

*Original Research Article*

Anatomical Studies on *Vitex Leucoxylon* and *Vitex Negundo* (Verbenaceae)

Silvy Mathew, S. John Britto, Sinjumol Thomas

The Rapinat Herbarium and Centre for Molecular Systematics, St. Joseph's College (Autonomous),
Tiruchirappalli -620002, Tamilnadu, INDIA.

Corresponding Author: Silvy Mathew

Received: 21/10/2014

Revised: 18/11/2014

Accepted: 18/11/2014

ABSTRACT

Plants have served as a source of medicine to man for several decades now and still remain a source for vast potent bioactive molecules for the treatment of ailments. The anatomical and physiological features of plants may provide valuable characters and character states in assessing homology and elucidating phylogenetic relationships among plants. Anatomical features of vegetative as well as reproductive organs have been studied and the results of such research have found application in systematics, particularly for resolving controversial taxonomic problems. *Vitex* species possesses numerous biological activities proved by many experimental studies. One of the ancient uses of *Vitex negundo* Linn. documented in ayurveda is to provide mental peace. The leaf extract of *Vitex negundo* are generally used as preservation in storage of grain to protect the pulses against insects. *Vitex leucoxylon* Linn. is used as folkloric medicine in India for the treatment of cancer. The stem of *Vitex negundo* consists of wide parenchymatous pith, Chlorenchymatous hypodermis and TLS showing the multiseriata rays. *Vitex leucoxylon* TLS shows biseriata and uniseriate rays with intervessel pits.

Keywords: anti-inflammatory, antimicrobial effects, febrifuge, folkloric medicine.

INTRODUCTION

Medicinal plants contain secondary metabolites that are bioactive and these bioactive substances are responsible for their medicinal properties. The medicinal plants with time tested healing properties serve as health care entities. An urgent need is therefore essential for their proper identification and utility. In this regard, the knowledge of plant internal structure has essential role to solve several common and everyday problems such as identification of unknowns, food contaminants and forensic complications. Most of the species of the

genus *Vitex* are used therapeutically in ancient Indian systems of medicine especially, Ayurveda and Siddha. *Vitex leucoxylon* is a large deciduous tree with spreading head and trunk. It is an endemic tree found in peninsular India and Sri Lanka. The leaves of *vitex* are used in traditional medicine for relieving headache, fever and catarrh ^[1] and are also used for medicinal baths in fever and anaemia. ^[2] The major compound compound such as vitexin which is a flavanoid is mainly responsible for the anti-cancer activity. These dietary constituents mostly act as anti-oxidants and

may prevent from DNA damage. [3] The roots and bark are astringent and the roots are reported to be used as a febrifuge. [4] *Vitex negundo* Linn. is a woody, aromatic shrub growing to a small tree. The extract from fresh leaves exhibit analgesic and antihistaminic properties [5] and its aqueous and ethanolic extract from leaf show significant hypoglycaemic activity in alloxan induced diabetic rats. [6] It has also been reported that the extract has mosquito repellent effects, antiparasitic [7] and antimicrobial effects. [8-9] Besides it is reported that the species shows HIV type1 reverse transcriptase inhibitory activity especially the water extract of the aerial parts of *Vitex negundo*. [10] Leaves possess antiulcerogenic, antiparasitic, hepatoprotective potentials, anti-inflammatory and antifungal activities. [11-12]

MATERIALS AND METHODS

Leaf, stem and petiole of the *Vitex leucoxylo*n and *Vitex negundo* were collected from the Rapinat Herbarium-Botanical garden, St. Joseph's College, Tiruchirappalli and the plant specimen was botanically identified and authenticated by comparing the herbarium specimen (Fig.1 & Fig.2). Few fully matured leaves, petioles and stems were preserved in fixative solution FAA (Formalin-5ml + Acetic acid-5ml + 70% Ethyl alcohol-90ml) for more than 48 hours. The preserved specimens were cut into thin transverse section using sharp blade. The free hand sections were stained with safranin, Aniline blue, Eosin Y as per standard methodology. The selected diagnostic characters of the transverse section were photographed under suitable magnification using camera. The transverse sections of the stems, petioles and fresh leaves through the midrib were also cleared, mounted and observed under fluorescent microscope.



Fig.1. *Vitex leucoxylo*n-Habit



Fig.2. *Vitex negundo* - Habit

RESULTS AND DISCUSSION

The stem of *Vitex negundo* consists of wide parenchymatous pith, Chlorenchymatous hypodermis, TLS showing the multiseriate rays. The leaf contains the single epidermal layer with thick cuticle, hypodermis with intercellular spaces. Petiole possesses crescent shaped vascular bundle, single layered epidermal layer with hairs, hypodermal layer with intercellular spaces. In *Vitex leucoxylo*n also there is wide parenchymatous pith, metaxylem outside, protoxylem inside and TLS showing biseriate and uniseriate rays with intervessel pits. Leaf consists of single layered epidermal layer with thick cuticle, and sclerenchymatous bundle sheath present.

Petiole displays three lobed vascular bundle, xylem intermixed with phloem (Table-1 & Fig-3, Fig-4).

Table-1: comparative anatomical profile of *Vitex negundo* and *Vitex leucoxylo*n

Part	<i>Vitex negundo</i>	<i>Vitex leucoxylo</i> n
Stem	Wide parenchymatous pith and metaxylem outside with protoxylem inside; Chlorenchymatous hypodermis present; presence of epidermal hairs, TLS with multiseriate rays	Wide parenchymatous pith and metaxylem outside with protoxylem inside, TLS showing biseriate and uniseriate rays with intervessel pits
Leaf	Xylem is intermixed with phloem. There is one layer of epidermal cells with thick cuticle and epidermal hair; hypodermis consists of parenchyma cells with intercellular spaces	Sclerenchymatous bundle sheath present. there is a single layer of epidermal cells with thick cuticle
Petiole	Consists of crescent shaped vascular bundle, metaxylem inside and protoxylem outside, single layered epidermis with epidermal hairs; hypodermal parenchymatous cells with intercellular space	Exhibiting the vascular bundle in three lobes, single epidermal layer with epidermal hairs, parenchymatous hypodermal layer; xylem intermixed with phloem

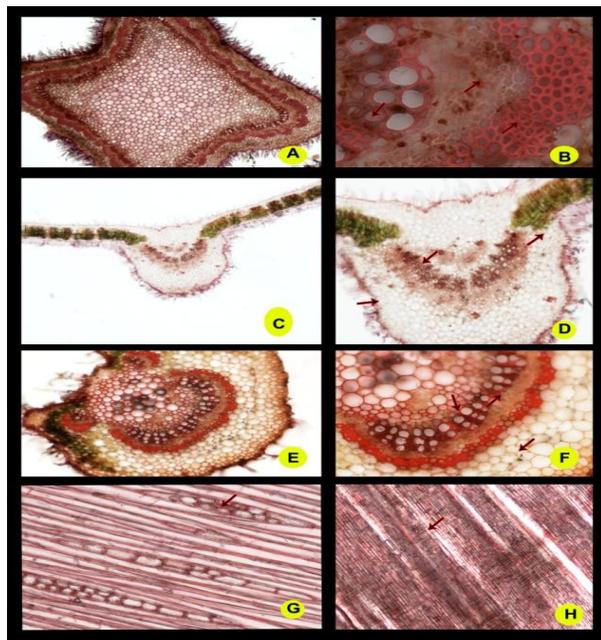


Fig.3. *Vitex negundo*: A. Stem (4x); B. Enlarged section of stem showing the parenchymatous pith, vascular bundles, chlorenchymatous hypodermis, single epidermal layer with hairs; C. Leaf (4x), D. Enlarged view of leaf showing the vascular bundle, parenchymatous endodermis and unicellular trichomes; E&F. Petiole (10x) and 20x indicating xylem, phloem and hypodermis; G.TLS showing the formation of biseriate rays; H. RLS showing medullary rays.

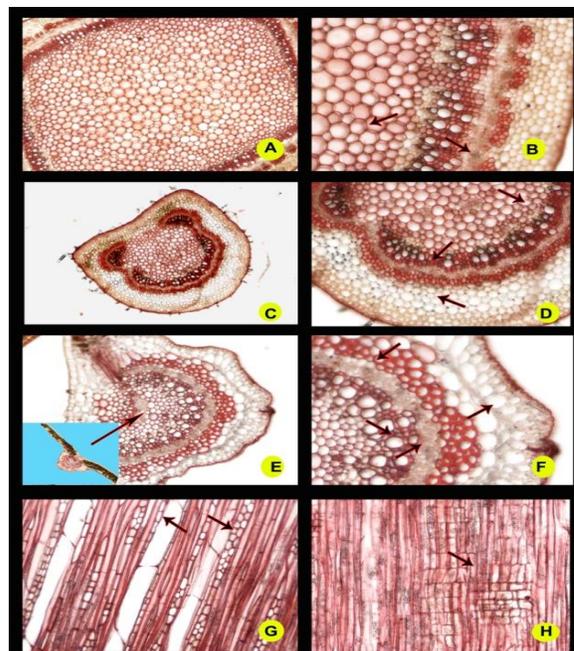


Fig.4. *Vitex leucoxylo*n: A. Stem(4x) B. Enlarged view of stem showing the central wide parenchymatous pith, vascular bundle, single layered epidermis; C. Petiole(4x), D. enlarged view of petiole exhibiting the vascular bundle arranged in three lobes, parenchymatous pith, outer single layered epidermis with hairs; E. Leaf(10x), F. Enlarged view of leaf displaying xylem, phloem, endodermis and epidermis; G.TLS showing biseriate and uniseriate rays with intervessel pits, H. RLS showing medullary rays.

In the present study an attempt has been made to establish an evaluation of morphological and microscopical features which are helpful in identification of the authentic plant sample and marketed sample. The comparative anatomical studies of these plants are really helpful for the correct identification of the plants and also a great contribution in the field of Plant anatomy. This study has also formulated pharmacopoeial standards for these medicinal plants. The microphotographs on different magnifications which were carried out in the present study reveal specific identification features of each plant.

CONCLUSION

Plant anatomy plays an important role in the understanding of plant biology. A realistic interpretation of morphology, physiology, and phylogeny must be based on a thorough knowledge of the structure of

cells and tissues. pharmacognostical analysis of stem, leaf, petiole and peduncle of the selected medicinal plants provides substantial information for the proper identification, authentication and scientific evaluation. It is to be noted that the transverse sections and longitudinal sections of the plant parts show unique characters and they play an important role in the proper identification of species. From the above discussion it may be concluded that *Vitex species* are used for its various properties by several of pharmaceutical companies

REFERENCES

1. Chanda Y.R. The wealth of India: A dictionary of Indian Raw materials and Industrial products; Publication and Information Directorate. CSIR. New Delhi. 1982;520-521.
2. Nandkarni KM. *Indian Materia Medica*. Popular prakashan Mumbai. 1976; 3(1):1278-1280.
3. Althaf faimum D, Sudaroli. Influence of *Vitex leucoxylo* Linn on oxidative stress and hepatocarcinogenesis induced by diethylnitrosamine and phenobarbital in rats. *International Journal of Toxicological and Pharmacological Research*. 2012;4(4):96-107.
4. Alluri V, Krishnaraju, Chundi B M Rao. Anti inflammatory activity of *Vitex leucoxylo* L. bark extracts against freund's complete adjuvant induced arthritis in Sprague Dawley rat. *American Journal of infectious diseases*. 2009;5(2):68-73.
5. Dharmasiri MG, Jayakody, Gathena G. Anti-inflammatory and analgesic activities of mature fresh leaves of *Vitex negundo*. *J Ethnopharmacol*.2003;87(2-3): 199-206.
6. Prasanna Raja P, Sivakumar V, Riyazullah M S. Antidiabetic potential of aqueous and ethanol leaf extracts of *Vitex negundo*. *International Journal of Pharmacognosy and Phytochemical Research*. 2012;4(2):38-40.
7. Shrishailappa B, Mahesh Kumar G, Suresh B. Antioxidant activity of the ethanolic extract of *Stsiga orobanchioides*. *Journal of Ethnopharmacology*.2003;85: 227-230.
8. Rasia K, Srivastava SK. Antimicrobial activity of some Indian medicinal plants. *Ind J Pharm Sc*.1998;60:57-58.
9. Ahmad I, Mehamood Z, Mohammad F. Screening of some Indian medicinal plants for their antimicrobial properties. *J Ethnopharmacol*.1998;62:183-193.
10. Tandon V R, Gupta R K. An experimental evaluation of anticonvulsant activity of *Vitex negundo*. *Indian Journal of Physiology and Pharmacology*.2005; 49(2): 199-205.
11. Sathiamoorthy B, Gupta, Kumar M, Chaturved A K, Shukla P K, Maurya. New antifungal flavonoid glycosides from *Vitex negundo*. *Bio org. Med. chem: left*. 2007; 17(1): 239 – 42.
12. Dmayanathi M, Susheela K, Sharma G J. Effect of plant extract and systemic fungicide on the pineapple fruit – rotting fungus, *Ceratocystis paradoxa*. *Cytobios*.1996; 86 (346): 155 – 65.

How to cite this article: Mathew S, John SB, Thomas S. Anatomical studies on *vitex leucoxylo* and *vitex negundo* (verbenaceae). *Int J Res Rev*. 2014; 1(3):7-10.
