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MACROSCOPICAL AND MICROSCOPICAL STUDIES ON JUSTICIA TRANQUEBARIENSIS Linn.

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ABSTRACT

Justicia tranquebariensis Linn. belongs to the family Acanthaceae and it is popular for its numerous medicinal uses. Acanthaceae is a diverse family of flowering plants containing almost 240 genera and about 2200 species, distributed from the tropics to temperate regions. *J.tranquebariensis* is one of the sources of Sivanarvembu in the Siddha system of medicine and used in traditional ayurvedic medicine to treat cold, coughs, nasal disorders and smallpox, toothache, diaphoretic, diuretic, rheumatism, snake bite, jaundice, skin disease, reduces the pain of swelling areas and also as a cooling agent. Hence, the study was aimed to explore the morphological and anatomical characters of *J.tranquebariensis*. It is a woody herb, pubescent, leaves opposite and terminal spike inflorescence with pinkish-purple flowers. Microscopic study of the leaf revealed the presence of few calcium oxalate crystals in spongy parenchyma.

Keywords: Acanthaceae, *Justicia tranquebariensis*, macroscopical, microscopical, calcium oxalate crystals.

INTRODUCTION

Plants have been the basis of many traditional medicine systems in the world for thousands of years and have find application in the pharmaceutical, cosmetic, agricultural, and food industries. The correlation lies between the phytoconstituents and the bioactivity of plants which is desirable to be known for the synthesis of compounds to specific activities to treat various health ailments[1]. Acanthaceae is also known as acanthus family of flowering plants includes almost 240 genera and about 2200 species, usually distributed from the tropics to temperate regions. In Tamil, it is called Tavashoo moorunghie or Poonakapoondo. *Justicia tranquebariensis* Linn. is a woody herb, pubescent with up to 5 mm long petiole, leaves opposite and inflorescence is terminal spike. Flower white with pinkish-purple colour, calyx 5 partite, corolla 2-lobed, tube cylindrical, white pubescent with purple spot, stamen 2, ovary ellipsoidal, ciliate at the margin, 2-loculated with 4 ovules, stigma minutely lobed and sub capitate. Fruit is a Capsule. Leaf of *Justicia tranquebariensis* (Acanthaceae) are made as expectorant, in cold, cough, and nasal disorders[2]. Juices of leaves are treated as

cooling agents and aperients and also given to children to cure Smallpox. Crushed leaves are applied to contusions. Paste made of the leaves of *Justicia tranquebariensis*, is applied externally on the swelling area to reduce the pain. Root paste is applied to the tooth to reduce the pain. Leaf juice is administered orally and leaf paste is externally applied on the sight of snake bite and works as an antidote for Cobra bite. Leaf juice is orally administered to treat jaundice and leaf paste is applied over the affected area to treat skin diseases[3]. Our study was aimed to explore the morphological and anatomical characters of *Justicia tranquebariensis* Linn. root, stem and leaf.

MATERIALS AND METHODS

Macroscopical studies

Macroscopical observations of the leaf, stem and root of *Justicia tranquebariensis* was done by following the standard procedure [4&5.]

Microscopical studies

The fresh root, stem and leaf of *Justiciatranquebariensis* were smoothly cut and finally fixed in FFA (Formalin - 5 ml +Acetic acid – 70 % Ethyl alcohol – 90 ml[6]. The plant materials were rinsed twice in deionized water before sectioning. Thin, free-hand transverse sections were made with the help of a sharp razor blade and cleared with chloral hydrate solution[7]. For the investigation of each specimen section, a drop of water was placed on a clean slide, the specimen section was mounted on it and then stained with a drop of Toludine Blue solution. The suitable thin sections were stained, mounted in glycerin and covered with the help of a coverslip[8]. The images were carefully observed under an OLYMPUS (Model A x 70 TRF) light microscope at (40x and 100x) magnifications. The photomicrographs were taken with a digital camera (Nikon lab photo 2 microscopic unit).

RESULT AND DISCUSSION

Macroscopical Observation

Justicia tranquebariensis Linn. is a woody herb, pubescent up to 5 mm long petiole, opposite leaves and terminal spike inflorescence. Macroscopical observations of *J. tranquebariensis* showed the presence of whitish-grey stem, obovate, simple,opposite and decussate leaves [9] . These observations were in consonance with our present study.Flowers white with pinkish-purple colour, calyx 5 partite, corolla 2-lobed, tube cylindrical, white pubescent with purple spot, stamen 2, ovary ellipsoidal, ciliate at the margin, 2-loculated with 4 ovules, stigma minutely lobed and sub capitate. Fruit is a Capsule. Macroscopic observations of the study plant is presented in Table 1and Plate –1a,b & c.

Microscopical observation

a) Root

The transverse section of the root shows the outermost epidermal layer covered by a cuticle. The cortex region

consists of closely arranged 5-6 layers of collenchymas and parenchyma cells. The vasculature consists of outer phloem followed by cambium and radially arranged xylem vessels and tracheids. Large parenchymatous pith is present in the center (Plate – 2 a, b& c).

b) Stem

The transverse section of the stem is irregularly circular in outline (Plate – 3a). It consists of a single epidermal layer with a thin cuticle, occasionally traversed by more multicellular glandular trichomes (Plate – 3b). However, transverse section of the *J.adhatoda* stem showed both glandular and non-glandular trichomes, heterogenous cortex (collenchyma and parenchyma layers) and siphon stele [10].The cortical zone follows the epidermis. The heterogenous cortex consists of closely arranged 2-3 layers of collenchyma followed by 2-3 outer layers of parenchyma cells and 5-6 layers of chlorenchyma layers on the innerside. The vascular bundle is arranged in a ring and each bundle is conjoint, collateral, endarch and open (Plate– 3c). There is broad parenchymatous pith in the centre.

c) Leaf

The transverse section of the leaf shows the outermost single epidermal layer covered by thin cuticle and multicellular glandular trichomes are present in the lower epidermis (Plate – 4a). In *Justicia acuminatissima*, the transverse section of the leaf revealed the presence of both glandular and non-glandular trichomes[11]. Mesophyll is differentiated into palisade parenchyma and spongy parenchyma with few calcium oxalate crystals. In the midrib region, the T.S. of the leaf shows single, conjoint, collateral, and open single vascular bundle with phloem lying towards the lower epidermis (Plate – 4b). The microscopical analysis of the *Justicia adhatoda* leaf also showed the presence of a thin cuticle, 2 layers of palisade parenchyma and single conjoint, collateral vascular bundle[12]

CONCLUSION

The present study provides detailed information about the macroscopical and microscopical structures of *Justicia tranquebariensis*. The important microscopic features of root, stem and leaf of *J.tranquebariensis* may serve as a useful diagnostic tool and thus forms a basis for proper authentication and identification of the species. It could also serve as a database for future references of the taxa and are of great relevance in the field of systematic and taxonomy.

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Plate - 1

***JUSTICIA TRANQUEBARIENSIS* Linn.**

1a -Habit



1b -Flower **1c-Fruit**

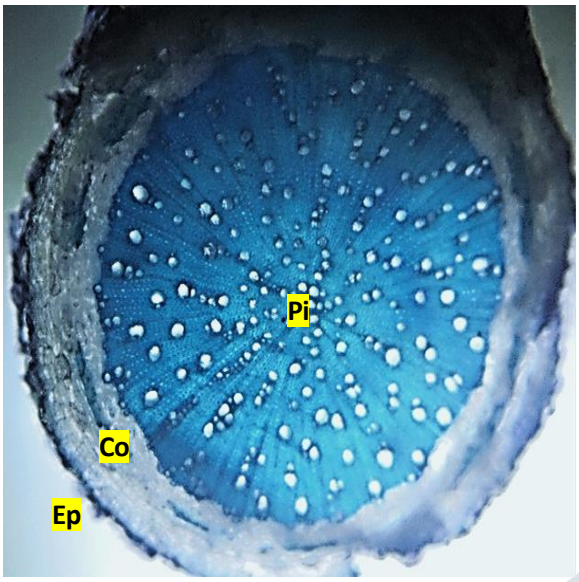


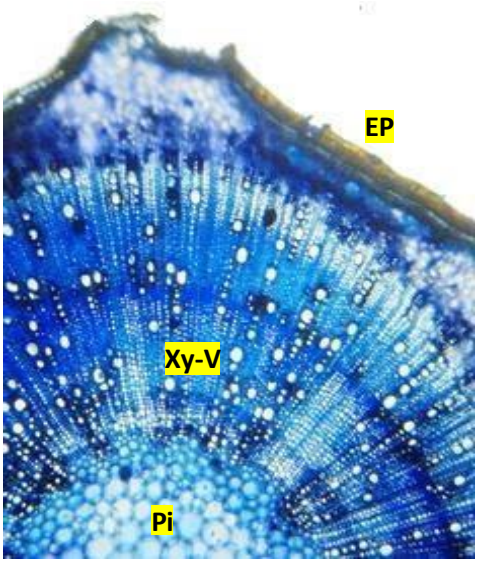


Plate – 2

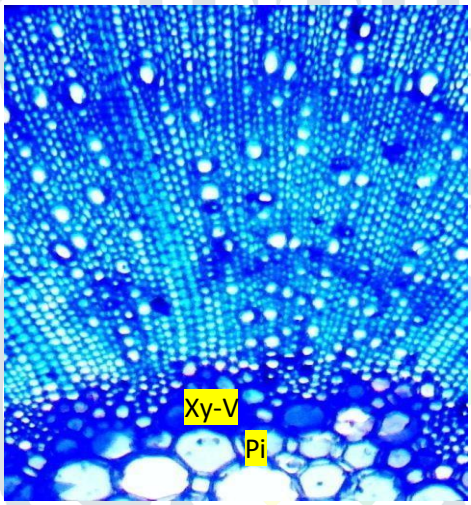
Anatomical studies of *Justicia tranquebariensis* root

a) T.S. of root - entire view **b) T.S. of root - A sector enlarged**





c) T.S. of root – xylem enlarged

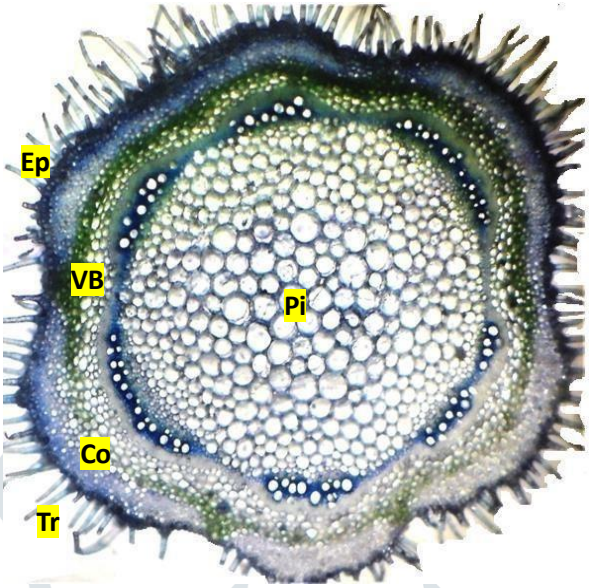


Ep:Epidermis; Co:Collenchyma; Xy-V:Xylem vessels; Pi: Pith

Plate - 3

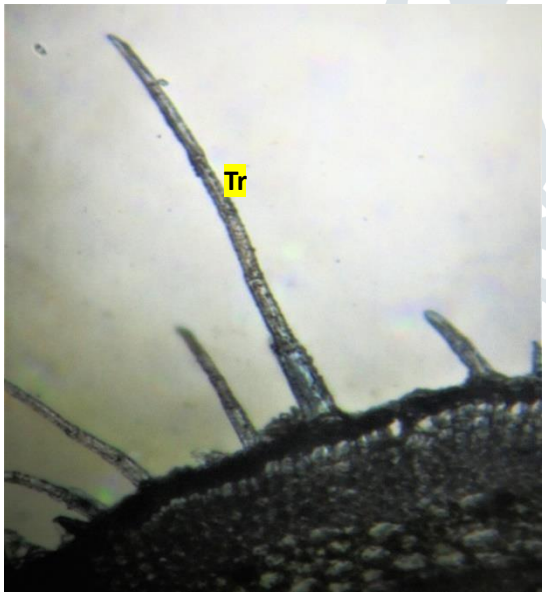
Anatomical studies of *Justicia tranquebariensis* stem

a) T.S. of stem - entire view

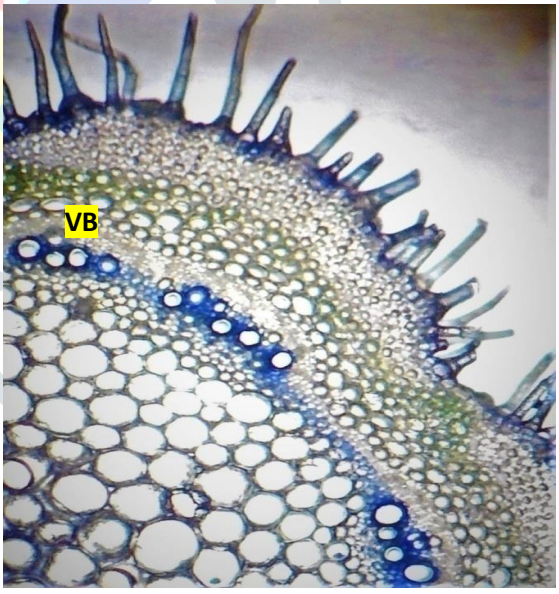


b) T.S. of stem showing trichome enlarged

c) T.S. of stem – vascular bundle



c)

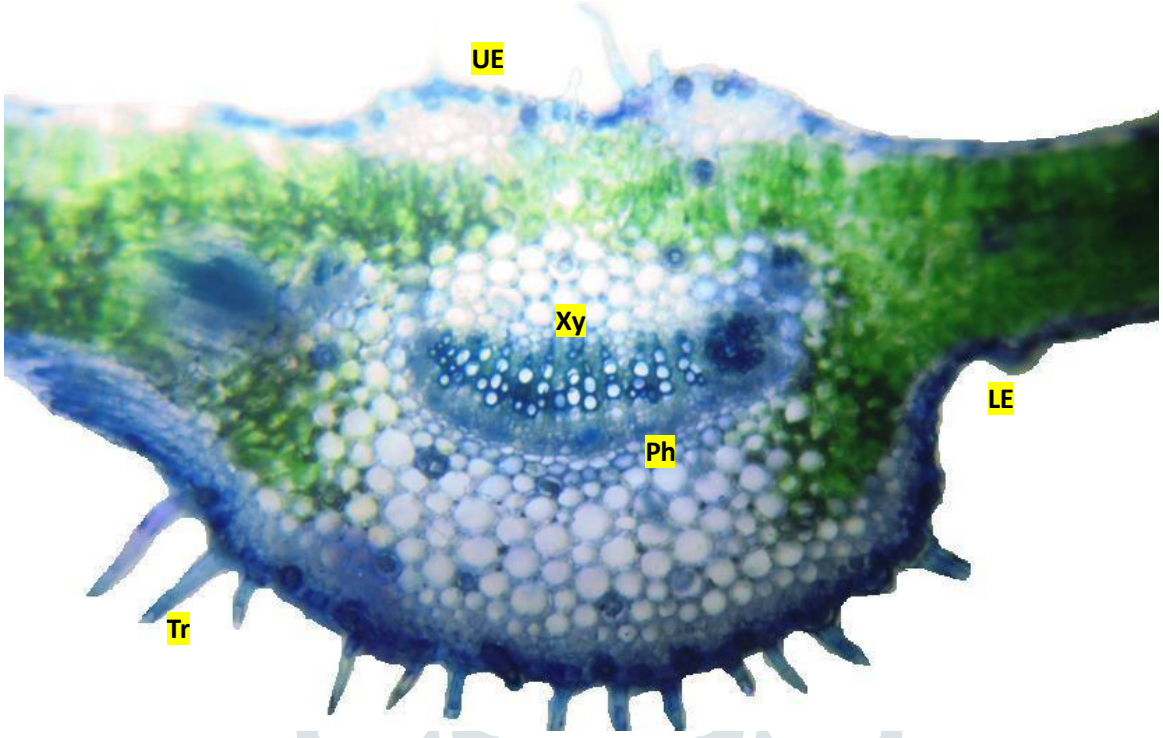


Ep:Epidermis; Tr:Trichome; Co:Cortex; VB:Vascular bundle; Pi: Pith

Plate - 4

Anatomical studies of *Justicia tranquebariensis* leaf

a) T.S. of leaf – entire view



b) T.S. of Leaf - vascular bundle enlarged

Tr:Trichome; UE:Upper epidermis; LE:Lower epidermis; VB:Vascular bundle; Xy:Xylem; Ph: Phloem

Table - 1

Macroscopical observations of *Justicia tranquebariensis* Linn.

S.No.	Parts of the Plant	Characters Noted	Observations
1.	Stem	Shape	Cylindrical
		Size	3 mm
		Texture	Herbaceous
		Colour	Whitish-brown with green
		Fracture	Fragile
		Taste	Bitter
		Odour	Characteristic Odour
2.	Leaf	Phyllotaxy	Opposite
		Petiole	5mm
		Colour	Green
		Shape	Obovate-orbicular
		Size	16 mm
		Base	Cuneate
		Margin	Ciliate
		Apex	Obtuse
		Texture	Smooth
		Appearance	Glabrous

		Taste	Bitter
		Odour	Characteristic Odour
3.	Flower	Inflorescence	Terminal spike
		Colour	White with pinkish-purple
		Calyx	5 partite
		Corolla	2 lobed
		Stamen	2 curved
		Ovary	Inferior
		Style	Slender
		Stigma	Minutely 2 lobed
		Ovule	4 (Bilocular- syncarpous)
4.	Fruit	Type	Capsule oblong
		Size	6.5 mm
		Colour	Green
5.	Seed	Shape	Egg-shaped
		Number	4
		Colour	Black