



REGULAR ARTICLE

# STANDARDIZATION OF *TERMINALIA MYRIOCARPA* HEURCK AND MUELL. - ARG.

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## SUMMARY

*Terminalia myriocarpa* Heurck and Muell. - Arg. synonym *Myryobalanus myriocarpa* is commonly known as *Tolhao*, *Mezok* in Manipuri, *Panisaj* in Bengali. It is a large evergreen tree. Its bark has medicinal value, it is diuretic, cardiac stimulant and antioxidant used in various drug preparations, which are sometimes adulterated with other plant materials. In order to standardize the drug, detail morphological, anatomical (Transverse section of bark, petiole and leaf; Transverse section, Transverse longitudinal section and Radial longitudinal section of wood and maceration of bark and wood) and dermatological studies were undertaken.

It was observed that *Terminalia myriocarpa* Heurck and Muell.- Arg. can be easily standardized on the basis of combination of these parameters which are peculiar to this species.

**Key words:** Standardization, *Terminalia myriocarpa*, Anatomy

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## 1. Introduction

*Terminalia myriocarpa* Heurck and Muell.- Arg. synonyms *Myryobalanus myriocarpa* (Heurck & Muell.-Arg) Kuntze, *Pentaptera saja* Buch.-Ham., *Terminalia saja* Steud. is commercially known as *Hollok*, *Tolhao*, *Mezok* in Manipuri, *Panisaj* in Bengali. It is a large evergreen tree 20-45m tall, bark grayish-brown, branchlets black to brownish. Leaves sub opposite oblong, elliptic-oblong to oblong lanceolate, 10-25 cm long, petiole with one or two prominent glands at the top. Flowers small, pink, in long slender spikes arranged in long terminal panicles, bracts very short. Fruits 4-5 mm long, 3-cornered, two lateral angles expanded in to wings.

It is highly medicinal and economically important tree distributed to North East India, Bhutan, upper Myanmar and Hawaii Islands (Elbert 2003). It yields valuable timber for furniture and house construction in the form of scantlings, beams, rafters and for heavy packing cases; it is also suitable for manufacture of plywood for general purposes and also for tea chests. The wood is also good for making Match-boxes. Timber is suitable for making jute-mill rollers and for construction of lorry bodies. The plant is

often cultivated as an avenue tree (Gangopadhyay 1997, Singh 2000).

Its bark has medicinal value, bark extract is given on chest pain (Deb 2009), it is diuretic, cardiac stimulant and antioxidant used in various drug preparations (Sinha 1996, Gangopadhyay 1997, Singh 2000). Because of excessive exploitation and depletion of tree population, it has been adulterated with other plant materials. In order to standardize and to detect adulteration in this crude drug, an attempt has been made to develop the anatomical parameters of bark, wood and leaves.

## 2. Materials and Methods

Plant material was collected from a tree planted on roadside at Lower Siche, Indira bypass, Shahi School, Gangtok, Sikkim (Latitude N27°20'26.5", Longitude E088°36'19.7", Altitude 467.9 ft). Transverse sections (T.S.) of bark, wood, petiole and leaf, tangential longitudinal section (T.L.S.) and radial longitudinal section (R.L.S.) of wood were taken by free-hand method; they were double stained and mounted permanently as per standard procedures. The tissue of bark,

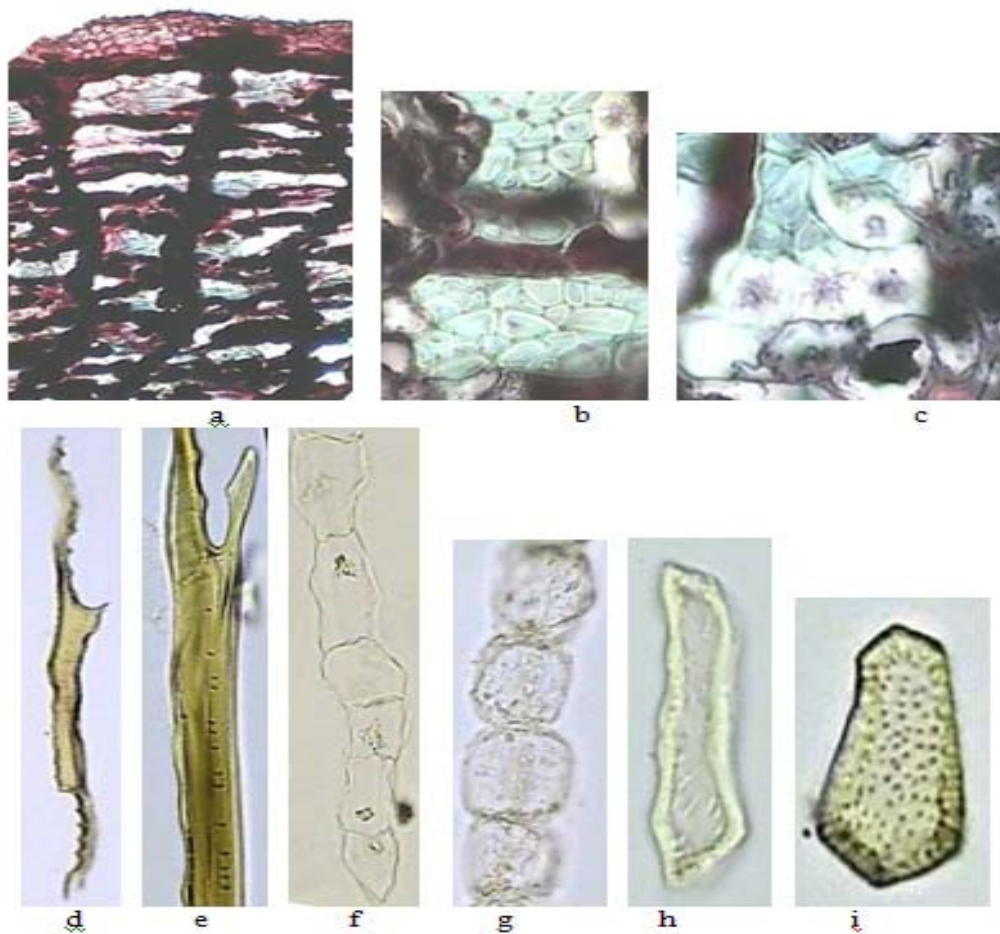
wood and leaf for dermatological studies were macerated by Jeffery's method. Trichomes were studied by scraping (Khandelwal 1991). The slides were prepared temporarily. Microphotographs were taken by using Motic microscope with image processing software.

### 3. Result and Discussions

Transverse section of bark showed 10-15 layers of tubular cells deposited with tannin (Photo plate 1a). Some bundles of phloem fibers of 4-57 were observed in a ring (Photo

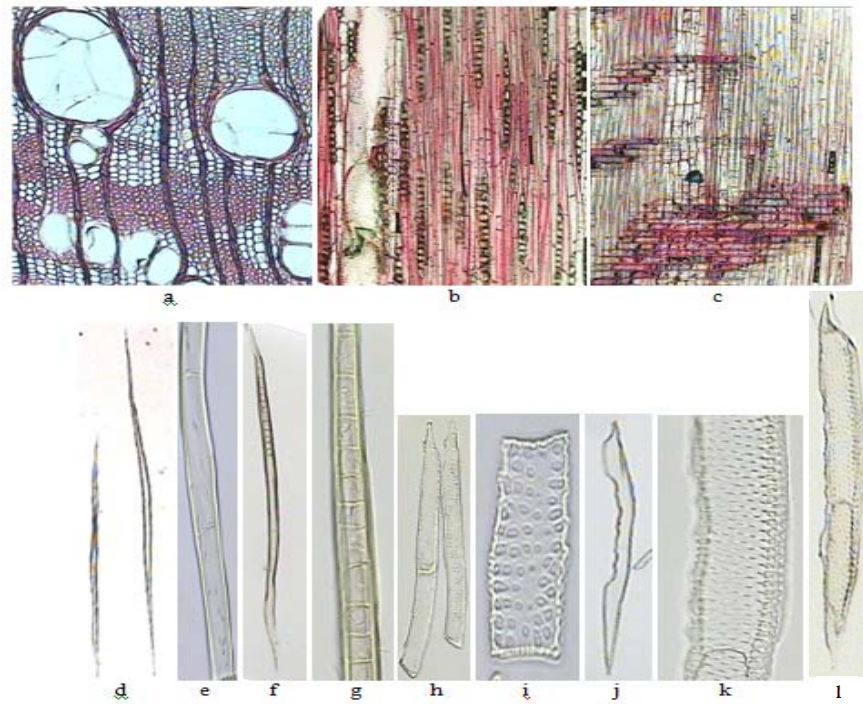
plate 1b). Medullary rays uniseriate deposited with tannin and starch grains. Parenchymatous cells showed deposition of compound crystals ca  $10.1-35.1\mu$  and compound starch grains ca  $3.9-12.1\mu$  (Photo plate 1c). Maceration of bark showed thick walled, spindle shaped phloem fibers some are with small pits and some are without pits measuring ca  $15.1-28.7\mu \times 606.4-1248.8\mu$  (Photo plate 1d, e). Phloem parenchyma cells thin walled ca  $83.8-115.1 \times 109.4-187.7\mu$  (Photo plate 1f, g), some thick walled ca  $16.3-34.8 \times 25.6-63.5\mu$  (Photo plate 1h, i).

Photo plate-I



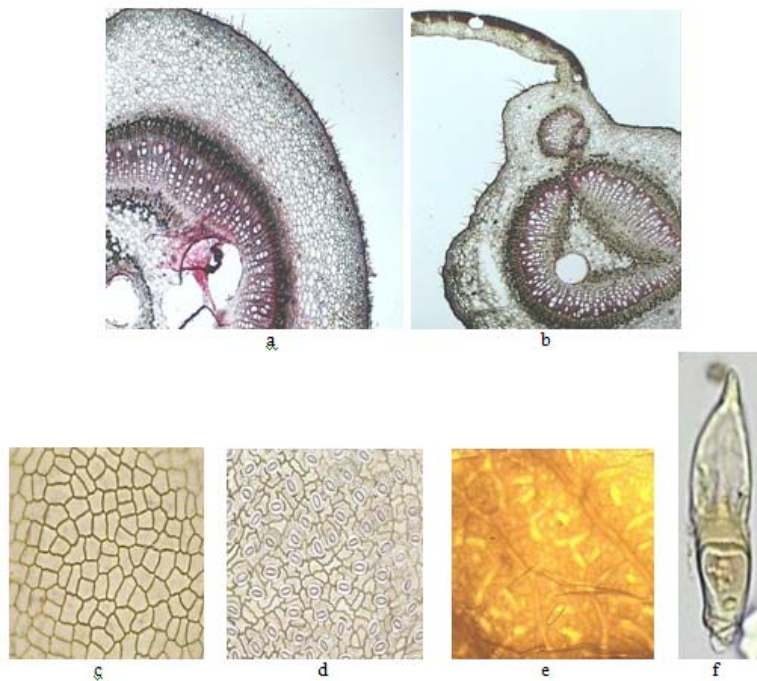
a- T.S. of bark, b- fibres in bark, c- crystals, d- phloem fiber, e- pitted phloem fibre, f & g- thin walled phloem parenchyma, h & i- thick walled phloem parenchyma

Photo plate-II



a-T. S. of wood, b- TLS of wood, c- RLS of wood, d- simple xylem fibre, e- fibrotracheid, f & g- septed xylem fiber, h- ray parenchyma, i- axial parenchyma, j- tracheid, k- vessel, l-oblique

Photo plate-III



a- TS of petiole, b- TS of leaf, c- upper epidermal cells, d- stomata on lower epidermis, e- leaf islets, f- trichome

Transverse section of wood showed diffuse porous nature (Photo plate 2a). Vessels circular to oval, mostly single, rarely in groups of 2-6, with tyloses. Ray parenchyma continuous with deposition of starch grains. Tangential longitudinal section of wood showed row of vessel with simple, alternate pits (Photo plate 2b). Parenchymatous rays uniseriate to biseriate with 2- 35 cells per ray. Radial longitudinal section of wood showed heterogenous ray parenchyma, cells square and procumbent with deposition of starch grains (Photo plate 2c).

Maceration of wood showed axial parenchyma ca 19.7-47.7 x 53-95.1 $\mu$  (Photo plate 2h). Some parenchymatous cells with few pits ca 20.3-41.6 x 32.5-172.5 $\mu$  (Photo plate 2i). Xylem fibers spindle shaped, thick walled with narrow lumen, some are with pits and some are without pits ca 21.8-30.9 x 712.3-1550 $\mu$  (Photo plate 2d & e), some septed fibers are also found ca 18.1-30.9 x 835.8-1449 $\mu$ , which is diagnostic character of the species (Photo plate 2f). Tracheid tubular, thick walled, ca 28.7-45.2 x 286.9-653.3 $\mu$  with small pits (Photo plate 2j). Vessel elements of two types- without beak ca 173.9-219.8 x 144.9-352.6 $\mu$  (Photo plate 2k) and beaked ca 91.5-202.2 x 240.6-441.5 $\mu$  pits simple, alternate, end wall Oblique (Photo plate 2l).

Transverse section of petiole showed single layered epidermis, cells filled with tannin (Photo plate 3a). Cortex parenchymatous, compound crystals observed frequently. Vascular bundle conjoint, collateral and open, mucilage canals present at central region.

Transverse section of leaf showed single layered epidermis followed by double layered palisade, continuity of which get disturbed by mucilage canals. Below palisade 8-14 layered spongy parenchyma were observed. Vascular bundle conjoint, collateral and open (Photo plate 3b).

In the dermatology leaf showed palisade ratio 46.75, vein islet no. 4.3, veinlet termination no. 7.1 (Photo plate 3e). Stomatal index 79.78 in 1mm<sup>2</sup>. Stomata anomocytic, amphistomatic, few stomata scattered along midrib on upper surface (Photo plate 3d).

Upper epidermal cells ca 16.5-28.5x24.7-48.4 $\mu$  (Photo plate 3c), lower epidermal cells 35.4-63.8 x 61.9-156 $\mu$  (Photo plate 3d). Trichomes glandular, unicellular ca 53.1-217.3 $\mu$  present on both the surfaces (Photo plate 3f).

#### 4. Conclusion

The above anatomical and dermatological parameters in combination were found to be diagnostic for standardization of *Terminalia myriocarpa* Heurck and Muell. - Arg. and also for detecting the adulteration.

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