

Nyctanthesarbor-tristis: An Important Vulnerable Medicinal Plant

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Abstract

Nyctanthesarbor-tristis is a small ornamental tree with fragrant white flowers. Crude extracts of different parts of this plant have been used as a traditional medicine for the treatment of various diseases. Due to the presence of various secondary metabolites like nycnanthic acid, mannitol, flavonoids, alkaloids, ascorbic acid etc. in various parts of the plant, it shows antihistaminic, anaesthetic, analgesic, anti-inflammatory, antibacterial, hepato-protective, antioxidant, amoebocidal, antifungal, antiviral and immunomodulatory properties. Due to unrestricted large-scale exploitation of the natural resources, coupled with limited cultivation and insufficient attempts for its replenishment, the natural stock of this species has been markedly depleted. In vitro culture is an alternative method for conservation and propagation of this species. Hence this report aims to develop an efficient protocol for the micropropagation of Nyctanthesarbor-tristis.

Keywords: *Nyctanthesarbor-tristis*, *Nycnanthic acid*, *Mannitol*, *Flavonoids*, *Alkaloids*, *Immunomodulatory*, *Micropropagation*

1. Introduction

The paper must be divided into various sections This planet's spectacular web of life provides countless assets to humanity. One of them, bestowed by nature is the Medicinal plants. These plant species have received increased scientific and commercial attention in recent years. But due to overexploitation and bioprospecting for new resources, these species are destructing at an alarming rate.

Nyctanthesarbor-tristis is one of the very important medicinal plant that has many antimicrobial, anti-inflammatory, analgesic, anaesthetic and immunomodulatory properties.

Taxonomic classification of the proposed plant

Botanical Name(s): <i>Nyctanthesarbor-tristis</i>
Family Name: Oleaceae
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Lamiales
Family: Oleaceae
Genus: <i>Nyctanthes</i>
Species: <i>arbor-tristis</i>

Oleaceae, the olive family, belonging to the order Lamiales, is named for the economically important olive tree. A number of plants in the family are of economic or aesthetic importance. Most members are trees or shrubs, but a minority, such as most jasmines, are woody climbers. It produces the most delightful fragrant flowers from September to November. It is also the Official flower of the state West-Bengal, India.

The shrub is known as "Tree of Sorrow" due to a folk tale being associated with it. The shrub blooms after sunset and the flowers drop each morning before sunrise.

Common name: Coral Jasmine, Night Jasmine, Harsinghar, Tree of Sorrow

Regional name: Marathi-Parijat, Gujarati-Parijat, Hindi-Harsinghar, Malayalam-Parijatukam, Telugu-Parjatamu, Bengali-Sephalika, Harsinghar, Seuli, Tamil-Manjatpu Pavelam

Distribution- It flourishes well in dry hillslides and deciduous forest. It is native to southern Asia, it grows at sea level upto 1500 m altitude within a wide

range of rainfall patterns and seasons. In India it grows in Himalayas, Jammu and Kashmir, East Assam, West Bengal, Tripura and Godavari.

Morphology- *Nyctanthesarbor-tristis* is a large shrub growing 7-10 metres tall. The leaves are rough and hairy, flowers are arranged in clusters at the tips of branches or in the axils of the leaves. The flowers are fragrant, sessile, having bell shaped calyx and white corolla with an orange centre. Fruits are brown and heart shaped



Climatic Factors- The plant well flourishes in loamy soils and semi-shady areas, requiring the pH 5.6-7.5.

Flowering season- September-October

Botanical Synonyms- *Bruschiamacrocarpa* Bertol, *NyctanthesDentata* Blume, *Nyctanthesristis* Salisb, *Pariliumarbor-tristis* (L.), *Scabritascabra* (L.), *Scabritatriflora* (L.)

Uses-

1.Antimicrobial Activity- The plant possess antimicrobial activity mainly in the leaves, seeds and barks. Crude petroleum ether extract of the leaves of *Nyctanthesarbor-tristis* showed more pronounced antimicrobial activity as compared to ethanol, methanol. The petroleum ether leaves extract exhibited highest zone of inhibition against *P.aeruginosa* and *R.stolonifer*¹. The acetone extract of the leaf was more effective than the aqueous extract and the zone of inhibition obtained against many human pathogens. The most susceptible microbe was *Vibrio cholera*². The bark was analysed for antimicrobial activity *in vitro* against *Staphylococcus aureus*, *Bacillus subtilis*, and *Aspergillus niger*³. Inhibitory effect is possessed by the ethanolic extract against EMCV and SFV^{4,5}.

2.Anti-Inflammatory Activity- The extracts of the *Nyctanthesarbor-tristis* contains significant amount of flavonoids which played a good evaluator parameter in reduction of the inflammation and thus reducing leg gait⁶. The water soluble fraction of the

ethanol extract significantly reduced acute inflammation in the knee joint of rats induced by the turpentine oil present in the flowers⁷.

3.Anti-oxidant Activity- The extracts of leaves and stems revealed abundant presence of flavonoids, alkaloids, glycosides and phenolic compounds. Phytochemical screening suggests that the plant *Nyctanthesarbor-tristis* contains carbohydrates, alkaloids, flavonoids and cardiac glycosides. It does not have steroids, saponins and tannins⁸.

4. Immunomodulatory Activity- The ethanolic extracts found in the seeds, leaves and flowers enumerated the immuno-stimulant activity. Maximum activity was found in seeds, the mechanism of action associated with the lipids. High activity was found in aqueous fraction of 50% ethanolic extracts produced from flowers and leaves⁹. The aqueous ethanolic extract of root and seed revealed the immunostimulant properties against candidiasis in mice¹⁰.

5.Hepatoprotective Activity- The aqueous extract of leaves and seeds revealed to have protective functioning against carbon tetrachloride induced toxicity¹¹. Regeneration of the hepatocytes by the aqueous and alcoholic extract of the leaves, hepatoprotective activity shown by reducing the elevated levels of certain biochemical¹².

6.Anti-Histaminic Activity- The water soluble portion of the alcoholic extract of the leaves of *Nyctanthesarbor-tristis* was screened for hypnotic, tranquilizing, local anaesthetic, purgative and antihistaminic activities. The extract exhibited depression of motor activities and significantly increased sleeping time¹³. The alcoholic soluble extract of the leaves diagnosed the presence of certain chemicals like arbortristoid A and C which greatly reduced aerosol induced asphyxia¹⁴.

7. Anti- Leshmanial Activity- The iridoid glucosides and arbortristoid A,B,C found in leaves and seeds respectively has shown profound effect against *Leshmania* both *in vivo* and *in vitro* condition^{15,16}.

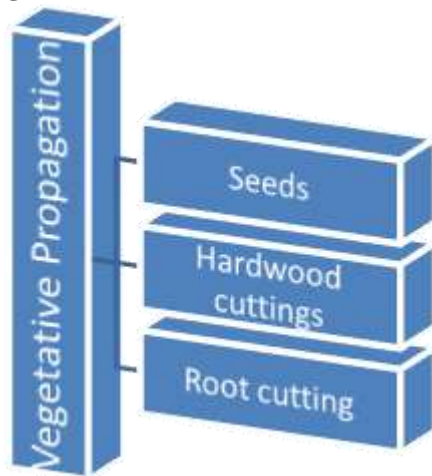
8. Antipyretic Activity- The water soluble extract of the leaves exhibited antipyretic effect against brewer's yeast induced pyrexia¹⁷.

9.Analgesic Activity- The water soluble extract of the leaves exhibited aspirin like antinociceptive activity but has not revealed morphine like analgesia¹⁷.

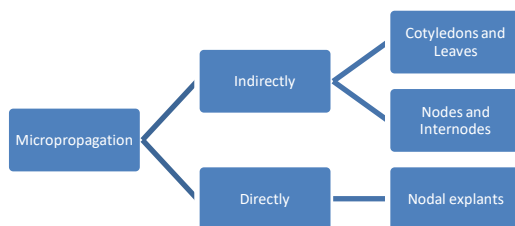
10. Antifilarial and Antiplasmodial Activity-The chloroform extract of white coloured flowers revealed larvicidal activity against *Culex* mosquito which is the vector of filariasis disease¹⁸. The ethanolic flower extract of this plant exhibited antiplasmodial activity against *P. falciparum*¹⁹.

11. Sedative Activity- Sedative potential of flowers was examined in rats. Male rats exhibited dose - dependent conscious while the female rats remain unaffected²⁰.

Propagational Studies-



Above referred methods are not reliable because of the low, rather poor germination and death of many young plantlets in the early stages of development. So Plant Tissue Culture provides an alternative approach for raising the plantlets.



Various works have been done in the field of micropropagation and still some corners are untouched which need to be exploited. Here is the brief description of some researchers who made an effort for giving their contribution in the same-

1. Axillary meristem on MS media supplemented with benzyl adenine (BA), adenine sulphate (Ads), indole acetic acid (IAA) and sucrose

exhibited excellent shoot multiplication. Maximum percentage of rooting was observed on medium having IAA, IBA and sucrose. Shoot and root multiplication was dependent on the nutrient media and the culture conditions²¹.

2. Cotyledonary explants (explants obtained from the mature green seeds) gave maximum percentage of callus induction on medium enriched with 2,4-D and on GA₃ alone as well as media supplemented with combination of 2,4-D & Kinetin. In internodal and nodal explants 2,4-D and kinetin has been found good for callus induction²².
3. The cotyledonary node explants excised from 15 days old aseptic seedling revealed maximum induction of shoots on media supplemented with thiadiazuron, and benzyladenine. Further shoot multiplication was enhanced by combining benzyladenine with naphthalene acetic acid²³.

Conclusion & future prospects

Nyctanthes arbor-tristis is a high value plant both ethically and scientifically. It has immense medicinal properties bestowed by nature. It has a wide variety of secondary metabolites which serve as anti-oxidants, anti-inflammatory, anti-leishmanial, anti-filarial, anti-arthritic, hepato-protective etc. But due to its over-exploitation and limited knowledge, the natural stock of this species is declining day-by-day. So the need of an hour is to conserve our biodiversity and significantly those varieties which serve fruitful to mankind.

Seeing the alarming and threatening situation of the plant *Nyctanthes arbor-tristis*, the need of an hour is to look for an alternative method for the conservation of *Nyctanthes arbor-tristis* through biotechnological approaches like tissue culture techniques.

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