International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X
Received: 19-02-2022, Accepted: 06-03-2022, Published: 21-03-2022
Volume 7, Issue 3, 2022, Page No. 173-178

Pharmacognostical study of *Morinda tinctoria* roxb leaves

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Abstract
The current pharmacognostical study looks at the macroscopical and microscopical structure and data of *Morinda tinctoria* Roxb.
Methods: With the help of a magnifying device, infinitesimal characteristics were conducted, as well as a macroscopical examination of *Morinda tinctoria* Roxb. The Rotating MICROTOME was used to separate the paraffin implanted specimens. The regions were 10-12m in thickness. The sections were waxed as usual (Johansen, 1940). O'Brien *et al*. disseminated an approach for recoloring the regions with Toluidine Blue. The anatomical highlights are defined in clear words as found in conventional life structure literature (Esau, 1964).
Conclusion: This is an essential source of information, and it provides appropriate guidelines for identifying this plant fiber in future studies and applications.

Keywords: *Mirondia tinctoria* roxb, pharmacognostical future investigation purpose

Introduction
Morinda tinctoria, Roxb. (Rubiaceae) known as Indian mulberry or aal (despite the fact that these common names also refer to *Morinda citrifolia*), is a flowering plant of Rubiaceae family that is found in southern Asia. It grows to a height of 5–10 meters as an evergreen shrub or small tree [1]. 15–25 cm long, elongated to lanceolate takes off. The blooms are tubular, white, and perfumed, and are about 2 cm in length. A green syncarp with a diameter of 2-2.5 cm might be the natural result. *Morinda* is a tropical plant that includes 80 different species of trees, shrubs, and vines that may be found all over the world. All *Morinda* species produce a variety of natural products, which can be fleshy (as in *Morinda citrifolia*) or dry (as in *Morinda citrifolia*). *Morinda citrifolia* is a citrus fruit [4].

Plant Information [2, 3]
Synonym: Indian mulberry
Botanical Name: *Morinda tinctoria* Roxb.
Family: Rubiaceae

Taxonomy [2, 3]
Kingdom: Plantae
Sub Kingdom: Tracheobionta
Super division: Spermatophyta
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Asterids
Order: Gentianales,Rubiales
Family: Rubiaceae
Genus: Morinda
Species: *M. Tinctoria*

Vernacular names [2, 4, 6]
English: Morinda tree
Hindi: Aal, Auch
Kannada: Maddi
Konkani: Bartondi
Malayalam: Kattapitalavam, Manganathi, Manjapavitta, Pavitta, Manjappaavatta.
Marathi: Bartondi
Oriya: Pindra

Other: Indian Mulberry, Morinda, Noni,
Sanskrit: Achyuta, Akshikiphala,
Tamil: Manchanari, Nuna
Telugu: Maddi, Togaru,
Urdu: Togar Mughalai

Distribution
Chengalpattu, Coimbatore, Ramanathapuram, Tiruchchirappalli. (RHT)

Ethano botonical information
Macroscopical character
Deciduous trees
12m high, bark pale brown, thick, vertically fissured and irregularly cracked, Blaze turmeric yellow.

Leaves
Simple, decussate, opposite, stipules interpetiolar, connate, sheating, bifid at apex.

Petiole
5-20 mm in length, Stout, pubescent, grooved, above glabrous, lamina 7.5-25 × 2-8cm, elliptic-lanceolate, oblanceolate, or elliptic-oblong, base acute, cuneate, or attenuate, apex acute to acuminate, margin entire, pubescent or tomatoes, cretaceous, lateral nerves 7-12 pairs, conspicuous, pinnate, reticulate intercostal, slender, domatia present.

Flower
Bisexual, White, in terminal, globose heads, calyx limb truncate, corolla 2cm long, tube 1mm long, villous within, lobes 4, oblong, recurved, stamens 4 attached to the throat of corolla, anthers exerted, ovary 1.5mm, 2-celled or incompletely 4-celled, inferior, style 4mm, stigma 2 lobed.

Fruit
A syncarp, 15-18mm across, globose, pyrenes 4, oblong.

Seeds
Not winged

Common uses
Anti-bacterial, analgesic, anti-oxidant, anti-inflammatory, astringent, laxative, sedative, and hypotensive (lowers blood pressure) potentials, hypoglycemic potentials, acetyl cholinesterase inhibitors activity for many ailments from medicinal plants in Ayurveda medicines. It also to make the *morindone* dye. *Morindone* is used for the dyeing of cotton, silk and wool in shades of red, chocolate or purple.

Materials and Methods
Chemicals
Formalin, ethyl alcohol, acetic acid, Chloral hydrate, phloroglucinol, toluidine blue, glycerin, hydrochloric acid and all other chemicals used in this study.

Collection of Specimens and Authentication
The Leaf of the selected plant were collected from the Tirucharapalli district and were identified and authenticated by Dr. P. Jayaraman, Director of plant Anatomy Research Institute, Chennai, Tamilnadu, Chennai.

Macroscopic analysis
macroscopic observation of the plant was done. The shape, size, texture, surface characters, colour, odour, taste etc [5, 13].

Microscopic analysis
The leaves were fixed in FAA (Formalin-5 ml + acetic acid- 5 ml + 70 % ethyl alcohol- 90 ml). After 24 hrs of fixing, the specimens were dehydrated dith graded series of TBA (Tertiary- Butyl alcohol). Infiltration of the specimens was carried by gradual addition of paraffin wax, until TBA solution attained supersaturation. The specimens were cast into paraffin blocks [17].

Sectioning
The paraffin embedded specimens were sectioned with help of rotary microtome. The thickness of the sections was 10-12µm. After DE-Waxing, the section were stained with toluidine blue, since toluidine blue is a polychromatic stain, the result of staining were remarkably good and some cytochemical reactions were obtained. The dye rendered pink color to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, protein bodies etc. [13, 20]

Photomicrographs

photographs of different magnifications were taken with Nikon lab photo 2 microscopic unit. For the study of crystals, lignified cells, starch grains, polarized was employed. Since these structure have birefringent property, under polarized light they appear bright against dark background.

Result

Microscopical Study

Morinda Tinctoria

Anatomy of the Leaf of *Morinda Tinctoria*

The midrib is 14.5 mm in vertical plane and 13mm in horizontal plane. The leaf is dorsiventral with thick prominent midrib which is differentiated into adaxial wide conical part and adaxial circular thick midrib. (Fig.No:1)

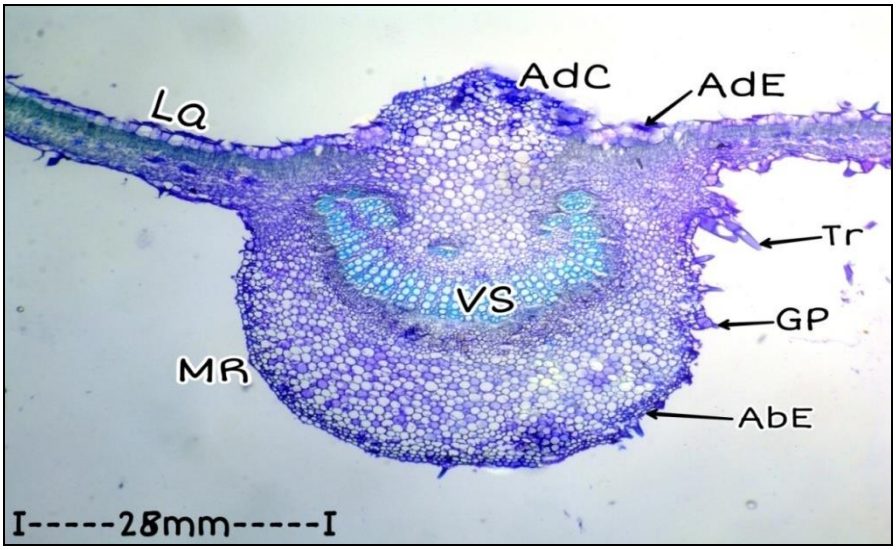

Fig 1: Transverse Section of leaf through midrib

The midrib consists of conical part with small circular thick walled parenchyma cells with thin, small epidermal layers of cells. The remaining part of the midrib has wide, hollow bowl shape. Vascular cylinder. The vascular cylinder consist of three to five xylem elements arranged in several radial and parallel lines. He lateral ends of vascular arch is broken into small circular vascular bundles.

Phloem occurs all along the adaxial part of the xylem arch. The phloem elements are distributed in small bundles.

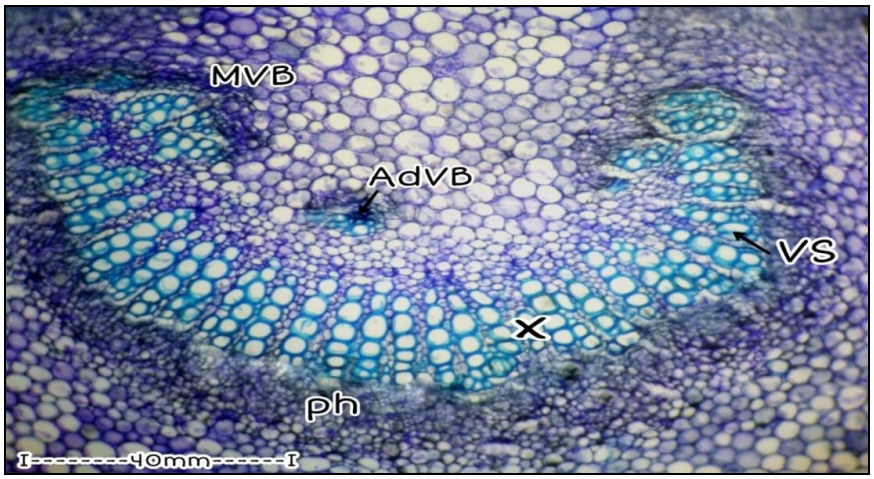

Fig 2: Transverse Section of midrib-enlarged.

The midrib has small, circular, thin walled epidermal layers of cells and circular compact thin, walled unicellular trichrome located on the surface of the midrib. (Fig.No: 2)

Lateral Vein

The lamina becomes slightly thin along the lateral vein due to the presence of vascular bundle the vascular vein due to the presence of vascular bundle. The vascular bundle is large conical with several radially arranged xylem

elements and thin arch are phloem elements on the lower end of the xylem strand there is a thin arch of fibers located on the lower part of the vascular bundles.

The lateral part of the lamina is 120µm thick and consist of wide rectangular adaxial epidermal cell with thin cuticle. There is a single vertical row of palisade cells and less compact spogy mesophyll tissue. An adaxial epidermis is thin with small circular cells and thin cuticle. (Fig.No:3)

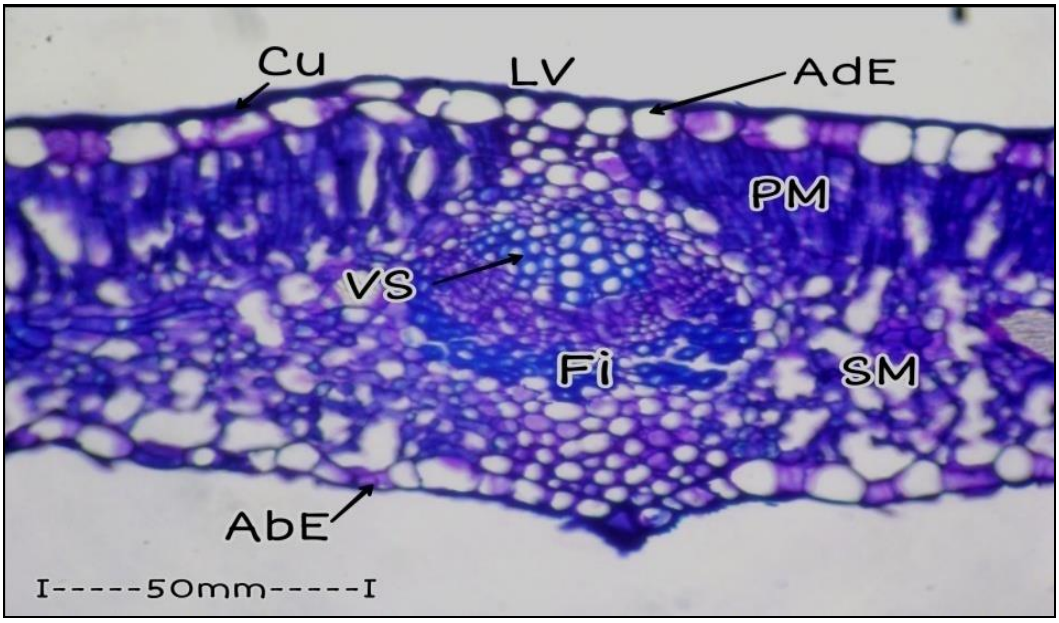

Fig 3: Transverse Section of lateral vein of the leaf

Lamina

The lamina is 20µm thick; the abaxial epidermal cells are wide, vertically oblong with thin cuticle. The abaxial epidermis consists of epidermal cells of various size and shape stomata are present on the lower epidermal layer. The mesophyll tissue consists of one or two vertically elongated palisade mesophyll cells and below the palisade zone occur less compact small, circular parenchyma cells having wide intercellular spaces. (Fig: 2.3)

Epidermal Trichrome

Long, thick unicellular epidermal tic homes are seen on the abaxial part of the lamina. The epidermal cell bearing trichrome is wide and thin walled. (Fig. No:4)

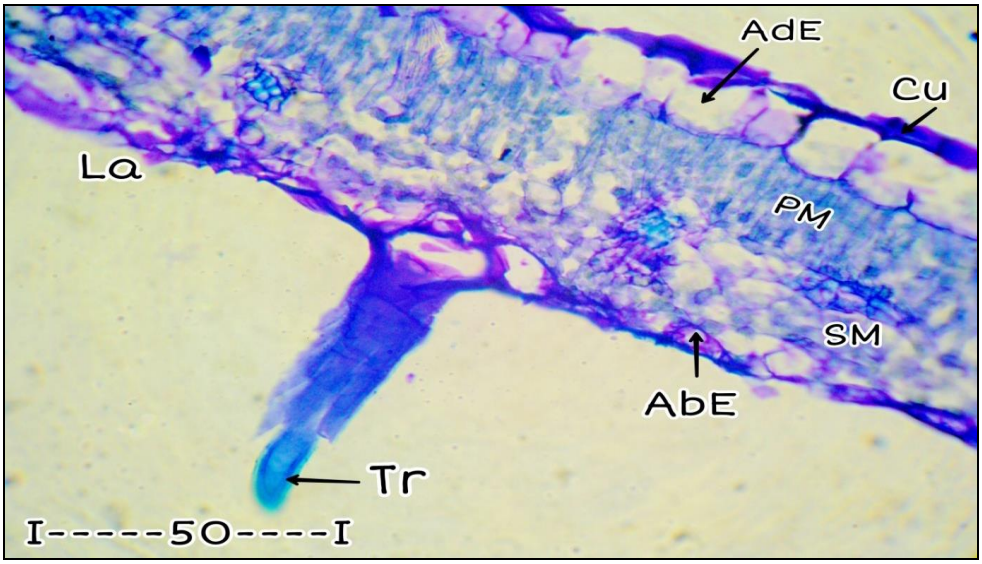

Fig 4: Transverse Section of lamina showing abaxial thick walled trichrome

Crystal Distribution

Calcium Oxalate crystals are common in the mesophyll tissue. The crystals are raphide type. It is a bundle of long compact cylindrical crystals. In cross sectional view the rapide bundle appears circular in the outline.(Fig.No:5)

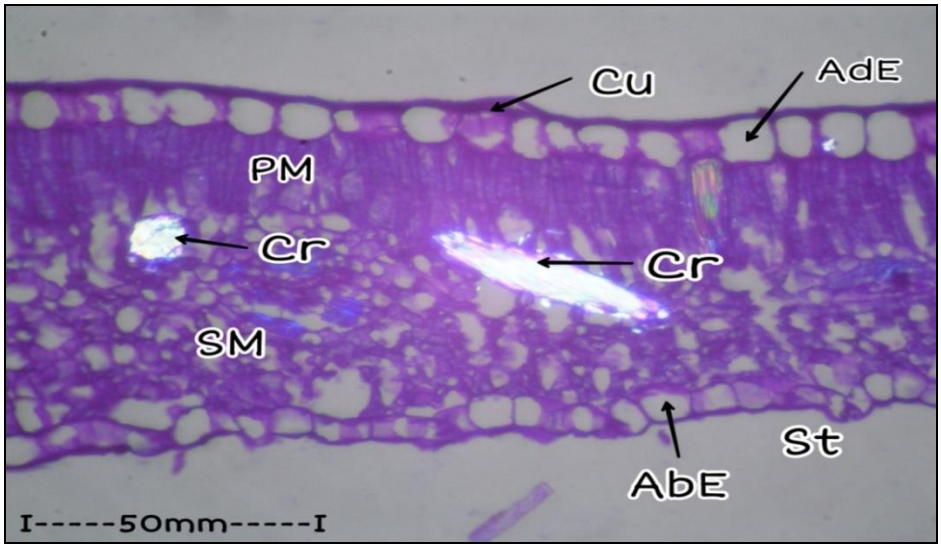

Fig 5: Transverse Section of calcium oxalate crystals

Legend for the Figure

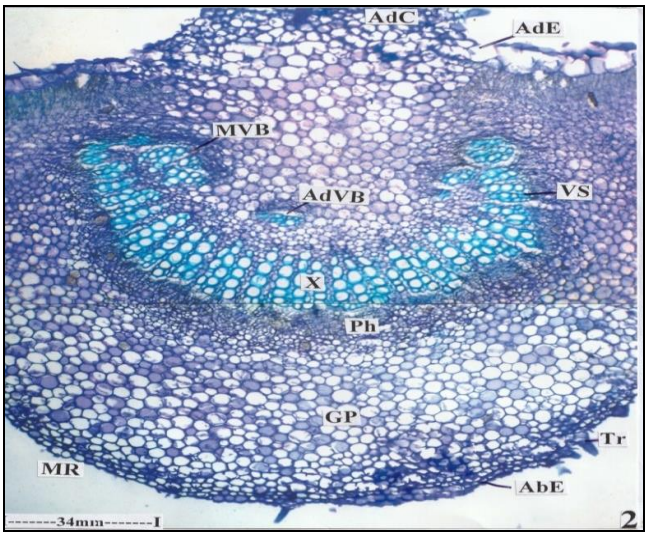

Fig 6: TS of through midrib (AbE- Abaxial Epidermis; AdC-Adaxial Cone; AdE- Adaxial Epidermis; AdvB-Adaxial Vascular Bundle; GP-Ground Parenchyma; La-Lamina; MR-Midrib; MVB-Marginal Vascular Bundle; Ph- Phloem; Tr-Trichome; Vs-vascular starnd; X-Xylem)

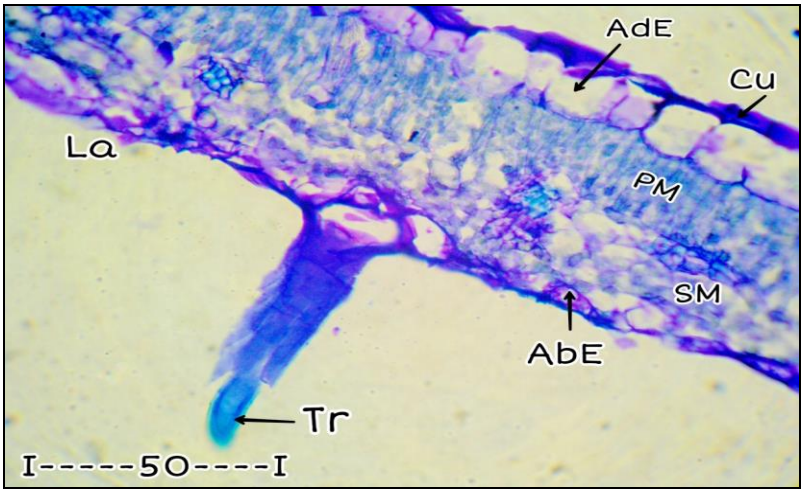

Fig 7: Transverse Section of lamina showing aboxial thick walled trichome (AbE- Abaxial Epidermis; AdE-Adaxial Epidermis; AdvB- Adaxial Vascular Bundle; Cu-cuticle; Fi-Fibre; LV-Lateral Vein; La-Lamina; MVB-Marginal Vascular Bundle; PM-Palisade Mesophyll; SM-Spongy Mesophyll; Ph- Phloem; Vs-vascular starnd; St-Stomata; X-Xylem)

Conclusion

The study's findings can be a useful source of knowledge and give appropriate criteria for identifying this plant material in future research and applications.

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