

Chapter 9

Morphology, traditional therapeutic uses, pharmacology, cultural and mythological values of *Nyctanthes arbor-tristis* (Oleaceae)

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Abstract: Night-flowering Jasmine (*Nyctanthes arbor-tristis* L.) has been a cornerstone of traditional medicine for centuries, particularly in managing chronic and infectious diseases. This plant's diverse pharmacological activities, ranging from anti-inflammatory to antimicrobial properties, make it a valuable resource for treating various ailments. Recent studies have identified bioactive compounds, such as flavonoids, glycosides, and alkaloids, which validate Night-flowering Jasmine's therapeutic potential. Further research is needed to fully explore its applications, optimize extraction and purification methods, and conduct clinical trials to establish its efficacy and safety in modern medicine.

Keywords: Ayurveda, Night-flowering Jasmine, Oleaceae, pharmacological uses, traditional uses

Introduction

Nyctanthes arbor-tristis L., commonly known as Night Jasmine, is a significant species of the Oleaceae family. This small tree is characterized by its fragrant white flowers, which bloom at night, and is native to the sub-Himalayan regions and central India. The plant's geographical distribution ranges from northern Pakistan and southern Nepal to northern India and southeast to Thailand. It is often cultivated in gardens across various parts of India due to its ornamental value and aromatic properties (Kumari *et al.*, 2012; Vishwakarma *et al.*, 2023). The plant has a rich history in traditional medicine, where different parts are utilized for various therapeutic purposes, including treatment for fever, rheumatism, and inflammatory disorders (Uroos *et al.*, 2017). The pharmacological potential of *Nyctanthes arbor-tristis* has been explored in numerous studies, highlighting its antioxidant, anti-inflammatory, and hepatoprotective effects (Akki *et al.*, 2023; Lad and Bhatnagar, 2017; Godse *et al.*, 2016). Leaves and flowers have demonstrated significant antioxidant activity, crucial in combating oxidative stress-related diseases (Das and Sasmal, 2003; Hussain and Ramteke, 2012). Research has shown that the phytochemical constituents of *N. arbor-tristis* contribute to its medicinal efficacy. Compounds such as flavonoids and alkaloids have been isolated, which are believed to play a role in anti-inflammatory and analgesic properties (Bordoloi *et al.*, 2018; Sharma *et al.*, 2023). Additionally, studies have indicated that the plant exhibits the potential to manage chronic conditions such as arthritis and diabetes, further emphasizing its importance in traditional and modern medicine (Sharma *et al.*, 2023). This plant is known for its ornamental beauty and significant medicinal value. Widely used in traditional medicine, it has been known for its therapeutic properties across cultures. Scientific studies continue to explore its pharmacological potential, revealing applications in treating various ailments. Its versatility extends to

cultural symbolism and environmental benefits, making it a vital species in both ecological and medicinal domains.

Morphology

N. arbor-tristis, locally known as Gangasiuli, Gotikhadika, Harshringar or Parijat, is a small tree that typically attains a height up to 10 meters. This plant is characterized by its rough, grayish bark, which exhibits a scaly texture, and a somewhat irregular stem. The leaves are arranged oppositely, are ovate, and possess a simple structure, featuring a rough surface, prominent veins, and serrated edges. The upper side of the leaves is dark green, while the underside is pale, with each leaf attached to the branches by short petioles. The plant produces fragrant flowers that bloom at night; these flowers are small and tubular, showcasing an orange-red corolla tube and white-lobed petals that grow in clusters. These blossoms are short-lived, typically falling by morning and creating a carpet of petals beneath the tree. The fruit is a flat, brown, two-lobed capsule that contains compressed seeds encased in thin wings, which facilitate dispersal. This species flourishes in well-drained soils and exhibits drought tolerance, commonly found in tropical and subtropical areas. Its distinctive morphology renders it a valued addition to gardens and landscapes (Kumar *et al.*, 2022; Swain *et al.*, 2024; Plate 1).

Traditional therapeutic uses

N. arbor-tristis, holds a prominent place in traditional medicine systems such as Ayurveda, Siddha, and Unani. Indigenous populations across the Indian subcontinent have identified and utilized the therapeutic properties of various components of this plant.

Leaves: Leaf juice is used to eliminate roundworms and threadworms in children. It treats anorexia, haemorrhoids, liver, and biliary disorders,

persistent fever, malaria, and rheumatism. It acts as a diaphoretic and safe laxative for infants when combined with honey and common salt. Effective in inducing sweating and increasing urine output to manage fever and rheumatism. Leaf paste administered for pyrexia, hypertension, and diabetes. It is applied for anaemia and hepato-biliary disorders, particularly hepatic and splenic enlargement when combined with loha-bhasma (Bhalakiya and Modi, 2019; Singh and Kumar, 2022; Ashokkumar *et al.*, 2024)

Flowers: Flowers infusion is utilized as a sedative by Buddhist monks in Sri Lanka. It treats gastrointestinal issues, improves digestion, and tightens tissues. Reduce bile secretion, alleviate coughs, and promote hair health. It is also used to cure hemorrhoids, scabies, and other skin conditions (Jain *et al.*, 2005; Sawant and Sonar, 2022).

Seeds: Seeds function as an anthelmintic and treat conditions like alopecia, bilious pyrexia, and scurfy scalp conditions. Powdered seeds are used for piles, baldness, scurvy, and skin ailments (Azma *et al.*, 2021; Yadav and Laware, 2023).

Stem bark: A powdered form of stem bark is used to treat rheumatic joint pain, malaria, bronchitis, ulcers, bleeding gums, anorexia, liver disorders, piles, and worm infestations. Acts as an expectorant and treats skin diseases, blood disorders, and fever. The bark is also used for treating bronchitis and snakebites (Bhalakiya and Modi, 2019; Yadav and Laware, 2023).

Bioactive compounds

N. arbor-tristis contains diverse bioactive compounds that contribute to its significant pharmacological properties. Key constituents include flavonoids (such as quercetin and kaempferol), alkaloids, glycosides, tannins, saponins, and phenolic compounds (Ashokkumar *et al.*, 2024).



Plate 1: Vegetative parts of *N. arbor-tristis*, a) canopy, b) flowers, c) leaves, d) fruit, e) bark

Leaves contain alkaloid nyctanthine alongside mannitol, β Amyrin β -Sitosterol, hentriacontane, benzoic corrosive, astragalin, nicotiflorin, oleanolic

acid, nyctanthic corrosive, friedelin and lupeol (Bhosale *et al.*, 2009; Singh and Kumar, 2022). These compounds exhibit potent antioxidant, anti-inflammatory, and antimicrobial activities. The plant also contains iridoid glycosides like nyctanthin and arbortristoside, associated with antipyretic and hepatoprotective effects. Additionally, essential oils, steroids, and terpenoids present in its parts contribute to its therapeutic efficacy in treating ailments such as fever, rheumatism, and gastrointestinal disorders (Jain *et al.*, 2005; Sawant and Sonar, 2022). These bioactive constituents make *N. arbor-tristis* a valuable resource for developing potential treatments in modern medicine (Figure 1).

Pharmacological values

N. arbor-tristis is esteemed for its wide-ranging pharmacological attributes, which are linked to the bioactive compounds found in various parts of the plant. Comprehensive research has substantiated its traditional medicinal applications, underscoring its potential for therapeutic use.

Anti-inflammatory and antipyretic activities: The leaves and flowers are noted for their pronounced anti-inflammatory effects, proving beneficial in treating ailments such as rheumatism and sciatica. Extracts derived from the plant have also shown antipyretic properties, making them useful in addressing persistent fevers and malaria (Nirmal and Patil, 2011; Parekh and Soni, 2020).

Anthelmintic properties: The leaves and seeds are employed to eliminate roundworms and threadworms, particularly in pediatric cases, thereby confirming their anthelmintic effectiveness (Yadav and Laware, 2023).

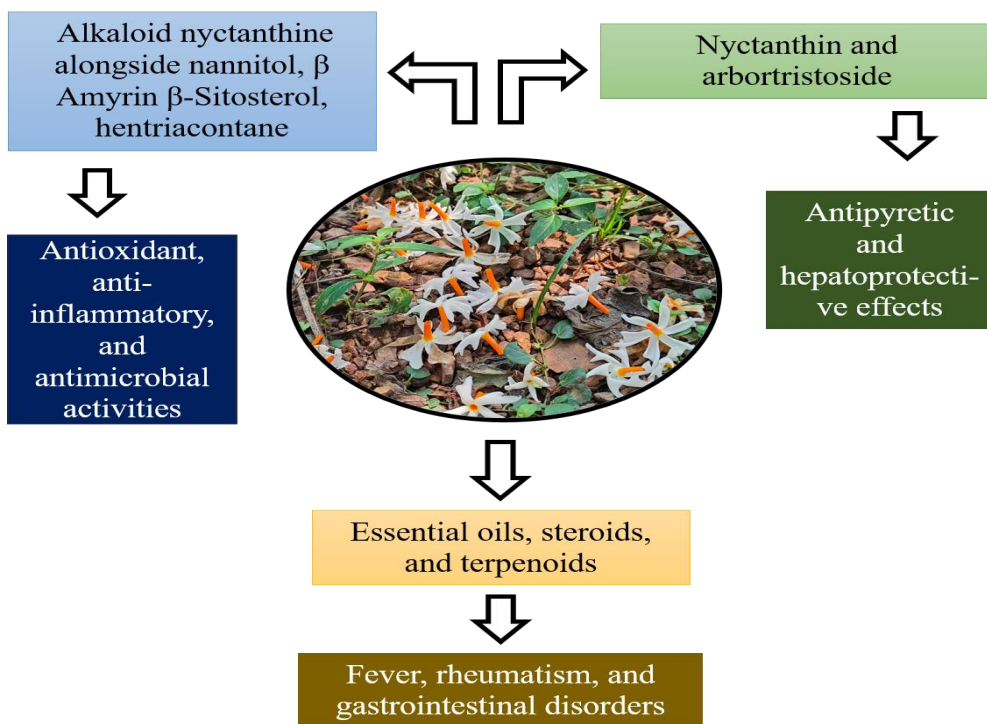


Figure 1: Pharmacological values of *N. arbor-tristis*

Antioxidant activity: Abundant in flavonoids, phenolic compounds, and other antioxidants, the plant aids in mitigating oxidative stress, thereby lowering the risk of chronic illnesses (Rathee *et al.*, 2007; Naredhirakannan and Smeera, 2010).

Immunomodulatory effects: The bioactive constituents of the plant boost immune responses, offering protection against infections and enhancing overall health (Parekh and Soni, 2020).

Hepatoprotective and gastroprotective effects: Extracts from the leaves and bark are recognized for their liver-protective qualities, making them effective in the management of liver and biliary disorders. Additionally, the flowers have demonstrated potential in promoting digestion and addressing

gastrointestinal concerns, including ulcers and diarrhoea (Rathee *et al.*, 2007; Bhalakiya and Modi, 2019).

Antimicrobial properties: The plant displays antimicrobial activity against a broad spectrum of bacteria, fungi, and viruses, supporting its application in infection treatment (Balasubramanian, 2012; Singh and Kumar, 2022).

Antidiabetic activity: Traditional medicine utilizes leaf extracts for diabetes management, with research indicating potential hypoglycaemic effects (Thapa and Kumar, 2024).

Anticancer potential: Initial studies suggest that certain compounds within *N. arbor-tristis* may exhibit anticancer properties, meriting further investigation (Thapa and Kumar, 2024; Swain *et al.*, 2024).

Wound healing and dermatological applications: The leaves, flowers, and bark are applied to wounds, skin infections, and other dermatological conditions due to their anti-inflammatory, antimicrobial, and tissue-repair properties (Ravishankar and Sireesha, 2021).

Antiviral activity: Research highlights the potential antiviral activity of the plant, especially against certain strains of viruses, making it a promising candidate for antiviral drug development (Das *et al.*, 2008; Singh and Kumar, 2022).

Antiarthritic and analgesic properties: The plant is widely used in traditional medicine for alleviating joint pain and stiffness, supported by studies showing its analgesic effects.

Cultural and mythological importance

N. arbor-tristis holds profound cultural and mythological significance, especially in Indian traditions. According to Hindu mythology, the Parijat tree

is said to have emerged during the Samudra Manthan, symbolizing its divine origins. Parijat is a holy tree of India since the time of Lord Krishna which is found as an ornamental plant in Indian garden and temple sides (Singh *et al.*, 2022). The tree is deeply symbolic in Hinduism, representing immortality, spirituality, and selflessness. Despite blooming at night and shedding its flowers at dawn, it serves as a metaphor for the transient nature of life and the virtue of giving without expectation. Parijat flowers are considered sacred and are widely used in religious offerings to deities such as Vishnu, Shiva, and Lakshmi (Patel, 2021; Kaursohi, 2021). Additionally, the tree is often planted near cremation grounds, as its blossoms are believed to symbolize the soul's journey to the afterlife. Beyond Hinduism, the tree also holds significance in Buddhist traditions, symbolizing peace and enlightenment (Singh *et al.*, 2022). The Parijat's cultural and spiritual relevance continues to inspire its use in art, rituals, and storytelling, making it a timeless symbol of devotion and purity.

Conclusion

Nyctanthes arbor-tristis is an ornamental plant with various medicinal and pharmacological properties. It is an essential herbal medicine for the treatment of a wide range of diseases like malaria, hypertension, skin infections, diabetes, etc. The plant is a rich source of phytochemicals and almost every part of the plant possesses versatile pharmacological properties. Studies found that the plant has immunomodulatory, antipyretic, analgesic, anti-arthritic, and hepatoprotective activities. The plant is also important in ecological, and cultural aspects. Its bioactive compounds hold the potential for developing novel drugs for various diseases and disorders. Ecologically, it can contribute to biodiversity conservation and landscaping. Research into its role in integrative medicine, supported by clinical validation, can bridge traditional knowledge with modern healthcare.

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