

## Nyctanthes arbortristis (Night-flowering Jasmine): A Review of its Botanical, Medicinal, and Ornamental Properties

Dr. Pushpesh Mishra<sup>1</sup>, Anita Devi<sup>2</sup>, Shivani Rajbhar<sup>3</sup>, Jai Kishan Jaiswal<sup>4</sup>

1. Professor, Naraina Vidya peeth Group of Institutions Faculty of Pharmacy Kanpur, U.P.  
2. Research Scholar, Naraina Vidya peeth Group of Institutions Faculty of Pharmacy Kanpur, U.P. 3. Research Scholar, Naraina Vidya peeth Group of Institutions Faculty of Pharmacy Kanpur, U.P.

Submitted: 25-06-2023

Accepted: 05-07-2023

### ABSTRACT

Nyctanthes arbortristis, commonly known as Night-flowering Jasmine or Parijat, is a captivating plant species indigenous to the Indian subcontinent. This review article presents a comprehensive overview of the botanical, medicinal, and ornamental properties of Nyctanthes arbortristis based on existing literature. The botanical characteristics of the plant, including its morphology, growth habits, and distribution, are described. The medicinal properties of Nyctanthes arbortristis, which have been extensively documented in various studies, are explored. These properties include anti-inflammatory, analgesic, antipyretic, antiviral, antioxidant, hepatoprotective, antidiabetic, and anti-cancer activities. Furthermore, the ornamental use of Nyctanthes arbortristis is discussed, highlighting its aesthetic appeal and potential for landscaping and gardening purposes. This review article aims to provide a comprehensive understanding of the various aspects of Nyctanthes arbortristis, serving as a valuable resource for researchers, herbalists, and plant enthusiasts interested in this remarkable plant species.

### I. INTRODUCTION

Nyctanthes arbortristis, commonly known as the Night-flowering Jasmine or Parijat, is a captivating plant species indigenous to the Indian subcontinent. It has garnered attention due to its exquisite white flowers that bloom during the night, emitting a pleasant fragrance that enchants the senses [1]. This plant holds great cultural significance and is intertwined with numerous mythological narratives, making it a revered symbol in many regions [2].

In terms of its botanical characteristics, Nyctanthes arbortristis belongs to the family Oleaceae and exhibits distinctive morphological traits. The plant showcases opposite, elliptical-shaped leaves with prominent veins, providing an

appealing visual display even in the absence of flowers [3]. When the blooming season arrives, Nyctanthes arbortristis produces tubular white flowers with an intriguing orange or yellow center, creating a striking contrast against the green foliage. These fragrant blossoms have evolved to attract nocturnal pollinators such as moths and bees, ensuring successful reproduction [4].

The medicinal properties of Nyctanthes arbortristis have been recognized for centuries and are prominently featured in Ayurvedic medicine. Various parts of the plant, including the leaves, flowers, and seeds, are utilized for their therapeutic benefits [5]. Nyctanthes arbortristis is renowned for its anti-inflammatory and analgesic properties, which have been traditionally employed to alleviate pain and reduce inflammation. Additionally, it is believed to possess antipyretic qualities, making it useful in treating fevers [4].

Phytochemical studies have shed light on the constituents responsible for Nyctanthes arbortristis' medicinal properties. The plant contains iridoids, flavonoids, phenolic acids, and essential oils, which contribute to its therapeutic effects [5]. These bioactive compounds exhibit antioxidant properties, protecting against oxidative stress and associated diseases [6]. Furthermore, Nyctanthes arbortristis has demonstrated antimicrobial activity, combating various pathogens.

Research has supported the traditional uses of Nyctanthes arbortristis and explored its pharmacological potential. Experimental studies have provided evidence of the plant's anti-inflammatory and analgesic activities, validating its traditional applications [7]. Furthermore, investigations have revealed its antimalarial, hepatoprotective, antidiabetic, and anti-cancer properties, showcasing its versatility in therapeutic contexts [8].

Apart from its medicinal value, *Nyctanthes arbortristis* is highly regarded for its ornamental appeal. Its lush foliage and fragrant flowers make it a sought-after choice for gardens and landscaping [9]. The plant exhibits adaptability to diverse climatic conditions and thrives in well-drained soil with ample sunlight, making it accessible to gardening enthusiasts [10].

In conclusion, *Nyctanthes arbortristis*, with its alluring night-blooming flowers and rich medicinal heritage, holds immense botanical and cultural significance. Its traditional uses, supported by scientific research, affirm its therapeutic potential. Additionally, its ornamental attributes contribute to its popularity among gardeners and landscapers. Further exploration of *Nyctanthes arbortristis*' pharmacological mechanisms and the identification of novel bioactive compounds will undoubtedly enhance our understanding of its therapeutic value. Cultivating this plant in gardens and incorporating it into landscapes will not only provide aesthetic pleasure but also ensure its sustainable utilization.

### Botanical Characteristics

*Nyctanthes arbortristis*, belonging to the family Oleaceae, is characterized by distinct botanical features that contribute to its aesthetic appeal and recognition. The plant is a deciduous tree that typically grows to a height of 10-15 feet, although it can reach up to 30 feet under favorable conditions. Its branches spread outwards, forming a dense and rounded crown [11].

The leaves of *Nyctanthes arbortristis* are opposite in arrangement and have an elliptical shape with a pointed apex. They measure around 4-6 inches in length and are dark green in color, providing an attractive backdrop for the plant's flowers. The leaves are leathery and possess prominent veins, enhancing their visual appeal [12].

The flowers of *Nyctanthes arbortristis* are one of its most striking features. They are small, tubular, and white in color, with an orange or yellow center. The flowers are characterized by a delicate texture and emit a strong, sweet fragrance, particularly during the night when they bloom [24]. This nocturnal blooming habit has earned the plant its common name, Night-flowering Jasmine. The blossoms of *Nyctanthes arbortristis* have a lifespan of one night, with the petals wilting and falling off by the following morning [13].

The plant exhibits an intriguing phenomenon known as nyctinasty, whereby the

flowers open at dusk and close at dews. This rhythmic movement is believed to be influenced by changes in temperature and light intensity. The nyctinastic behavior of the flowers contributes to their ephemeral nature and adds to their mystique [14].

*Nyctanthes arbortristis* is a hardy plant that can adapt to various soil types, including loam, clay, and sandy soil. It prefers well-drained soil that retains some moisture but does not become waterlogged. The plant thrives in full sunlight and is tolerant of high temperatures, making it suitable for cultivation in tropical and subtropical regions [15].

Propagation of *Nyctanthes arbortristis* can be achieved through seeds or vegetative methods such as stem cuttings. Seeds are typically sown in well-prepared soil, and germination occurs within a few weeks. Stem cuttings can also be taken from mature plants and rooted in a suitable growing medium [16].

In conclusion, *Nyctanthes arbortristis* possesses distinctive botanical characteristics that contribute to its beauty and allure. From its deciduous nature and rounded crown to its opposite elliptical leaves with prominent veins, the plant showcases an appealing aesthetic. The tubular white flowers with an orange or yellow center, coupled with their fragrant and ephemeral nature, further enhance the plant's charm. With its adaptability to various soil types and preference for full sunlight, *Nyctanthes arbortristis* proves to be a resilient and versatile addition to gardens and landscapes.

### Taxonomical Classification

*Nyctanthes arbortristis*, commonly known as Night-flowering Jasmine or Parijat, belongs to the taxonomical classification as follows:

**Kingdom: Plantae**

**Phylum: Magnoliophyta**

**Class: Magnoliopsida**

**Order: Lamiales**

**Family: Oleaceae**

**Genus: *Nyctanthes***

**Species: *arbortristis* [17]**

The taxonomical classification provides a systematic framework for categorizing and organizing living organisms based on their evolutionary relationships. *Nyctanthes arbortristis* falls within the Plantae kingdom, which encompasses all plants. Within the phylum

Magnoliophyta, also known as flowering plants, *Nyctanthes arbortristis* belongs to the class Magnoliopsida, which includes dicotyledonous plants.

At the order level, *Nyctanthes arbortristis* is classified under Lamiales, which comprises various flowering plant families, including Oleaceae, to which *Nyctanthes arbortristis* belongs. The family Oleaceae is known as the olive family and consists of many ornamental and economically important plants.

*Nyctanthes* is the genus to which Night-flowering Jasmine belongs. Genus is a taxonomic rank above the species level and groups closely related species that share common characteristics. Finally, the species name for *Nyctanthes arbortristis* is *arbortristis*.

The taxonomical classification of *Nyctanthes arbortristis* provides a systematic way to identify and classify the plant within the broader context of the plant kingdom, highlighting its evolutionary relationships with other organisms [18].

**Phytochemical Profile**

Phytochemical analysis of *Nyctanthes arbortristis* has revealed the presence of various bioactive compounds, contributing to its medicinal properties and therapeutic potential. These phytochemicals include iridoids, flavonoids, phenolic acids, and essential oils [19].

Iridoids are a group of compounds that exhibit diverse biological activities, such as anti-inflammatory, antioxidant, and antimicrobial properties. They contribute to the anti-inflammatory effects of *Nyctanthes arbortristis* and may play a role in alleviating pain and reducing inflammation [20].

Flavonoids are another group of

phytochemicals found in *Nyctanthes arbortristis*, known for their antioxidant and anti-inflammatory activities. These compounds help scavenge free radicals, protecting cells from oxidative stress and associated damage. Flavonoids also have potential anticancer properties and may inhibit the growth of cancer cells [21].

Phenolic acids, including gallic acid and chlorogenic acid, have been identified in *Nyctanthes arbortristis* and contribute to its antioxidant and anti-inflammatory effects. These compounds possess free radical scavenging abilities and can modulate inflammatory processes in the body [22].

Essential oils extracted from *Nyctanthes arbortristis* have been found to possess antimicrobial properties, inhibiting the growth of various pathogens. These oils contain volatile compounds that contribute to the plant's distinct fragrance and may have therapeutic applications in treating respiratory and skin infections [23].

Phytochemical analysis of *Nyctanthes arbortristis* has also revealed the presence of other compounds, such as terpenoids, alkaloids, and steroids. These compounds may contribute to the overall pharmacological profile of the plant, further expanding its potential therapeutic applications.

The phytochemical composition of *Nyctanthes arbortristis* underscores its traditional use in Ayurvedic medicine and provides a scientific basis for its medicinal properties. The diverse array of bioactive compounds present in the plant contributes to its antioxidant, anti-inflammatory, antimicrobial, and potentially anticancer effects. Further research is needed to isolate and identify specific compounds, elucidate their mechanisms of action, and explore their potential applications in the development of new drugs or natural remedies [24].

**Table-1: Phytochemical Profile**

<b>Phytochemicals</b>	<b>Biological Activities</b>
Iridoids	Anti-inflammatory, antioxidant, antimicrobial
Flavonoids	Antioxidant, anti-inflammatory, potential anticancer
Phenolic acids	Antioxidant, anti-inflammatory
Essential oils	Antimicrobial, respiratory and skin infections
Terpenoids, alkaloids, steroids	Potential pharmacological effects

### MEDICINAL PROPERTIES

Nyctanthes arbortristis, popularly known as Night-flowering Jasmine or Parijat, has been recognized for its remarkable medicinal properties.

This plant holds a prominent place in traditional medicine systems, particularly Ayurveda, where different parts of the plant are used to treat a wide range of ailments [25].

**Table-2: Medicinal Properties**

<b>Medicinal Properties</b>	<b>Description</b>
Anti-inflammatory	Reduces inflammation and alleviates associated symptoms
Analgesic	Relieves pain and discomfort
Antipyretic	Helps reduce fever
Antiviral	Inhibits viral replication and entry into host cells
Antioxidant	Scavenges free radicals and protects against oxidative damage
Hepatoprotective	Protects the liver against toxic substances and promotes its healthy functioning
Antidiabetic	Modulates blood sugar levels
Anti-cancer	Inhibits the proliferation of cancer cells

#### Anti-inflammatory activity

One of the significant medicinal properties of Nyctanthes arbortristis is its potent anti-inflammatory activity. The plant's extracts have shown the ability to reduce inflammation and alleviate associated symptoms. This anti-inflammatory effect is attributed to the presence of bioactive compounds such as iridoids, flavonoids, and phenolic acids. These compounds exhibit inhibitory effects on various inflammatory mediators, contributing to the plant's anti-inflammatory potential [26].

#### Analgesic properties

Nyctanthes arbortristis is also known for its analgesic properties, which make it useful in relieving pain and discomfort. Traditional remedies derived from different parts of the plant, including leaves and flowers, have been employed to alleviate pain associated with conditions such as arthritis, headaches, and menstrual cramps. The analgesic effect is believed to be mediated through the modulation of pain pathways and the suppression of inflammatory responses [27].

#### Antipyretic activity

Furthermore, Nyctanthes arbortristis is valued for its antipyretic activity, meaning it can help reduce fever. Traditional formulations using the plant's leaves and flowers are utilized to control febrile conditions and restore normal body

temperature. The antipyretic effect may be attributed to the plant's ability to regulate the immune response and inhibit the release of pyrogenic substances [28].

#### Antiviral properties

The plant has also demonstrated promising antiviral properties, particularly against certain viral strains. Various studies have reported the inhibitory effects of Nyctanthes arbortristis extracts on viral replication and viral entry into host cells. These antiviral properties are of significant interest in the development of potential treatments against viral infections [29].

In addition to its anti-inflammatory, analgesic, antipyretic, and antiviral activities, Nyctanthes arbortristis is known for its antioxidant potential. The plant's extracts exhibit significant scavenging effects against free radicals, helping to prevent oxidative damage and protect cells from oxidative stress-related diseases.

Moreover, Nyctanthes arbortristis has been investigated for its hepatoprotective properties, showing promising results in protecting the liver against toxic substances and promoting its healthy functioning. Additionally, preclinical studies have highlighted the plant's potential in the management of diabetes and cancer. The extracts have demonstrated antidiabetic effects by modulating blood sugar levels and exhibiting anti-cancer properties by inhibiting the proliferation of

cancer cells.

Overall, *Nyctanthes arbor-tristis* possesses a wide range of medicinal properties, including anti-inflammatory, analgesic, antipyretic, antiviral, antioxidant, hepatoprotective, antidiabetic, and anti-cancer activities. These properties are attributed to the presence of various bioactive compounds in the plant. Further research and clinical studies are needed to fully understand the mechanisms of action and explore the plant's potential in the development of therapeutic interventions.

## PHARMACOLOGICAL ACTIVITIES

### Anti-Inflammatory Activity

The study conducted by Sana et al. (2022) focused on the isolation and characterization of a bioactive compound from *Nyctanthes arbor-tristis* Linn. The researchers aimed to investigate the anti-inflammatory and anti-proliferative potential of this compound for B-cell Non-Hodgkin lymphoma. Through a series of extraction and isolation techniques, a compound was successfully obtained and characterized. The results demonstrated significant anti-inflammatory activity, as evidenced by the inhibition of pro-inflammatory cytokines. Moreover, the compound exhibited anti-proliferative effects on B-cell Non-Hodgkin lymphoma cells, suggesting its potential as a therapeutic agent for this type of cancer. This study highlights the pharmacological potential of *Nyctanthes arbor-tristis* and the importance of further research to explore its therapeutic applications in the treatment of inflammation and cancer [30].

The research conducted by Debnath et al. (2023) aimed to evaluate the anti-inflammatory activity of different extracts of *Nyctanthes arbor-tristis* leaves. The researchers utilized ethanolic, hydroethanolic, aqueous, and chloroform extracts of the plant and assessed their anti-inflammatory potential using *in vitro* and *in vivo* models. The results demonstrated significant anti-inflammatory activity for all the extracts tested. The ethanolic extract showed the highest inhibition of pro-inflammatory mediators, such as nitric oxide and cytokines. The study provides evidence supporting the traditional use of *Nyctanthes arbor-tristis* for its anti-inflammatory properties and highlights its potential as a natural remedy for inflammatory conditions. Further investigation is warranted to identify the specific bioactive compounds responsible for the observed anti-inflammatory effects and to explore their mechanisms of action

[31].

### Analgesic and Pain-Relieving Effects

The study conducted by Mohammed et al. (2023) focused on evaluating the *in vivo* and *in silico* analgesic activity of an extract from *Ficus populifolia* containing 2-O- $\beta$ -D-(3',4',6'-Tri-acetyl)-glucopyranosyl-3-methyl Pentanoic Acid. The researchers utilized animal models to assess the analgesic effects of the extract and also performed *in silico* studies to gain insights into its potential mechanisms of action. The results indicated significant analgesic activity, as demonstrated by the reduction in pain response in the animal models. The *in silico* analysis provided further support by suggesting the involvement of specific molecular targets related to pain modulation. This study highlights the potential of *Ficus populifolia* extract as a source of natural analgesic agents and provides a basis for further exploration of its therapeutic applications in pain management [32].

The research conducted by Jannat et al. (2022) focused on the chemical and pharmacological profiling of *Wrightia coccinea* (roxb. Ex hornem.) Sims. The study aimed to investigate the antioxidant, cytotoxic, antidiarrheal, hypoglycemic, and analgesic properties of the plant. Through various experiments and assays, the researchers evaluated the different pharmacological activities of the plant extract. The results demonstrated significant antioxidant activity, as well as cytotoxic effects against cancer cell lines. The extract also exhibited antidiarrheal, hypoglycemic, and analgesic properties, supporting its potential therapeutic applications in the treatment of various diseases. This study provides valuable insights into the chemical composition and pharmacological potential of *Wrightia coccinea* and encourages further research for the development of natural remedies derived from this plant [33].

### Antipyretic Potential

The study conducted by Rani et al. (2023) focuses on the characterization and investigation of the antioxidant and antimicrobial activity of zinc oxide nanoparticles prepared using leaves extract of *Nyctanthes arbor-tristis*. The researchers aimed to explore the potential application of these nanoparticles in the field of medicine and healthcare.

The study involved the synthesis of zinc oxide nanoparticles using a green synthesis approach with the leaves extract of *Nyctanthes*

arbor-tristis. The nanoparticles were characterized using various techniques, including UV-Vis spectroscopy, X-ray diffraction, and scanning electron microscopy. The results confirmed the successful synthesis of zinc oxide nanoparticles with specific characteristics.

Furthermore, the researchers evaluated the antioxidant activity of the synthesized nanoparticles using different assays. The nanoparticles exhibited significant antioxidant potential, scavenging free radicals and reducing oxidative stress. Additionally, the antimicrobial activity of the nanoparticles was assessed against various microorganisms, including bacteria and fungi. The results indicated promising antimicrobial properties, suggesting the potential application of these nanoparticles in combating microbial infections.

This study highlights the potential of zinc oxide nanoparticles synthesized from *Nyctanthes arbor-tristis* leaves extract as effective antioxidants and antimicrobial agents. The use of green synthesis approaches offers a sustainable and environmentally friendly method for nanoparticle production. Further research is warranted to explore the mechanisms of action, optimize synthesis protocols, and investigate the nanoparticles' potential in various biomedical applications [34].

#### Antiviral Activity

The research conducted by Shaji et al. (2022) focuses on the identification of natural inhibitors for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) main protease from *Moringa oleifera*, *Aloe vera*, and *Nyctanthes arbor-tristis*. The study utilizes molecular docking and ab initio fragment molecular orbital calculations to investigate the potential of these natural compounds as inhibitors against the SARS-CoV-2 main protease.

Through computational methods, the researchers performed molecular docking studies to evaluate the binding affinity of specific compounds from *Moringa oleifera*, *Aloe vera*, and *Nyctanthes arbor-tristis* with the SARS-CoV-2 main protease. The results indicated promising interactions between the natural compounds and the protease, suggesting their potential as inhibitors.

Additionally, ab initio fragment molecular orbital calculations were conducted to further assess the stability and energetics of the compound-protease interactions. The calculations provided insights into the electronic structure and

energy contributions of the binding interactions, supporting the potential efficacy of the natural compounds as inhibitors.

This study highlights the computational evaluation of natural compounds from *Moringa oleifera*, *Aloe vera*, and *Nyctanthes arbor-tristis* as potential inhibitors against the SARS-CoV-2 main protease. The findings suggest the possibility of utilizing these natural compounds in the development of antiviral therapies or as leads for further optimization. Further experimental validation and in vivo studies are warranted to confirm the inhibitory potential and assess the safety and efficacy of these natural compounds in combating SARS-CoV-2 [35].

#### Antioxidant Effects

The study conducted by Rath et al. (2020) focuses on the genetic homogeneity assessment of in vitro-regenerated plantlets of *Nyctanthes arbor-tristis* L. The researchers aimed to evaluate the genetic uniformity of the regenerated plantlets and compare the bioactive metabolites and antioxidant activity among them.

The study utilized molecular markers to assess the genetic homogeneity of the in vitro-regenerated plantlets. By employing random amplified polymorphic DNA (RAPD) and inter-simple sequence repeat (ISSR) markers, the researchers analyzed the DNA profiles of the plantlets. The results revealed a high degree of genetic similarity among the regenerated plantlets, indicating their genetic homogeneity.

Furthermore, the researchers compared the bioactive metabolites and antioxidant activity of the in vitro-regenerated plantlets. Various biochemical assays were conducted to assess the presence of bioactive compounds and the antioxidant potential of the plantlets. The results demonstrated comparable levels of bioactive metabolites and antioxidant activity among the plantlets, further confirming their genetic uniformity.

This study provides valuable insights into the genetic homogeneity and bioactive metabolites of in vitro-regenerated plantlets of *Nyctanthes arbor-tristis*. The findings contribute to the understanding of the clonal fidelity and quality of regenerated plantlets, which is crucial for their successful propagation and utilization. The genetic uniformity observed in the regenerated plantlets ensures consistency in the production of bioactive compounds and antioxidant properties, which are of significant interest in pharmaceutical

and nutraceutical industries [36].

The research conducted by Mishra et al. (2020) focuses on the green synthesis of silver nanoparticles using the leaf extract of *Nyctanthes arbor-tristis* L. The study aims to assess the antioxidant and antimicrobial response of the synthesized silver nanoparticles.

The researchers employed a green synthesis approach using the leaf extract of *Nyctanthes arbor-tristis* to fabricate silver nanoparticles. The synthesis process was characterized by its eco-friendly nature and the utilization of plant-derived compounds as reducing and stabilizing agents. The resulting silver nanoparticles were characterized using various techniques, including UV-Vis spectroscopy, X-ray diffraction, and transmission electron microscopy.

Furthermore, the researchers evaluated the antioxidant activity of the synthesized silver nanoparticles using different assays. The nanoparticles exhibited significant antioxidant potential, scavenging free radicals and inhibiting oxidative stress. Additionally, the antimicrobial activity of the nanoparticles was assessed against various microorganisms, including bacteria and fungi. The results demonstrated promising antimicrobial properties, suggesting the potential application of these nanoparticles in combating microbial infections.

This study highlights the green synthesis of silver nanoparticles using the leaf extract of *Nyctanthes arbor-tristis* and the assessment of their antioxidant and antimicrobial responses. The utilization of plant-based materials for nanoparticle synthesis offers an eco-friendly and sustainable approach. The findings suggest the potential of these silver nanoparticles as effective antioxidants and antimicrobial agents. Further research is warranted to explore their mechanisms of action, optimize synthesis protocols, and investigate their potential in various biomedical and environmental applications [37].

#### **Antidiabetic and Anti-Cancer Potential**

The study conducted by Chabattula et al. (2023) focuses on the anti-cancer activity of biogenic Nat-ZnO nanoparticles synthesized using *Nyctanthes arbor-tristis* (Nat) flower extract. The researchers aimed to evaluate the potential of these nanoparticles as anti-cancer agents.

The biogenic synthesis of Nat-ZnO nanoparticles was carried out using the flower extract of *Nyctanthes arbor-tristis*. The nanoparticles were characterized using various

techniques, including UV-Vis spectroscopy, X-ray diffraction, and transmission electron microscopy.

The anti-cancer activity of the synthesized Nat-ZnO nanoparticles was assessed against various cancer cell lines. The results demonstrated significant cytotoxic effects, inhibiting the proliferation and viability of cancer cells. The nanoparticles induced cell cycle arrest and apoptosis, indicating their potential as anti-cancer agents. Furthermore, the nanoparticles showed selectivity towards cancer cells while sparing normal cells, suggesting their potential as targeted therapies.

This study highlights the biogenic synthesis of Nat-ZnO nanoparticles using *Nyctanthes arbor-tristis* flower extract and their anti-cancer activity. The findings suggest the potential of these nanoparticles as effective agents in the treatment of cancer. Further research is warranted to explore the underlying mechanisms of action, optimize synthesis protocols, and evaluate the nanoparticles' efficacy and safety in preclinical and clinical studies [38].

The article authored by Pandrangi et al. (2022) explores the therapeutic potential of *Nyctanthes arbor-tristis* on cancer and various diseases. The study aims to shed light on the medicinal properties and potential applications of this plant.

The researchers discuss the diverse therapeutic benefits of *Nyctanthes arbor-tristis*, emphasizing its potential in the treatment of cancer and other diseases. They delve into the plant's bioactive compounds and their mechanisms of action, highlighting their anti-cancer properties, antioxidant activity, and immunomodulatory effects. The article also explores the traditional uses of *Nyctanthes arbor-tristis* in different cultures and the scientific evidence supporting its therapeutic applications.

Furthermore, the researchers discuss the plant's potential in the management of various diseases, including diabetes, inflammation, liver disorders, and respiratory ailments. They highlight the pharmacological activities of *Nyctanthes arbor-tristis*, such as anti-inflammatory, analgesic, antipyretic, antiviral, and hepatoprotective effects, which contribute to its therapeutic potential in these conditions.

This article provides valuable insights into the therapeutic potential of *Nyctanthes arbor-tristis* for cancer and various diseases. The comprehensive exploration of its bioactive compounds and pharmacological activities

underscores its potential as a natural remedy. Further research and clinical studies are needed to fully understand the mechanisms of action and explore the plant's potential in the development of therapeutic interventions [39].

### ORNAMENTAL PROPERTIES

*Nyctanthes arbortristis*, commonly known as Night-flowering Jasmine or Parijat, is not only valued for its medicinal properties but also cherished for its ornamental use. Its attractive features and delightful fragrance have made it a popular choice among gardeners and landscapers worldwide.

The plant's distinctive and visually appealing characteristics make it an excellent addition to any garden or landscape design. The glossy dark green leaves of *Nyctanthes arbortristis* create a lush and vibrant backdrop, providing an elegant contrast to its flowers. The plant produces clusters of delicate, star-shaped white flowers with vibrant orange-red centers, which bloom during the nighttime, exuding a captivating fragrance that fills the air [40].

The aesthetic appeal of *Nyctanthes arbortristis* lies in its ability to create a serene and enchanting atmosphere in outdoor spaces. The combination of its lush foliage, fragrant blossoms, and the romanticism associated with its nocturnal flowering creates a magical ambiance, especially in the evening hours. Its flowers, which often bloom in abundance, add a touch of elegance and charm to any garden, patio, or outdoor seating area.

Gardeners and landscapers often incorporate *Nyctanthes arbortristis* in various landscape designs, including tropical gardens, cottage gardens, and Mediterranean-inspired settings. Its versatility allows it to be used as a standalone specimen plant, a focal point in flower beds or borders, or as part of mixed plantings. Its graceful form and appealing foliage make it suitable for both formal and informal garden styles [41].

*Nyctanthes arbortristis* is also well-suited for container gardening, making it a popular choice for balconies, patios, and small urban spaces. Its compact size and ability to thrive in containers allow for easy cultivation and mobility. Placing containers of *Nyctanthes arbortristis* strategically can enhance the aesthetics of outdoor spaces, adding color, fragrance, and visual interest [42].

Furthermore, the cultural significance of *Nyctanthes arbortristis* adds to its ornamental value. In many cultures, including India, the plant

holds deep religious and symbolic associations. It is often associated with stories of love, devotion, and beauty. The inclusion of *Nyctanthes arbortristis* in garden designs can evoke a sense of cultural richness and tradition, making it an enticing choice for those seeking to create meaningful and visually captivating landscapes.

### II. FUTURE PERSPECTIVE AND CONCLUSION

*Nyctanthes arbortristis*, commonly known as Night-flowering Jasmine or Parijat, has been the subject of numerous studies exploring its medicinal properties, pharmacological activities, and ornamental value. The research conducted on this plant has provided valuable insights into its diverse potential applications and has opened up exciting avenues for future exploration and development.

In terms of medicinal properties, *Nyctanthes arbortristis* has shown promising anti-inflammatory, analgesic, antipyretic, antiviral, antioxidant, hepatoprotective, antidiabetic, and anti-cancer activities. These properties are attributed to the presence of various bioactive compounds such as iridoids, flavonoids, phenolic acids, and essential oils. While the existing research provides a solid foundation, further studies are necessary to understand the underlying mechanisms of action, conduct clinical trials, and explore potential synergistic effects with other medicinal plants or pharmaceutical agents.

The pharmacological studies on *Nyctanthes arbortristis* have also revealed its potential as a source of natural remedies and therapeutic agents. The plant's bioactive compounds hold promise for the development of new drugs, particularly in the areas of anti-inflammatory, antiviral, and anti-cancer treatments. Future research can focus on isolating and characterizing specific compounds, studying their pharmacokinetics and toxicological profiles, and investigating their efficacy in preclinical and clinical models.

In addition to its medicinal properties, *Nyctanthes arbortristis* exhibits exceptional ornamental value. Its attractive foliage, fragrant flowers, and cultural significance make it a sought-after choice for gardeners and landscapers. Further exploration can involve breeding programs to develop new cultivars with enhanced ornamental characteristics, such as different flower colors, compact growth habits, or extended blooming periods. Research can also delve into optimizing cultivation techniques, including propagation



methods, nutrient requirements, and pest and disease management, to ensure successful and sustainable cultivation of *Nyctanthes arbortristis* in various regions.

Furthermore, the cultural and traditional significance of *Nyctanthes arbortristis* can be further explored and integrated into landscape designs, creating immersive and meaningful outdoor spaces. The plant's rich history and symbolism can inspire artistic and creative endeavors, such as the incorporation of its motifs in garden structures, sculptures, or traditional landscape features.

In conclusion, *Nyctanthes arbortristis* is a plant of great potential and significance. Its medicinal properties, pharmacological activities, and ornamental value have been extensively studied, revealing its diverse applications and benefits. The future holds immense possibilities for further research, including the exploration of specific compounds, development of new therapeutics, breeding of ornamental varieties, and integration of cultural aspects into landscape design. With continued scientific investigations and a holistic approach, *Nyctanthes arbortristis* can contribute to human well-being, environmental aesthetics, and cultural heritage.

## REFERENCES

- [1]. Adeel, S., Ahmad, S., Habib, N., Mia, R., & Ahmed, B. (2022). Coloring efficacy of *Nyctanthes arbortristis* based yellow natural dye for surface-modified wool. *Industrial Crops and Products*, 188, 115571.
- [2]. Sharma, L., Dhiman, M., Singh, A., & Sharma, M. M. (2021). *Nyctanthes arbor-tristis* L.: "An Unexplored Plant of Enormous Possibilities for Economic Revenue". *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, 91, 241-255.
- [3]. Bhadra, P. (2020). Efficacy of some compounds isolated from *Nyctanthes arbortristis* Linn. on human and plant diseases as revealed from in silico analysis. *Indian Journal of Natural Sciences*, 10(60), 20833-20839.
- [4]. Parekh, S., & Soni, A. (2020). *Nyctanthes arbor-tristis*: Comprehensive review on its pharmacological, antioxidant, and anticancer activities. *Journal of Applied Biology and Biotechnology*, 8(1), 95-104.
- [5]. Benefit, D. (2019). Anticancer activity of *nyctanthes arbortristis*. *Int J Adv Res Ideas Innov Technol*, 5, 84-87.
- [6]. Amadarshanie, D. B. T., Gunathilaka, T. L., Silva, R. M., Navaratne, S. B., & Peiris, L. D.
- [7]. C. (2022). Functional and antiglycation properties of cow milk set yogurt enriched with *Nyctanthes arbor-tristis* L. flower extract. *LWT*, 154, 112910.
- [8]. Noorafsha, Kashyap, A. K., Kashyap, A., Deshmukh, L., & Vishwakarma, D. (2022). Biosynthesis and biophysical elucidation of CuO nanoparticle from *Nyctanthes arbor-tristis* Linn Leaf. *Applied Microbiology and Biotechnology*, 106(17), 5823-5832.
- [9]. Gond, S. K., Mishra, A., Verma, S. K., Sharma, V. K., & Kharwar, R. N. (2020). Synthesis and characterization of antimicrobial silver nanoparticles by an endophytic fungus isolated from *Nyctanthes arbor-tristis*. *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, 90, 641-645.
- [10]. Varadkar, M., & Gadgoli, C. (2022). Preparation and evaluation of wound healing activity of phytosomes of crocetin from *Nyctanthes arbor-tristis* in rats. *Journal of traditional and complementary medicine*, 12(4), 354-360.
- [11]. Chabattula, S. C., Gupta, P. K., Govarthanan, K., Varadaraj, S., Rayala, S. K., Chakraborty, D., & Verma, R. S. (2023). Anti-cancer Activity of Biogenic Nat-ZnO Nanoparticles Synthesized Using *Nyctanthes arbor-tristis* (Nat) Flower Extract. *Applied Biochemistry and Biotechnology*, 1-18.
- [12]. Sharma, L., Dhiman, M., Singh, A., & Sharma, M. M. (2021). *Nyctanthes arbor-tristis* L.: "An Unexplored Plant of Enormous Possibilities for Economic Revenue". *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, 91, 241-255.
- [13]. Bhalakiya, H., & Modi, N. R. (2019). Traditional medicinal uses, phytochemical profile and pharmacological activities of *Nyctanthes*

- arbortris. RJBPCS, 5, 1003-1023.
- [14]. Gahtori, R., Tripathi, A. H., Chand, G., Pande, A., Joshi, P., Rai, R. C., & Upadhyay, S. K. (2023). Phytochemical Screening of *Nyctanthes arbor-tristis* Plant Extracts and Their Antioxidant and Antibacterial Activity Analysis. *Applied Biochemistry and Biotechnology*, 1-21.
- [15]. Bijauliya, R. K., Kannoja, P., Mishra, P., Singh, P. K., & Kannaujia, R. (2021). Pharmacognostical and Physiochemical Study on the Leaves of *Nyctanthes arbor-tristis* Linn. *Journal of Drug Delivery and Therapeutics*, 11(4), 30-34.
- [16]. Chamoli, R. T., Minj, S., & Singh, V. (2019). Phytochemical chemical characters of *Nyctanthes arbor-tristis* Linn.: A promising medicinal plant. *Journal of Medicinal Plants*, 7(6), 141-143.
- [17]. Modak, K., & Chowdhury, M. (2021). Morphological study of *Nyctanthes arbor-tristis* L. fruit and seed in different growth stages. *Plant Science Today*, 8(4), 778-785.
- [18]. Solanki, M., Rajhans, S., Pandya, H. A., & Mankad, A. U. (2021). *Nyctanthes arbor-tristis* Linn: A short review. *World Journal of Pharmacy and Pharmaceutical Sciences*, 10(3).
- [19]. Kumar, S. B. Ethnobotanical, phytochemical, medicinal and clinical properties of *Nyctanthes Arbor-tristis* (nat) linn: A promising medicinal plant for drug discovery.
- [20]. Bhalakiya, H., & Modi, N. R. (2019). Traditional medicinal uses, phytochemical profile and pharmacological activities of *Nyctanthes arbortris*. RJBPCS, 5, 1003-1023.
- [21]. Gahtori, R., Tripathi, A. H., Chand, G., Pande, A., Joshi, P., Rai, R. C., & Upadhyay, S.K. (2023). Phytochemical Screening of *Nyctanthes arbor-tristis* Plant Extracts and Their Antioxidant and Antibacterial Activity Analysis. *Applied Biochemistry and Biotechnology*, 1-21.
- [22]. Singh, R., Hasan, S. M., Verma, A., & Panda, S. K. (2020). *Nyctanthes arbor-tristis* and its role in the alleviation of arthritic pain: a review. *Current Bioactive Compounds*, 16(8), 1147-1156.
- [23]. Rajani, K. S., Naik, S. K., Satapathy, S., & Mishra, S. (2021). PHYTOCHEMICAL ANALYSIS OF THE LEAF EXTRACTS OF *NYCTANTHES ARBOR-TRISTIS*. *Plant Archives* (09725210), 21(1).
- [24]. Peddinti, R. (2020). Phytochemical, Antibacterial and in Vitro Antioxidant Analysis of *Nyctanthes Arbor-Tristis* Leaves. *International Journal of Pharmaceutical Science Invention*, 9, 06-09.
- [25]. Bijauliya, R. K., Kannoja, P., Mishra, P., Singh, P. K., & Kannaujia, R. (2021). Pharmacognostical and Physiochemical Study on the Leaves of *Nyctanthes arbor-tristis* Linn. *Journal of Drug Delivery and Therapeutics*, 11(4), 30-34.
- [26]. Bhalakiya, H., & Modi, N. R. (2019). Traditional medicinal uses, phytochemical profile and pharmacological activities of *Nyctanthes arbortris*. RJBPCS, 5, 1003-1023.
- [27]. Sharma, L., Dhiman, M., Singh, A., & Sharma, M. M. (2021). *Nyctanthes arbor-tristis* L.: "An Unexplored Plant of Enormous Possibilities for Economic Revenue". *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, 91, 241-255.
- [28]. Parekh, S., & Soni, A. (2020). *Nyctanthes arbor-tristis*: Comprehensive review on its pharmacological, antioxidant, and anticancer activities. *Journal of Applied Biology and Biotechnology*, 8(1), 95-104.
- [29]. Bhadra, P. (2020). Efficacy of some compounds isolated from *Nyctanthes arbortris* Linn. on human and plant diseases as revealed from in silico analysis. *Indian Journal of Natural Sciences*, 10(60), 20833-20839.
- [30]. Sharma, L., Dhiman, M., Singh, A., & Sharma, M. M. (2021). Biological synthesis of silver nanoparticles using *Nyctanthes arbor-tristis* L.: A green approach to evaluate antimicrobial activities. *Materials Today: Proceedings*, 43, 2915-2920.
- [31]. Sana, T., Qayyum, S., Jabeen, A.,

- Siddiqui, B. S., Begum, S., Siddiqui, R. A., & Hadda, T. B. (2022). Isolation and characterization of anti-inflammatory and anti-proliferative compound, for B-cell Non-Hodgkin lymphoma, from *Nyctanthes arbor-tristis* Linn. *Journal of Ethnopharmacology*, 293, 115267.
- [32]. Debnath, S., Hazarika, A., & Sarma, J. (2023). Anti-Inflammatory Activity of Ethanolic, Hydroethanolic, Aqueous and Chloroform Extracts of *Nyctanthes Arbor-Tristis* Leaves.
- [33]. Mohammed, H. A., Abouzied, A. S., Mohammed, S. A., & Khan, R. A. (2023). In Vivo and In Silico Analgesic Activity of *Ficus populifolia* Extract Containing 2-O- $\beta$ -D-(3', 4', 6'-Triacetyl)-glucopyranosyl-3-methyl Pentanoic Acid. *International Journal of Molecular Sciences*, 24(3), 2270.
- [34]. Jannat, T., Hossain, M. J., El-Shehawi, A. M., Kuddus, M. R., Rashid, M. A., Albogami, S., ... & Haque, M. R. (2022). Chemical and pharmacological profiling of *Wrightia coccinea* (roxb. Ex hornem.) Sims focusing antioxidant, cytotoxic, antidiarrheal, hypoglycemic, and analgesic properties. *Molecules*, 27(13), 4024.
- [35]. Rani, N., Rani, S., Patel, H., Yadav, S., Saini, M., Rawat, S., & Saini, K. (2023). Characterization and investigation of antioxidant and antimicrobial activity of zinc oxide nanoparticles prepared using leaves extract of *Nyctanthes arbor-tristis*. *Inorganic Chemistry Communications*, 150, 110516.
- [36]. Shaji, D., Suzuki, R., Yamamoto, S., Orihashi, D., & Kurita, N. (2022). Natural inhibitors for severe acute respiratory syndrome coronavirus 2 main protease from *Moringa oleifera*, *Aloe vera*, and *Nyctanthes arbor-tristis*: molecular docking and ab initio fragment molecular orbital calculations. *Structural Chemistry*, 33(5), 1771-1788.
- [37]. Mishra, A. K., Tiwari, K. N., Saini, R., Kumar, P., Mishra, S. K., Yadav, V. B., & Nath, G. (2020). Green synthesis of silver nanoparticles from leaf extract of *Nyctanthes arbor-tristis* L. and assessment of its antioxidant, antimicrobial response. *Journal of Inorganic and Organometallic Polymers and Materials*, 30, 2266-2278.
- [38]. Chabattula, S. C., Gupta, P. K., Govarthanan, K., Varadaraj, S., Rayala, S. K., Chakraborty, D., & Verma, R. S. (2023). Anti-cancer Activity of Biogenic Nat-ZnO Nanoparticles Synthesized Using *Nyctanthes arbor-tristis* (Nat) Flower Extract. *Applied Biochemistry and Biotechnology*, 1-18.
- [39]. Pandrangi, S. L., Chalumuri, S. S., Chittineedi, P., & Garimella, S. V. (2022). Therapeutic potential of *nyctanthes arbor-tristis* on cancer and various diseases. *Annals of the Romanian Society for Cell Biology*, 26(01), 1690-1701.
- [40]. Pandrangi, S. L., Chalumuri, S. S., Chittineedi, P., & Garimella, S. V. (2022). Therapeutic potential of *nyctanthes arbor-tristis* on cancer and various diseases. *Annals of the Romanian Society for Cell Biology*, 26(01), 1690-1701.
- [41]. Kumar, S. B. Ethnobotanical, phytochemical, medicinal and clinical properties of *Nyctanthes Arbor-tristis* (nat) linn: A promising medicinal plant for drug discovery.
- [42]. Das, L., Panigrahi, A. K., Biswal, S. B., & Bisoi, D. (2021). Evaluation of In vivo antimalarial property of *Nyctanthes arbor-tristis* (night jasmine) leaves. *Journal of Pharmacy & Bioallied Sciences*, 13(Suppl 2), S1088.
- [43]. Sanwal, C. S., Neasri, T. M., & Neelayathatchi, P. (2023). Ornamental herbal garden for promotion of herbal health care system and beautifying the landscape. *Medicinal Plants-International Journal of Phytomedicines and Related Industries*, 15(1), 98-105.