



**PHARMACOGNOSTICAL, PHYTOCHEMICAL STUDIES OF THE BARK OF
MADHUCA NERIIFOLIA (MOON) H.J LAM**

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ABSTRACT

The plant *Madhuca neriifolia* (Moon) H. J Lam belongs to family Sapotaceae, commonly known as Illipe Butter Tree is one such tree commonly found in Sri Lanka and India's Western Ghats. The bark is reported to have anti-oxidant, anti-cancer, anti-inflammatory activities. Here the present study was undertaken for pharmacognostical evaluation of the bark of the plant with respect to macroscopy, microscopy and physico-chemical parameters. The preliminary phytochemical screening of various extracts was performed to identify class of compounds. Bark shows microscopic characters like cork, cortex, parenchyma cells, medullary rays. Powder microscopy revealed the presence of fibres, sclereids, pitted parenchyma cells, stone cells and starch grains. Physicochemical constants such as ash values, extractive values, loss on drying, mucilage content, swelling index, foaming index were established. The Phytochemical tests reveal the presence of carbohydrates, proteins, saponins, flavonoids, alkaloids, tannins and phenolic compounds.

KEYWORDS: *Madhuca neriifolia*, Pharmacognostical study, Phytochemical study.

1. INTRODUCTION

Madhuca neriifolia (Moon) H.J Lam is also known as Illipe Butter Tree, a species of the family Sapotaceae. This plant is native to Sri Lanka and India's Western Ghats. They have loculicidal capsule fruit. Fruits are recommended in cases of rheumatism, biliousness, asthma. The bark is a good remedy for itch, swellings, fractures and snakebite poisoning.^[1] The plant is used for leprosy, ulcers, itches, bleeding and spongy gums and also used in various disease conditions like anti-oxidant, anti-cancer, anti-inflammatory etc. DPPH radical scavenging and reducing power assay is used to determine anti-oxidant activity. The anti-inflammatory activity of *Madhuca neriifolia* (Moon) H.J Lam was studied by HRBC (membrane stabilizing) and protein denaturation methods.^[2] The anti-cancer activity was investigated by MTT assay on Hep G₂ Hepatic cells.^[3]



Figure 1: *Madhuca neriifolia* (Moon) H.J Lam.

Table 1: Classification of *Madhuca neriifolia* (Moon)

H.J Lam	
Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Ericales
Family	Sapotaceae
Genus	<i>Madhuca</i>
Species	<i>M. neriifolia</i>

Vernacular Names

English: Illipe Butter Tree.

Malayalam: Attuillippa, Kattuilluppei.

Tamil: Atta illupei, Naanilu mara.

Kannada: Neerippe, Holeyippe, Hulinaale.

2. MATERIALS AND METHODS

2.1 Plant collection and authentication

The plant was collected from Kabani riverside, Wayanad district of Kerala in the month of August (2022). Around 9 kg of fresh bark was collected and cut into small pieces, dried under shade. The dried bark was powdered and stored in well closed plastic containers at room temperature and used for further successive extraction. The plant was authenticated by Dr.Sreeja.P M.Sc., Ph.D., PG Dept. of Botany and Research Centre, Sir Syed College, Taliparamba, Kannur.



Fig 2: Herbarium of *Madhuca neriifolia* (Moon) H.J Lam.

2.2 Pharmacognostical studies

2.2.1 Macroscopic evaluation

The bark was macroscopically examined for colour, shape, size, odour and taste.

2.2.2 Microscopical studies

A transverse section of the bark was carried out. Free hand sections and microtome sections of the bark were taken. Thin sections were selected, stained with Saffranin, mounted in glycerine & observed through Trinocular 'Leica' microscope attached with 'Leica DFC 295' digital camera connected to the computer and Leica Application Software LAS Version 3.6.1. Dried powder of the bark was taken on a microscopic slide, add 1-2 drops of Saffranin. Spread the sample evenly over the slide & mount with glycerin. Observe through Trinocular 'Leica' microscope attached with 'Leica DFC 295' digital camera connected to the computer and Leica Application Software LAS Version 3.6.1. Repeat the procedure in 2-3 slides to get maximum characters.

2.2.3 Physicochemical evaluation

Physicochemical parameters of the bark were studied using standard procedures.^[4] These parameters include ash values, extractive values, loss on drying, mucilage content, swelling index and foaming index.

2.2.4 Phytochemical studies

The powdered drug was extracted by a Successive Soxhlet Extraction process using different solvents according to polarity. The solvents used are petroleum ether, benzene, chloroform, acetone, ethanol, water. Then concentrated extracts were subjected to preliminary phytochemical investigation.^[5]

3. RESULTS AND DISCUSSION

3.1 Macroscopic evaluation

Table 2: Organoleptic analysis of bark of *Madhuca neriifolia* (Moon) H.J Lam.

CHARACTERS	BARK
Size	6-8mm thick
Shape	Rectangular strips
Colour	Dark brown to grey
Odour	Aromatic
Taste	Bitter

3.2 Microscopic evaluation

Various microscopic characters of the bark of *Madhuca neriifolia* (Moon) H.J Lam were studied.

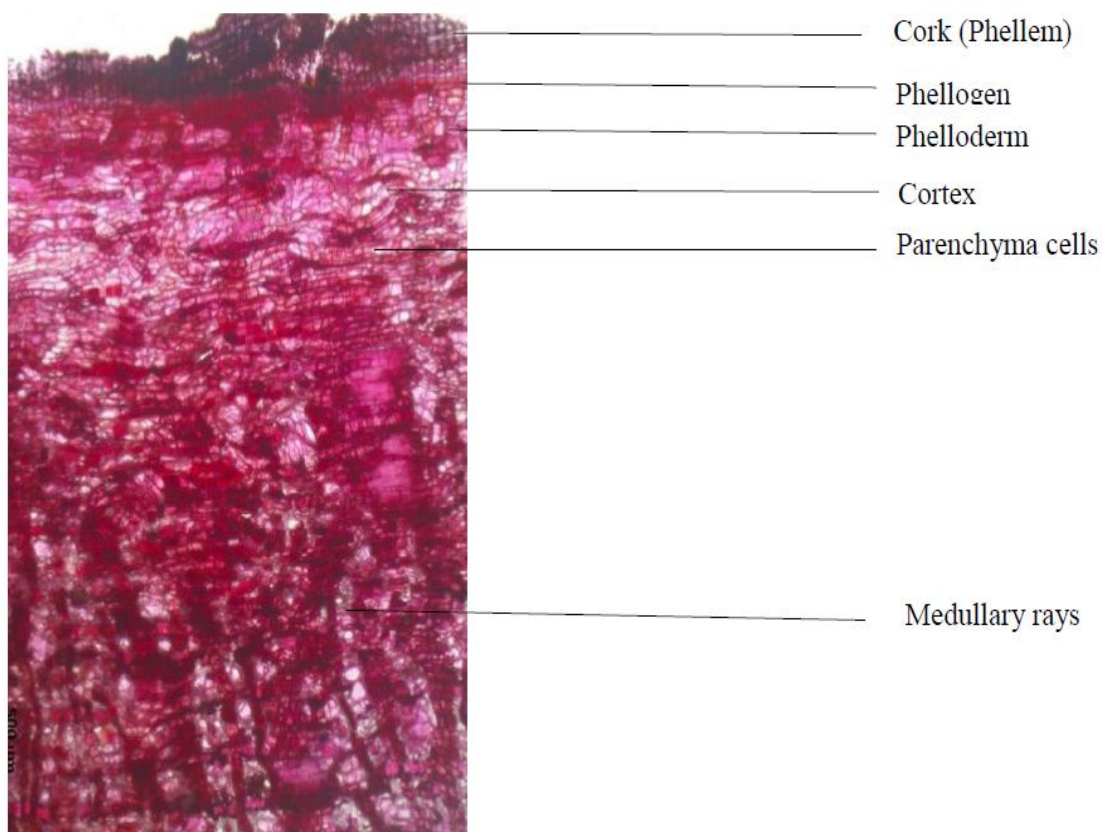


Figure 3: Transverse section of *Madhuca nerifolia* (Moon) H.J Lam bark.

The transverse section of the bark showed cork (phellem), cork cambium (phellogen), and secondary cortex. Cork is 6-8 layered tangentially elongated parenchyma followed by 2-3 layers of phellogen and then by phelloderm. Cortex was parenchymatous with

rectangular to polygonal cells. Medullary rays were heterogenous and multiseriate.

3.3 Powder microscopy

The powder microscopy of *Madhuca nerifolia* (Moon) H.J Lam bark shows following parts.



Fig 4: Fibres.

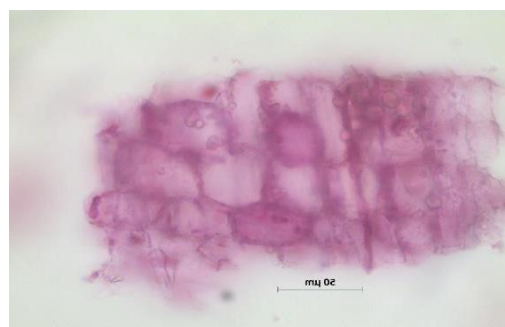


Fig 5: Cortical parenchyma cells with starch grains.



Fig 6: Pitted parenchyma cells.

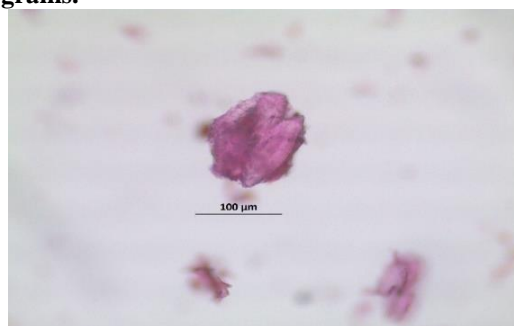


Fig 7: Sclereids.



Fig 8: Stone cells.

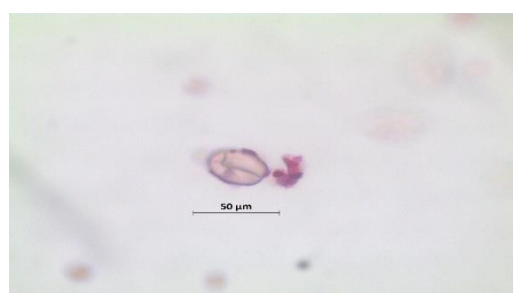


Fig 9: Starch grain.

3.4 Physicochemical characters

The physicochemical parameters are helps to detect adulteration or improper handling of the drugs.

Ash values of a drug give an idea of the earthy matters or the inorganic composition and other impurities present

along with the drug. The extractive values are primarily useful for the determination of exhausted and adulterated drug.^[6] The results of physicochemical evaluation were presented in Table 3.

Table 3: Physicochemical evaluation of *Madhuca neriifolia* (Moon) H.J Lam.

Parameter	Value (% w/w)
Moisture content	7.19
Total ash	7.12
Acid insoluble ash	5.3
Water soluble ash	3.89
Water soluble extractive	6
Ethanol soluble extractive	4
Mucilage content	0.6
Swelling index	3 ml
Foaming index	200 ml

3.5 Phytochemical studies

The extracts obtained after successive solvent extraction with petroleum ether, benzene, chloroform, acetone,

ethanol and water were subjected for qualitative phytochemical tests to identify the presence of chemical constituents.

Table 3: Colour, Consistency and yield of each extract.

Solvent	Colour and consistency	% Yield
Petroleum ether	Olive green (sticky semisolid)	3.8
Benzene	Greenish black (sticky semisolid)	2.2
Chloroform	Light green (solid)	1.1
Acetone	Reddish brown (solid)	2.7
Ethanol	Reddish brown (solid)	4.4
Water	Reddish brown (solid)	1.1

Phytochemical screening showed the presence of various constituents like carbohydrates, saponins, phenolic compounds, mucilage and flavonoids.

Table 4: phytochemical tests in different extracts.

Test	Petroleum ether	Benzene	Chloroform	Acetone	Ethanol	Water
Alkaloids	-	-	+	+	-	-
Carbohydrate	-	-	-	-	-	+
Phytosterols	+	+	-	-	-	-
Fat and oil	+	+	-	-	-	-
Saponin	-	-	-	-	-	+
Phenolic compounds	-	-	-	+	+	+
Mucilage	-	-	-	-	-	+
Flavonoids	-	-	-	-	+	+

Phytosterols, fixed oils are present in both petroleum ether and benzene extract. Chloroform extract contain alkaloids and acetone contains phenolic compounds and flavonoids as the main active constituent. Ethanolic extraction of *Madhuca neriifolia* shows the presence of Phenolic compounds and flavonoids. Carbohydrates, saponins, phenolic compounds, mucilage, flavonoids are found in aqueous extract.

4. CONCLUSION

The present study is related to pharmacognostical, physicochemical and phytochemical screening of *Madhuca neriifolia* (Moon) H.J Lam bark. The results will be helpful in developing standards for purity and quality. The evaluated physicochemical parameters will be useful in assessing the quality of raw material. Phytochemical study is also useful to identify the class of compounds.

5. ACKNOWLEDGEMENT

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