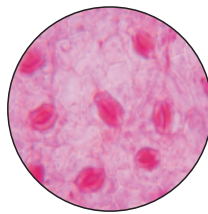
☞ Mahua and mohwa in Hindi.(Gedela *et al.*, 2016)

BIOLOGICAL SOURCE:

A multifunctional tree with its species, *Madhuca latifolia* (M) is the *Madhuca* genus, belonging to the Sapotaceae family. Due to its extensive uses of almost every part, the tree is so economically important. The description of different parts of the plant, its distribution, cultivation and ha been discussed. The description of Macroscopic & Microscopic Characters are given in Table-2.

Table: 2 - Macroscopic & Microscopic Characters

Part	Macroscopic Character[4]	Figure	Part	Macroscopic Character[4]	Figure
Leaves	Clustered branches, coriaceous, elliptic or oblong elliptic, shortly acuminate, base carinate, 5-10cm in height, green colour, bitter taste,		Stem	Layered cell cork, cortex, xylem, phloem, pith, epidermis.	
Flowers	Flowers numerous, near the end of branches, corolla yellowish white, stamens 20-30, usually 24 or 26		Petiole	Xylem, phloem, endodermis, pericycle, pith, vascular bundle.	
Fruits	Barriers, ovoid, fleshy and green.		Leaf T.S	Cork, upper and lower epidermis, xylem, phloem and pith are included.	

Part	Macroscopic Character[4]	Figure	Part	Macroscopic Character[4]	Figure
Stem	Cylindrical, decumbent and branched.		Trichomes	Leaves consist of trichomes of a uniserial type and cover trichomes	
Seed	Seeds are 1-4 and dark brown color		Stomata	Both lower and upper surface consist paracy.	

DISTRIBUTION AND HABITAT:

It is found in India, Sri Lanka and Burma on the north, middle, and south peninsulas. All shapes Var. Longifolia is growing in Sri Lanka, south of India, to the North to Maharashtra and Gujarat; var. In some regions of central and northern India, Burma can be found. The trees are found on a wide range of soils, but in sandy soils they thrive best. The mean average annual temperature is 28-50°C at an altitude of

1200m, minimum 2-12°C, annual precipitation 550–1500mm. (Evans, 2009).

CULTIVATION AND COLLECTION:

It is either cultivated for its fruit as well as it grows in wild condition. It flowers every year between March and April. (Behl and Sriwastawa,2002).

Part wise uses of Madhuca indica is given in Table -3.

Table 3. Parts wise use of Madhuca indica (Kirtikar and Basu).

Part of plants	Properties of medicine
Leaf	Eczema, Curing Wound, Anti Burns, Fracture of Bone, Emollient, Rheumatism, Headache, Diseases of Skin.
Oil	Sweetness, coolant, aphrodisiac, tonic, dispsica. Laxative, piles of Hemorrhoids, Emetics, Anti Earthworm.
Fruit	Acid and chronic amygdalitis, bronchitis, astringency, antiburning, pharyngitis, rheumatism, inflammating, bleeding, spongy.
Bark	Gum, amygdalitis, ache and diabetic, anti-snake poisoning, astringents, emollient crack, and scratching.
Flower	Cold, Wine, Jam, Sweet Syrup, Female Stimulants, Diuretics, Anthelmintics, Improves milk output.

Oil:

- ☞ Index of refractive:1.452
- ☞ Fatty acid composition (acid, %) :Palmitic (c16:0) : 24.5, stearic (c18:0) : 22.7, oleic (c18:1) : 37.0, linoleic (c18:2) : 14.3

Trifed, the Tribal Ministry website, notes on India's Government: "Mahua oil has emollient properties and is used in skin diseases, rheumatism, and headache. It is also a laxative and considered useful in habitual constipation, piles, and haemorrhoids and as an emetic. Tribal also used it as an illuminant and hair fixer." (Gedela *et al.*)

MAJOR CONSTITUENTS OF DRY FLOWER:

These are the main components of Mahua dry bloom. It consists of complete sugar reduction. Galacturonic acid. Maltose. Galacturonic acid., fructose, glucose., xylose. Amino acids Fat, Minerals (Ca, Fe, Mg, P, K & Na), Vitamins A raw fibre Nitrogen/protein content (Thiamine, Riboflavin, Ascorbic acid, Folic acid, and Niacin). Organic acid (Malic acid and Succinic acid) Enzymes (Maltase, Catalase, Oxidase and Invertase) Distinct (Betaine, Tannins, Crude pigments), (Ansari,2009).



Mahua Oil

Table 4 : Active Constituents Present In Different Parts Of *Madhuca Indica*:
(Behl And Sriwastawa), (kirtikar And Basu).

Parts	Phytoconstituents
Bark	flavonoids, sterols, triterpenes
Latex	Resin Soluble, Isolated Resin
Leaf	Moisture, Bio-matter, Minerals, Phosphoric Silica, Flavonoids Alkaloids, Protobasic Acid
Flowers	Thiamine, Riboflavine, Niacin, Folic Acid, Inositol, Ascorbic Acid and Carotene.
Ripe Fruit	Humidity, protein, fat, carbon dioxide, Calcium, Phosphorus, Iron, Carotene, Tannin, Ascorbic Acid,

Table 5 : Nutritional Constituents Of Mahua Flower: [10]

Per 100 gm.	Mahua flower (ripe)	Mahua flower (dry)
Moisture*	73.6	11.61
Protein*	1.4	6.67
Fat*	1.6	0.69
Minerals*	0.4	-
Fibres*	-	1.9
Carbohydrates*	11.1	68
Energy (Kcal)	22.7	-
Calcium**	45	139
Phosphorus**	22	137
Iron**	0.23	-
Carotene	307	-
Thiamine**	-	0.028
Riboflavin**	-	0.87
Niacin**	40	-
Choline**	-	-

*(g/100g) ** (mg/100g)

CHEMICAL TEST: (Saluja et al.,2011)

PHYTOCHEMICAL PRELIMINARY SCREENING:

Recovery of the presence of phytochemical components was checked with different chemical tests in different extracts of the leaves.

S.NO	NAME OF THE TESTS	PROCEDURE	OBSERVATION	INFERENCE
1	Alkaloids	Extract+Dragondroffs reagent Mayer's reagent Hager's reagent	Color orange Ppt White Ppt yellow	+ + +
2	Glycosides	Anthrone+ H ₂ SO ₄ + Heat	Purple or green	-
3	Carbohydrates	Extract+Molish's reagent+conc.H ₂ SO ₄ , Fehling solutionA&B	Purple colour Brick red colour	+ +
4	Triterpenoids	Liebermann test Salkowski test Noller's test	Bluish green Red fluorescent Pink colour	+ + +

S.NO	NAME OF THE TESTS	PROCEDURE	OBSERVATION	INFERENCE
5	Protein & Amino Acids	Biuret test Xanthoprotein test Million's test Ninhydrin test	Colour Violet Colour Orange White ppt White ppt	+ + + +
6	Saponins	Extract+water+shaking	Honey comb formation, such as froth	+
7	Flavonoids	Shinoda'test Zn-Hcl acid reduction test	Red colour Magenta colour	+
8	Fixed oil & Fats	Spot test	Upon drying, stains appear	-
9	Gums/Mucilage	Extract water	No thickening of the substance	-
10	Phenolics/Tannins	FeCl ₃ +lead acetate water	Intense white ppt colour formation	+/+

RESULTS AND DISCUSSIONS:

Diverse Phytoconstructors including alkaloids, carbohydrate, phenolic compounds, flavonos, protein and amino acids, tannins, sterols and saponins have been found in the preliminary phytochemical screening with different qualitative chemical measures. Table 6 revealed the findings. There were steroidal compounds in the present plants. Because of their association with compounds like genital hormones, pharmaceutical compounds become important and interesting. (Saluja *et al.*, 2011)

The present study relates to Madhuca indica leaves' preliminary phytochemical testing with usefully recognisable and evaluating details. The urgency for new medicines study from natural sources is now moving from the herbalist shop to the drug research laboratories away from core texts. There are a number of traditional medicines in India which relay their crude pharmaceutical products

largely to native plant species. (Saluja *et al.*,2011)

USED FOR MAKING SUGAR SYRUP:

The sugar syrup made of dry Mahua flowers is made in a number of records, since its sweets are used for fermentation. (Banerji, Rajini and Rao,2010), (Shriwastava, Sawarkar and Bhutey, 1970),(Patel and Naik,2010).



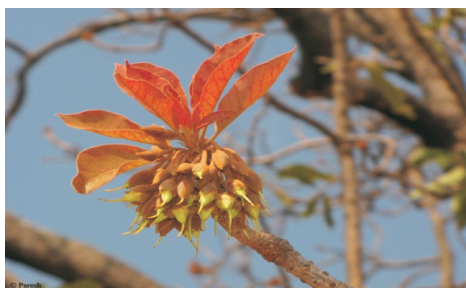
Sugar syrup

Various colours, including slack limes and activated charcoal, are colourful to remove water from the dried plant before being concentrated to the desired amount. The best agent for Mahua sugar

syrup was found to be activated charcoal at a concentration of 5 percent. [14] The syrup thus obtained from the Mahua flora is used for various purposes, including in chocolate processing or as a sweetener. (Wealth of India).

HEALTH BENEFITS OF MADHUCA: (*Madhuca indica* Ayurveda).

- i. In the bronchitis and coughs of Madhuca flowers are useful. Doses of 30 grams with 250 ml of milk are recommended.
- ii. Boiling Vapors of Madhuca leaves are good for alleviating orchitis pain or testicular inflammation.
- iii. In rheumatic diseases, a bark decoction may be administered internally. Even local oil can be utilised from the seeds.
- iv. Bark decoction can also be taken with beneficial results in diabetes mellitus.
- v. Laxative properties include oil extracted from Madhuca seeds. It helps to heal stacks by alleviating chronic constipation.
- vi. In eczema therapy, the leaves of the tree are useful. The leaves were heated by fire, smeared with sesame oil, bandaged onto the affected portion. After 3 to 4 hours, they should be modified.
- vii. A lotion is formed by combining 4 ml of the bark's fluid extracts with 300 ml of water in the Madhuca tree, an excellent gorge for bleeding and spongy gum. In the treatment of chronic and acute amber diseases and pharyngetics, this lotion can also be used as a gargle.
- viii. Ash from leaves and ghees is also used as dressings for burns and scalds in the indigenous



medicinal system. A bark paste is applied locally for the treatment of itching. The seed oil can be extracted in skin conditions locally.

Madhuca flowers raise the milk supply in the mothers who are breastfeeding. Similar properties exist for the plants.

SOME COSMETICS APPLICATIONS:

The fat of Madhuca is satisfactory for washing soap production. In rheumatism it is used as an ointment. It is used for cooking, hair oil, lighting, and is also used for hair washes. It keeps the body warm and glowing. (Sinha et al., 2016).

Butter (*Madhuca indica* seed butter): The butter is made from Indian tree fruit and is extracted from the seed kernels to make a yellow and white butter. It has the properties to prevent dryness of the skin and can impede skin wrinkles growth, as well as reducing degeneration of skin cells and restoring skincare. Mahua Butter has a mild, pleasant odour, ideal for use with cosmetics and toiletries. Mahua butter is room temperature soft and strong. Butter melts after contact with skin, which makes it perfect for melting pools, massage bars, body bars and whipped butters. To make butter like a balsam, use pure 3% to 100%. At room temperature, this is solid. (Sinha et al., 2016)



Mahua shampoo

Pharmacological Properties Of Madhuca Indica:

Parts	Pharmacological Activities
<i>Madhuca indica</i> Plant material	Anti – inflammatory
<i>Madhuca indica</i> whole part	Analgesic
<i>Madhuc aindica</i> whole part	Antipyretic
<i>Madhuca indica</i> bark	Anti-hyperglycemic
<i>Madhuca indica</i> plant	Anti- ulcer
<i>Madhuca indica</i> bark extract	Anti-oxidant
<i>Madhuca indica</i> whole part	Anti-infertility
<i>Madhuca indica</i> flower	Anti- bacterial
<i>Madhuca indica</i> heartwood extract	Anti-epileptic
<i>Madhuca indica</i> bark	Anti- cancer
<i>Madhuca indica</i> bark	Dermatological
<i>Madhuca indica</i> bark	Hepatoprotective
<i>Madhuc aindica</i> seed oil	Toxicity
<i>Madhuca indica</i> bark	Wound healing activity

CONCLUSION:

Plants are key economic sources for a number of well-known drugs that explore *Madhuca indica*'s diverse potential, opportunities and potential for different purposes. This will allow the vulnerable and landless families to get full financial support. This plant, *Madhuca indica*, is widely known for its liquor making feature, so it must change the minds of unconscious individuals. A calming aspect is the Mahua tree concealed from the public eyes. The best ability should be achieved by cultivating tissue by means of a micro-propagation of plants, and good quality of Mahua tree. Researchers must come together with the citizens of the region of government to have more and more precious information. The value of the facility and Mahua Tree will be increased in the next generation because of its efficiency, easy availability, low pricing and comparatively unotoxicity. *Madhuca indica* found a variety of pharmacological behaviours, but many more must be investigated. (Layle and Emison).

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