



An Overview on Vitex Negundo

AJILA RAJ S S*¹, SANTHAN NEHRU NARKILLI², DR.
PRASOBH G R³, SURABHI G S⁴, JIJI MOHAN M U⁴

¹B Pharm Student, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India, 695502

²Head, Department of Pharmacognosy, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India, 695502

³Principal, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India, 695502

⁴Assistsnt Professor, Department of Pharmacognosy, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India, 695502

*Author of correspondence: Ajila Raj S S
Sree Krishna College of Pharmacy and Research Centre, Parassala,
Thiruvananthapuram, Kerala, India, 695502

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ABSTRACT

Vitex negundo L. (Verbenaceae) is a hardy plant, flourishing mainly in the Indian subcontinent. All parts of the plant, from root to fruit, possess a multitude of phytochemical secondary metabolites which impart an unprecedented variety of medicinal uses to the plant. It is interesting to note that a single plant species finds use for treatment of a wide spectrum of health disorders in traditional and folk medicine; some of which have been experimentally validated. The plant is a component of a number of commercially available herbal formulations and has also shown potential as an effective bio-control agent. Employment of techniques such as cell and tissue culture would provide means of rapid propagation and conservation of the plant species and, from the point of view of phytochemistry, give scope for enhancement of the quality and quality of bioactive secondary metabolites occurring in the plant.

KEY WORDS: phytochemical, pharmacological, bio-control, herbal formulations

I. INTRODUCTION

Vitex negundo is a woody and higher shrub plant belongs to family **Lamiaceae**. *Vitex negundo*, commonly known as the Chinese chaste tree five-leaved chaste tree, or horseshoe vitex, is a large aromatic shrub with quadrangular, densely whitish, tomentose branchlets. It is widely used in folk medicine, particularly in South and Southeast Asia. Nochi – (Nir gundi – *Vitex negundo*): Nochi or Nir gundi as it is commonly called is native to Eastern and Southern Africa and Asia. It is found throughout Indian Subcontinent and can be easily identified by its light purple flowers borne in panicle inflorescence. Nochi is called by different names in different parts of India.

SYNONYMS

- *Vitex cannabifolia* Siebold & Zucc.
- *Vitex incisa* Lam.
- *Vitex incisa* var. *heterophylla* Franchi.
- *Vitex negundo* var. *heterophylla* (Franch.) Rehder

TAXONOMICAL CLASSIFICATION

- Kingdom - Plantae
- Super division - Spermatophyte
- Division - Magnoliophyte
- Subclass - Asteridae
- Order - Lamiales
- Family - Lamiaceae
- Genus - *Vitex*
- Species - *negundo*



VERNACULAR NAMES

Language	Name
Sanskrit	Nirgundika, Renuka, Nirgunda, Nilapushpi, Nilanirgundi,
Assamese	Pasutia, Aggla-Chita, Aslok, Pochatia
Bengali	Nisinda, Samalu, Nirgundi, Nishinda, Sinduari
English	Five-Leaved Chaste Tree, Indian Privet
Gujarati	Nagoda, Nagaol, Nirgari
Hindi	Samhalu, Saubhalu, Nirgandi
Kannada	Bile-Nekki
Malayalam	Indrani
Siddha	Noochi
Tamil	Nirkunnchi, Nallanochi
Telugu	Nallavalli, Vavilli, Tellavavilli
Urdu	Sambhalu, Panjangusht
Arabic	Uslaq

BOTANICAL DESCRIPTION OF VITEX NEGUNDO

Flowering season - June to December

Fruiting season - September to February.

Habit - Branched Shrub up to 5 m tall, or small, slender tree

Duration - Perennial

Part(s) used for medicinal purpose - Roots, fruits, flowers, leaves, bark

Leaves - Palmately compound petiole 2:5-3.8 cm long; mostly trifoliate, occasionally Penta foliate; in trifoliate leaf, leaflet lanceolate or narrowly lanceolate, middle leaflet 5- 10 cm long and 1.6-3.2 cm broad, with 1- 1.3 cm long petioles, remaining two sub-sessile; in Penta foliate leaf inner three leaflets have petiole and remaining two sub-sessile; surface glabrous above and tomentose beneath; texture leathery.

Roots - Cylindrical, hard, tough with irregular fractures; external surface is rough due to longitudinal, narrow, cracks and small rootlets; cut surface shows cork region greyish brown, middle region greyish-white, and xylem region cream coloured; bark thin, easily separate from wood; wood hard, forming a major part of the root.

Flowers - Bluish-purple, small, in forming large, terminal, often compound, pyramidal panicles.

Fruit - The fruit is rounded drupe, 1 to 3 mm in diameter, 1/3rd to 3/4th of its size surrounded by a dull grey cup-like, persistent calyx along with pedicel; calyx cup may show one or two vertical splits; fruit colour is light brown to black; locules two, each containing two seeds; texture is smooth, taste and odour not characteristic

Seeds - 5-6 mm in diameter.



Flowers of *Vitex negundo*



Leaves of *Vitex negundo*



Fruits of *Vitex negundo*



Roots of *Vitex negundo*



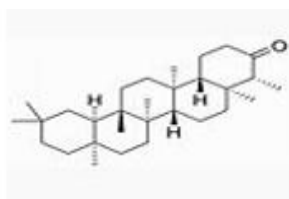
Seeds of *Vitex negundo*



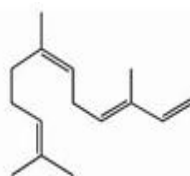
Stem of *Vitex negundo*

CHEMICAL CONSTITUENTS

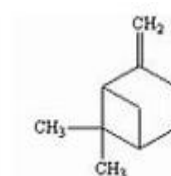
Major chemical constituents in leaves of *Vitex negundo* Linn are volatile oil, triterpenes, diterpenes, sesquiterpenes, lignan, flavonoids, flavones, glycosides, iridoid glycosides and stilbene derivative. They are friedelin, vitamin c, carotene, casticin, artemetin, sabinene, globulol, α -terpineol, Spathulenol, β - Farnesene, farnesol, α -pinene, β -pinene, linalool



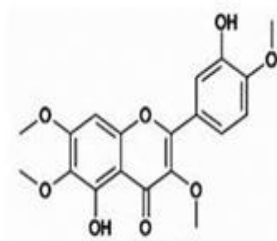
Friedelin



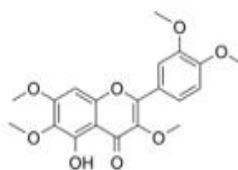
Farnesene



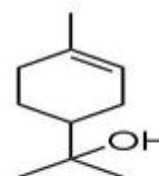
Pinene



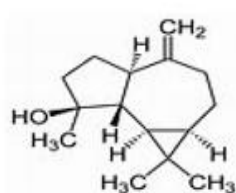
Casticin



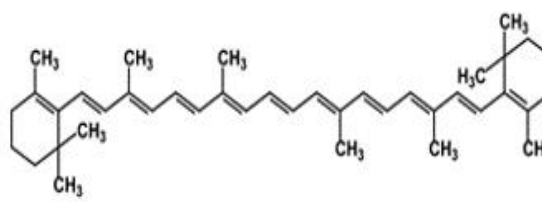
Artemetin



α -terpineol



Spathulenol



Carotene



TRADITIONAL USE

- Plant is acrid, astringent, cephalic, antiseptic, thermogenic, ophthalmic, anti-inflammatory, antipyretic and useful in bronchitis, asthma and enlargement of spleen.
- Roots are tonic, febrifuge, antirheumatic, diuretic, expectorant and are useful as a demulcent in dysentery in cephalalgia, otalgia, colic, uropathy, wound and ulcers.
- Bark is useful in odontalgia, erminois and ophthalmopathy.
- Leaves are bitter, aromatic, acrid, astringent, anti-inflammatory, antipyretic, bronchial smooth muscle relaxant, anti-arthritic, anthelmintic and vermifuge.
- Flowers are cool astringent, carminative, hepatoprotective, digestive, febrifuge, vermifuge and are useful in haemorrhage and cardiac disorders.
- Fruit is nervine, cephalic, aphrodisiac, emmenagogue and vermifuge.
- In some villagers use it to clean their teeth.
- *Vitex negundo* leaves are used in grains to protect them from killing insects as well as being bathed in water, which also ends skin diseases.

PHYTOCHEMICAL STUDIES

The whole plant or organism serves as an active laboratory for the production of natural products from primary metabolites. Primary metabolites are the products of vital metabolic pathways such as respiratory chain, TCA cycle etc. Secondary metabolites are varieties of simple to sophisticated bizarre molecules. They are fascinating chemical molecules, very useful and of great importance in nature, as well as highly diversified in structures, properties, uses, chemistry etc.

Extraction

The process of separating active principles from powdered crude drugs by using suitable solvents is called extraction. The choice of solvent depends upon the characteristics of the secondary metabolites like polarity, pH and thermal stability. Successive solvent extraction is suitable to extract the constituents of different polarity ranging from non-polar to polar.

Methods of extraction

- **Infusion**
Fresh infusions are prepared by macerating the crude drug for a short period of time with cold or boiling water.
- **Decoction**

In this process, the crude drug is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered.

e. g. Tea, coffee

- **Digestion**

This is a form of maceration in which gentle heat is used during the process of extraction.

e. g. Extraction of Morphine

- **Percolation**

It is continuous downward displacement of the solvent through the bed of crude drug material to get extract.

- **Supercritical fluid extraction**

Process of separating one component from another(matrix) using supercritical fluid as the extracting solvent. Carbon dioxide is known to be the most stable and an excellent solvent.

- **Counter-Current Extraction**

A liquid-liquid extraction process in which the solvent and the process stream in contact with each other flow in opposite directions.

- **Microwave-assisted Extraction**

Microwaves are electromagnetic radiations with a frequency from 0.3 to 300GHz.

- **Ultrasonication-Assisted Extraction**

The procedure involves the use of ultrasound waves, which have frequencies higher than 20kHz, have great effects on extraction yield and kinetics.

- **Maceration**

Maceration means to soften. It is an extraction process in which the drug powder is soaked in suitable solvent in a closed vessel for seven days with occasional shaking at room temperature. After specified period, the menstruum is strained, and the marc is pressed to obtain the remaining menstruum. This marc is dried at a temperature not exceeding 50 degree C and is used for extraction with the next solvent.

- **Soxhlet Extraction/Hot continuous percolation**

Here the plant material is continuously flushed with fresh solvent which is obtained by evaporation and subsequent condensation of the solvent containing extracted materials.

ETHNOBOTANICAL STUDIES

KambhamVenkateswarlu in 2012 - They have reported that this *Vitex negundo* Linn is an Indian plant, which have enormous traditional uses against various diseases and the report was generated through the research activity using modern scientific approaches and innovative scientific tools.



FauziyaBasriet et al in 2014 - *Vitex negundo* belongs to family Lamiaceae and grows as small tree with thin grey bark. The plant is widely distributed and also has pharmacological actions against wide spectrum of diseases in traditional system of medicines. All parts of the plant especially its leaves contain numbers of secondary metabolites such as alkaloids, phenols, flavonoids, glycosidic iridoids, tannins and terpenes. Therapeutic uses; antimicrobial, anti-inflammatory, astringent, bronchodilator, CNS-depressant, detoxicant, diuretic, emmenagogue, anticancer and hepatoprotective etc. It is also used as repellent, insecticide and larvicidal. Leaf extract is employed as nervine tonic, tranquilizer and vermifuge. This review they have reported that presenting a comprehensive information on phytochemical constituents and therapeutic uses which can be helpful in development of modern medicine.

Ajay Kumar Meena et al in 2011 - Plants and their active constituents play an important role in the prevention of a variety of ailments. Most of the species of the Genus *Vitex* are used therapeutically in ancient Indian systems of medicine especially, Ayurveda and Siddha. The genus *Vitex* contains about 270 species distributed around the world. These species contain a variety of potentially bioactive molecules, such as iridoids, flavonoids, diterpenoids, derivatives, and Phyto steroids. Most of these species possess analgesic, anti-inflammatory, antimicrobial, antioxidant, hepatoprotective, antihistamine, and anti-asthmatic properties. This work reviews the pharmacological evidence for the effects of extracts of plants from the genus *Vitex*, giving an overview of the most widely studied biological effects and the known phytochemical constituents.

S. Arumanayagam and M. Arunmani (2018) - Reported that *Vitex negundo* Linn is a large aromatic shrub used as a traditional medicine for the treatment as antimicrobial, anticancer and diuretic properties belongs to the family Verbenaceae. In the present study an attempt had been made to study the antibacterial and hepatoprotective activity of *V. negundo* (VN) against LPS. The antibacterial activity of leaves, bark and seeds of VN were tested against different commonly occurring human pathogenic bacteria's such as *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis*, and *Klebsiella pneumoniae*. Among the different extracts and parts of plant, methanolic extract of leaves showed much more antibacterial activity against these different bacterial strains especially *E. coli*. VN was checked on HepG2 cells against the toxicity induced by LPS to prove the hepatoprotective

activity. We showed that the VN induced ROS using JNK and MAPK pathways, decreased the apoptotic gene expressions such as COX2, IL 1 β , NF κ β and iNOS in HepG2 cells to protect the liver cells against LPS toxicity.

P. Renuka Devi, R. Kokila Vani and S. Gnana Poogotha - Reported the Anti-Microbial activity of the various leaf extracts of *Vitex negundo* Linn. The antibacterial activity of the leaves of *Vitex negundo* was tested against three bacteria Viz., *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella Pneumoniae*, the fresh aqueous, heated aqueous extract, chloroform and methanolic extract of leaves were used for screening their antibacterial potential. The fresh and aqueous extracts of leaves in various dilutions were found to have antibacterial activity against the three bacteria.

II. CONCLUSION

This review includes the pharmacognostical, phytochemical and therapeutical uses on the leaves of *Vitex negundo* Linn of family Lamiaceae.

According to the thorough study of the available literature it is quite obvious that the importance of *Nirgundi* in traditional system of medicine is of utmost significance. Almost all parts of the plant are use in preparing herbal medicines. The plant is known to possess anti-cancer, anti-microbial, anti-feedant, anti-inflammatory, anti-hyperpigmentation, hepatoprotective, anti-histaminic, analgesic and related activities. Scientifically explored exhaustive reports of the plant, their medicinal properties and active chemical constituents have a role in the management of various human ailments.

V. negundo possesses numerous biological activities proved by many experimental studies. It represents a class of herbal drug with very strong conceptual base for its use. Thus, this plant has great potential to be developed as a drug by pharmaceutical industries, but before it recommending it for clinical use in these conditions, there is a need to conduct clinical trials and prove its clinical utility.

Medicinal plants, which are the backbone of traditional medicine, have in the last few decades been the subject for very intense pharmacological studies; the value of medicinal plants as potential sources of new compounds of therapeutics value and as sources of lead compounds in the drug development. There arises a need therefore to screen medicinal plants for bioactive compounds as a basis for further pharmacological studies.



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