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COMPARATIVE PHARMACOGNOSTICAL AND PHYTOCHEMICAL STUDY OF LEAVES OF DIFFERENT SPECIES OF MIMUSOPS

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ABSTRACT:

Background: Two primary species of Mimusops are *Mimusops elengi* and *Mimusops hexandra.* Leaves of both species are traditionally used in several ailments. However, it is difficult to distinguish the leaves of the species.

Objectives: The present investigation deals with the comparative pharmacognostical study of the leaves of the two species and establishment of its quality parameters.

Methods: Detailed morphological and qualitative as well as quantitative microscopic study was carried out. This was followed by phytochemical screening and estimation of tannins in the two species.

Results: The important diagnostic feature of powder of both leaves include pericyclic fibers, rosette and prism shape calcium oxalate crystals and resinous matter. The leaves show significant difference in their quantitative microscopic parameters as well as their tannin content.

Conclusion: The present work can serve as a useful tool in the identification, authentication and standardization of the plant material and distinguishing the two species from each other.

INTRODUCTION: Trees of *Mimusops* (Family - Sapotaceae) grow near forests of western coast of India. *Mimusops elengi* syn. *Manilkara elengi* and *Mimusops hexandra* syn.

Manilkara hexandra are the two main species. Leaves of both species are traditionally used as anti-inflammatory, diuretic, antiurolithiatic, analgesic, anti-pyretic, anti- microbial, tonic and febrifuge [1, 2].

However, leaves are quite similar, which makes it difficult to differentiate the species. The present investigation deals with the comparative pharmacognostical study of the leaves of the two species and establishment of their quality parameters.

MATERIALS AND METHODS: Leaves of *M. elengi* and *M. hexandra* were collected in the flowering stage from Herbal Garden of RK College of Pharmacy, Rajkot, Gujarat in July 2012. Herbarium and voucher samples of *M. elengi* (RKCP/COG/23/2012) and *M. hexandra* (RKCP/COG/ 24/2012) were deposited in the college laboratory.

The fresh leaves were compared morphologically and used for transverse section and quantitative microscopy (stomatal index, rosette diameter, xylem vessel diameter and fibre length). The dried leaves were powdered, stored in airtight containers and used for powder study, phytochemical screening and estimation of tannins.

For microscopical studies, safranin was used for staining. Photomicrography of the transverse sections and the powdered drug was performed using camera. Quantitative microscopic study was performed using camera lucida and stage micrometer scale (**Table 1**) [3].

Phytochemical screening of both the species was performed using the appropriate extracts (aqueous and alcoholic) and appropriate chemical tests (**Table 2**) [4-8]. Estimation of tannins was done by the established method (**Table 3**) [9].

RESULTS:

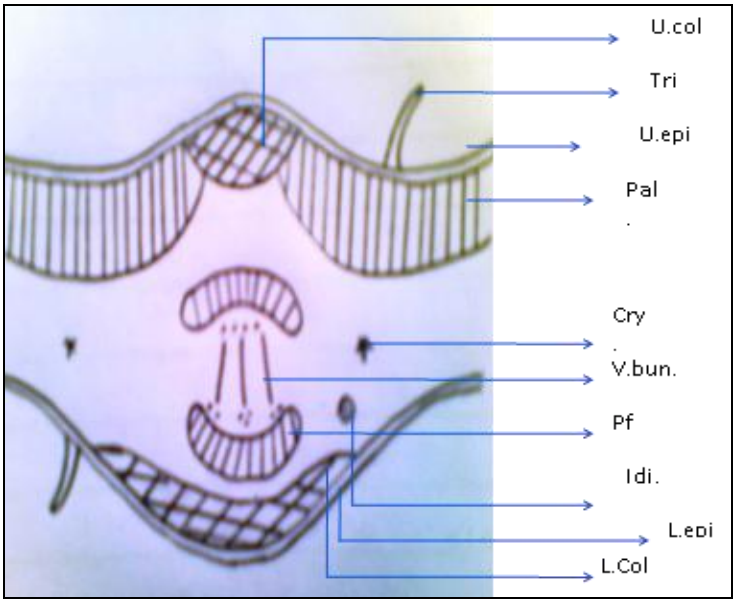
Macroscopy: *M. elengi* leaves are. simple, ovate lanceolate, 6-7cm X 3-4cm, glabrous, glaucous, having acute apex, undulate margin, reticulate venation, curved petiole and upper surface dark green and lower surface light green in color. *M. hexandra* leaves are simple, obovate lanceolate, 5-6cm X 2-3cm, glabrous, glaucous, having obtuse apex, straight petiole, entire margin and upper surface dark green and lower surface light green in color (**Fig. 1**).

FIGURE 1. *M. HEXANDRA* (L) AND *M. ELENGI* (R)

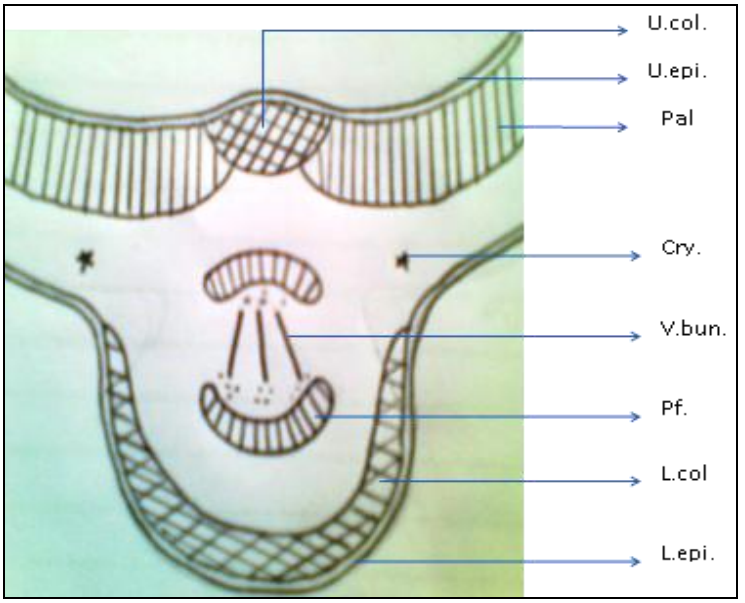
Microscopy:

Transverse section: Lamina of *M. elengi* consists of single-layered compactly arranged cells in the upper epidermis followed by compact, bi-layered palisade beneath which lies 4-5 layers of loosely arranged parenchymatous spongy mesophyll. Mid-rib consists of upper and lower collenchyma with both primary and secondary bicollateral vascular bundles in the central stele surrounded by 2-3 continuous layers of lignified pericyclic fibres. Ground tissue consists of several idioblasts of microsphenoidal crystals.

Resin cells, prism and rosette crystals of calcium oxalate are found scattered in the lamina and mid-rib. Lamina of *M. hexandra* consists of single-layered upper epidermis followed by bi-layered palisade beneath which lies 2-3 layers of loosely arranged spongy mesophyll. Mid-rib consists of upper and lower collenchyma with both primary and secondary bicollateral vascular bundles surrounded by discontinuous pericyclic fibres. Resin cells, prism and rosette crystals of calcium oxalate are found scattered in the lamina and mid-rib. Trichomes are rare in both species (**Fig. 2-5**).



A



B

FIGURE 2: SCHEMATIC TRANSVERSE SECTION

A: *M. elengi*, B: *M. hexandra*

U Epi: Upper Epidermis; L Epi: Lower Epidermis; U. Col: Upper Collenchyma; L. Col: Lower Collenchyma; Pal: Palisade; X: Xylem; P: Phloem; Cry, Calcium Oxalate crystals; Pf: Pericyclic fibers; Idi: Idioblasts; V Bun: Vascular Bundles

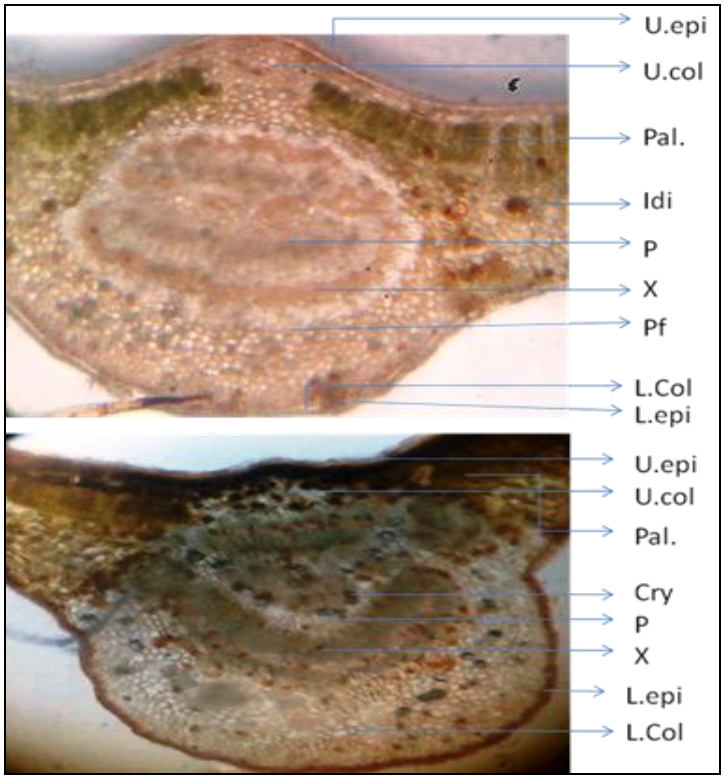
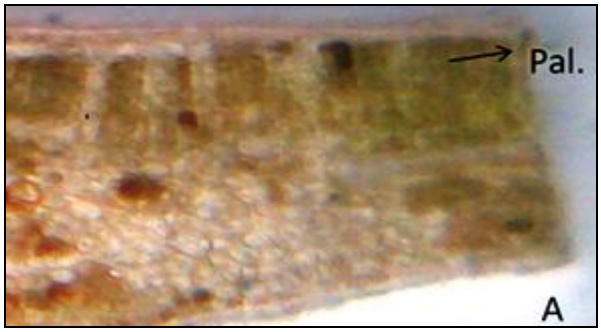
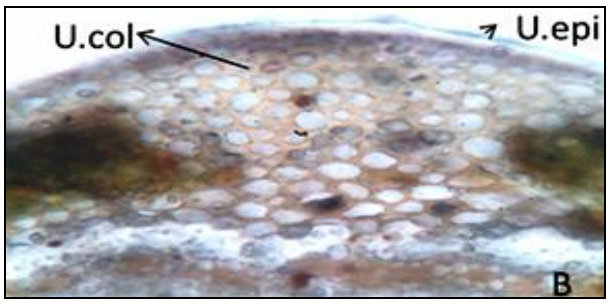
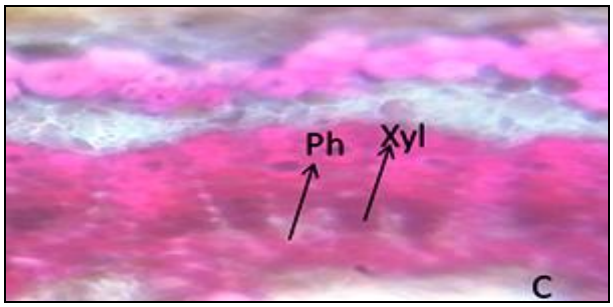


FIGURE 3: ENTIRE T. S. OF LEAVES (X100)

U Epi: Upper Epidermis; L Epi: Lower Epidermis; U. Col: Upper Collenchyma; L. Col: Lower Collenchyma; Pal: Palisade; X: Xylem; P: Phloem; Cry, Calcium Oxalate crystals; Pf: Pericyclic fibers; Idi: Idioblasts.







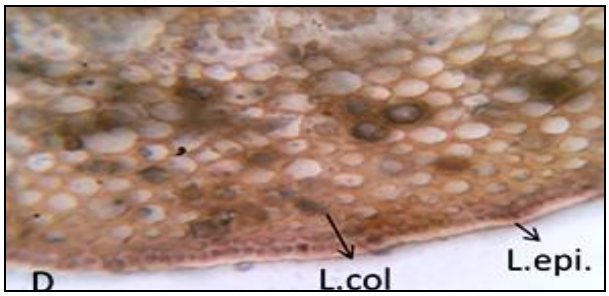
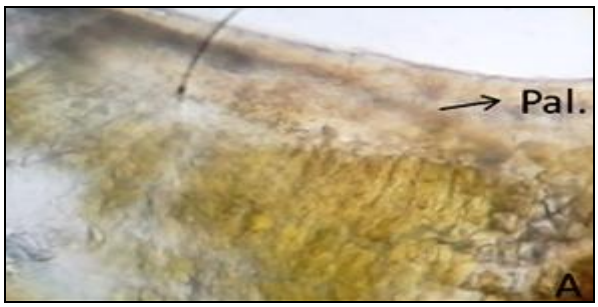
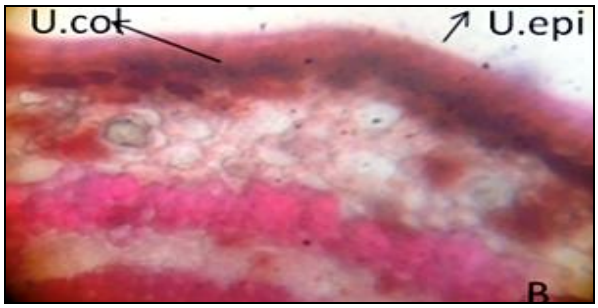


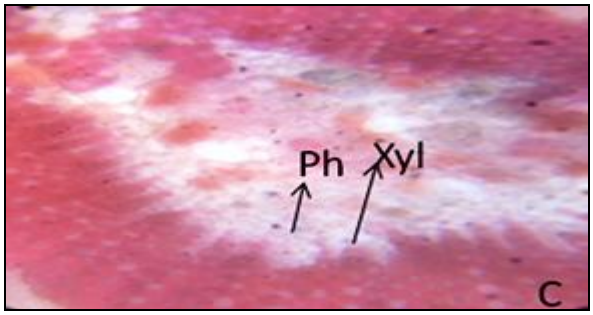
FIGURE 4: ENLARGED PORTIONS OF DETAILED T. S. OF *M. ELENGI*

A: Lamina; B: Upper Collenchyma; C: Stele; D: Lower Collenchyma

U Epi: Upper Epidermis; L Epi: Lower Epidermis; U. Col: Upper Collenchyma; L. Col: Lower Collenchyma; Pal: Palisade; Xyl: Xylem; Ph: Phloem; Pf: Pericyclic fibers.







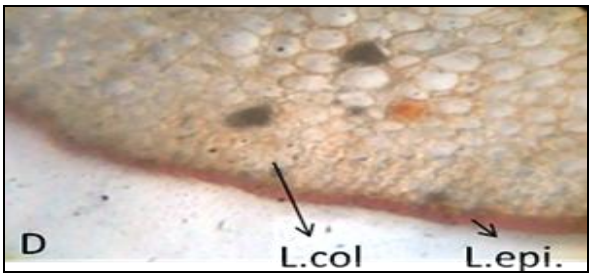


FIGURE 5. ENLARGED PORTIONS OF DETAILED T. S. OF *M. HEXANDRA*

A: Lamina; B: Upper Collenchyma; C: Stele; D: Lower Collenchyma

U Epi: Upper Epidermis; L Epi: Lower Epidermis; U. Col: Upper Collenchyma; L. Col: Lower Collenchyma; Pal: Palisade; Xyl: Xylem; Ph: Phloem; Pf: Pericyclic fibers

Powder Study: The important diagnostic feature of powder of both leaves include pericyclic fibers, rosette and prism shape calcium oxalate crystals and resinous matter (**Fig. 6**).

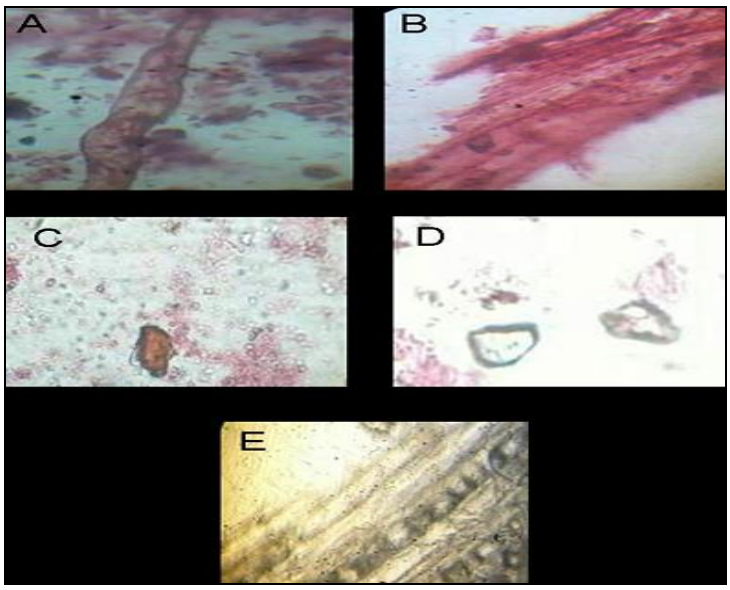


FIGURE 6: POWDER STUDY (X450)

A: Single Pericyclic fibre; B: Pericyclic fibres in groups; C: Resinous matter; D: Prism crystals; E: Parenchymatous tissue having rosette and prism crystals

TABLE 1: QUANTITATIVE MICROSCOPY

PARAMETERS	MEASURED VALUE	
	M. elengi	*M. hexandra*
Stomatal Index	25	22
Xylem Vessel Diameter (μ, x10)	2.8-3.2-3.6	2.1-2.6-3.0
Rosette Crystal Diameter (μ, x10)	5.1-5.8-6.4	2.1-2.6-3.2
Pericyclic Fibre Length (μ, x10)	15.1-15.6-16.0	17.0-17.6-18.1

Number of observations = 25

TABLE 2: PHYTOCHEMICAL SCREENING

Phytoconstituent	Test	Result	
		M. elengi	*M. hexandra*
Alkaloids	Dragendorff's test	-ve	-ve
	Wagner's test	-ve	-ve
	Mayer's test	-ve	-ve
	Hager's test	-ve	-ve
Flavonoids	Shinoda test	-ve	-ve
Sterols	Salkowski test	+ve	+ve
	LibermannBuchardt test	+ve	+ve
Cardiac glycosides	Legal's test	-ve	-ve
	Baljet test	-ve	-ve
	Keller Killiani test	-ve	-ve
	Kedde's test	-ve	-ve
Saponins	Foam test	-ve	-ve
Tannins	Lead acetate	+ve	+ve
Phenolics	Ferric chloride test	-ve	-ve
	Folin Ciocalteu test	-ve	-ve
Sugars	Fehling's test	-ve	-ve
	Molisch test	-ve	-ve
Volatile oil	Sudan red test	+ve	+ve

TABLE 3: ESTIMATION OF TANNINS

% w/w	
M. elengi	*M. hexandra*
68.37	49.08

Number of observations =3

DISCUSSION: A detailed comparative pharmacognostic study of leaves of *M. elengi* and *M. hexandra* has been performed. The leaves show a few morphological differences. Microscopically, the major difference lies in the fact that *M. hexandra* has discontinuous pericyclic fibres. The important diagnostic feature of powder of both leaves include pericyclic fibers, rosette and prism shape calcium oxalate crystals and resinous matter. The leaves show significant difference in their quantitative microscopic parameters as well as their tannin content. The present study can be very useful in distinguishing the two species, standardizing their formulations as well as serving as a guide for isolating novel phytoconstituents from them.

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