



# Plant Archives

Journal home page: [www.plantarchives.org](http://www.plantarchives.org)

DOI Url: <https://doi.org/10.51470/PLANTARCHIVES.2021.v21.no1.261>

## PHYTOCHEMICAL ANALYSIS OF THE LEAF EXTRACTS OF *NYCTANTHES ARBOR-TRISTIS*

Rajani KS<sup>1\*</sup>, Swasha Khandeparker Naik<sup>2</sup>, Subhadarshini Satapathy<sup>2</sup> and Sweta Mishra<sup>2</sup>

<sup>1</sup>Department of Biotechnology, Gulbarga University, Karnataka, India.

<sup>2</sup>Biodiversity and Conservation Lab, Ambika Prasad Research Foundation, Odisha, India.

\*E-mail: [rajaniksbt@gmail.com](mailto:rajaniksbt@gmail.com)

(Date of Receiving-25-12-2020; Date of Acceptance-21-03-2021)

### ABSTRACT

The present study highlights preliminary phytochemical analysis of the leaf extract of *Nyctanthes arbor-tristis*. Plants produce a wide range of bioactive molecules which make them as a rich source of various types of medicines. *Nyctanthes arbor-tristis* is one of the well-known medicinal herbs of Indian origin belonging to family Oleaceae, commonly known as night Jasmine. The leaf extract is taken by percolation method. Various bioactive primary and secondary metabolites were tested using colour reactions with specific reagents. The study reveals that it contains some bioactive compounds which indicate that this plant might be used as anti-malarial, anti-viral and antidiabetic.

**Keywords:** Phytochemical analysis, *Nyctanthes arbor-tristis*, percolation, leaf extract

### INTRODUCTION

*Nyctanthes arbor-tristis*, a medicinal plant belongs to family Oleaceae and commonly known as Night Jasmin (Vats *et al.*, 2009; Meshram *et al.*, 2012). It is a small tree with a grey or greenish, rough and peeling bark, growing up to 10 m in height. Leaves are opposite with an entire edging about 6 to 12 cm long and 2 to 6.5 cm wide. Flower has 5-8 lobed corolla and orange red centre. Petals are snowy white in colour. It has brown heart shaped to round capsule fruit about 2 cm in diameter having two sections and each section have a single seed (Bhalakiya and Modi, 2019; Saxena and Brahmam, 1995; Haines, 1924). It requires loamy soil with pH 5.6-7.5. It is a woody perennial having life span 5-20 years (Kiew and Baas, 1984). The plant has some traditional as well as medicinal values. The orange-white corolla is used for colouring the cloth and cotton. The whole flower is used to colour the orange robes of the Buddhist priest (Venkataraman *et al.*, 2019). Over 50% of all modern clinical drugs are of natural product origin and natural product play a vital role in modern drugs development in the pharmaceutical industry (Baker *et al.*, 1995). This plant also has some phytochemicals like flavanols, glycosides, D-mannitol, nicotiflorin etc. (Bordoloi & Lahkar, 2018). The whole plant exhibits pharmacological effects and the leaves show anti-fungal, anti-inflammatory and antibacterial effects (Gulsan *et al.*, 2015).

### MATERIALS AND METHODS

#### Preparation of leaf extract

The plant was collected from Bhubaneswar, Odisha. Around 25g of *Nyctanthes arbor-tristis* leaves were soaked overnight for 24 hours in 3 solvents (Aqueous,

methanol-aqueous and acetone-aqueous solvents). The solvents dissolve the active biomolecules. The leaves remain as precipitate and the active biomolecules were present in the solvent. The respective supernatants were taken and the following phytochemical assays were conducted to test the presence of secondary metabolites.

#### Phytochemical assays

Phytochemical analysis was carried out on different extract of the whole plant using standard procedure to identify the bioactive compounds (Harborne, 1973; Trease and Tiwari *et al.*, 2011).

#### Test for Tannin

5ml of plant extract was added with 5 drops of 10% lead acetate. Formation of a light-yellow precipitate indicates the presence of tannin.

#### Test for Saponin

1ml of the extract was boiled in 10ml of distilled water and filtered with Whatman filter paper. 5ml of filtrate was mixed with 2 ml of normal distilled water and shaken vigorously. Occurrence of stable persistent froth indicates the presence of saponins.

#### Test for Flavonoids

To 1 ml of the extract, few drops of dilute sodium hydroxide were added. Presence of flavonoids is indicated upon production of an intense yellow colour in the plant extract which became colourless on addition of 2-3 drops of 50% dilute acid.

### Test for Terpenoid

0.5 gm of plant extract was mixed with 2 ml of chloroform and equal volume of concentrated sulphuric acid was added. Terpenoids presence is confirmed by a reddish-brown colouration of interface.

### Test for Phenolic compounds

2 ml of plant extract was added with 5 drops of 1% ferric chloride and 1 ml of potassium ferro cyanide, a bluish-green solution showed the presence of phenolic compound.

### Test for Reducing sugar

0.5 g of plant extract was dissolved with distilled water and filtered. The filtrate was boiled with 2 drops of Fehling's solution A and B for 5 minutes. An orange-red precipitate obtained indicates the presence of reducing sugar.

### Test for Steroid

2 ml of plant extract was dissolved in 5 ml chloroform and then 5 ml of concentrated sulphuric acid was added. Formation of 2 phases (upper red and lower yellow with green fluorescence) indicates the presence of steroid.

### Test for Alkaloids

5ml of plant extract was mixed with 3 ml of aqueous HCl on water bath and then filtered. 1 ml of Dragendorff's reagent was added in the filtrate. The occurrence of orange-red precipitate indicates the presence of alkaloids in the sample extract.

### Test for Carbonyl

2 ml of plant extract was added with 2 drops of 2, 4-dinitrophenyl hydrazine solution and thoroughly shaken, yellow crystal formation indicates presence of carbonyl compound.

## RESULTS AND DISCUSSION

Phytochemical assays were done and the result reveals that saponin, tannin, flavonoids, phenolic compounds, reducing sugar and carbonyl were present in aqueous solution. In methanolic aqueous, saponin, tannin, terpenoids and phenolic compounds were present and in acetone aqueous, tannin, flavonoids, phenolic compound and reducing sugar were present (Table2) (Figure 1). Also, the literature studies were done (Table3). Hassan *et al.*, in (2016) found that Flavonoids, Phenolic Compounds and Saponin were present which reveals that it can be act as antioxidant activity and Cough. Sah *et al.*, (2012) reveals that due to presence of terpenoids in methanolic aqueous indicates it might use against viral fever. Gothai *et al.*, in

(2016) found Saponin, Flavonoids and Reducing Sugar which indicates it might be used as antidiabetic activity. Zhu *et al.*, in (2014), and found Terpenoids which reveal the antimalarial activity. Due to presence of such bioactive compounds, it reveals the said medicinal properties. Literature study also done on the medicinal uses and the study reveals that tribal people of Odisha and Jharkhand used *Nyctanthes arbor-tristis* in the treatment of Pain full conditions, act as anti-helminthic, to cure sciatica and arthritis also act as anti- spermatogenic etc. (Table1).

**Table 1:** Medicinal values of *Nyctanthes arbor-tristis*

Location	Uses
Odisha	The leaf extract is consumed against malaria.
Odisha	The decoction of leaf is used against severe cough
Jharkhand	The leaf infusion is taken 3 times a day to cure viral fever
Odisha	The leaf paste with flowers is used to make pills. 2-3 pills are taken against diabetes and respiratory problems.

**Table 2:** Phyto-constituents present in leaf of *Nyctanthes arbor-tristis*

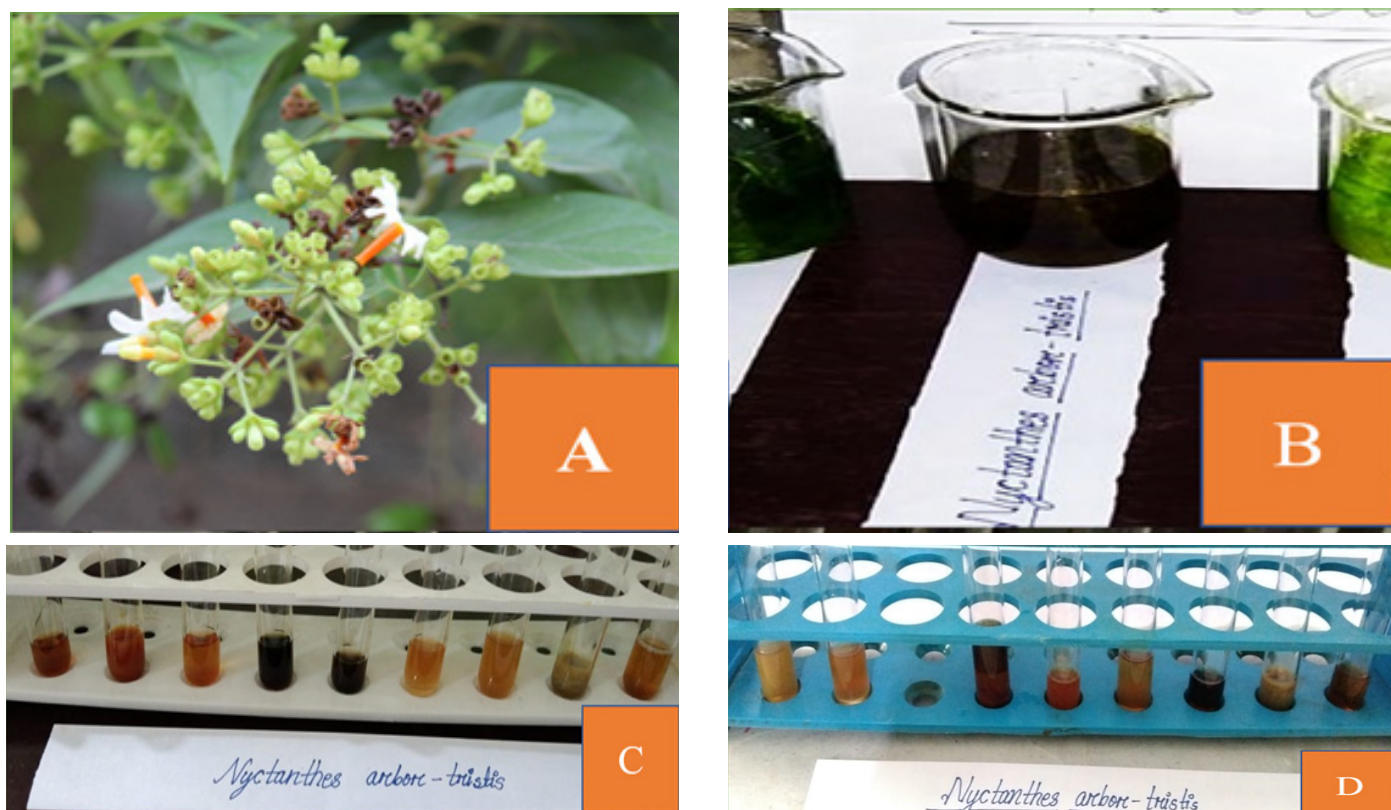
Serial Number	Solvent	Bioactive compounds detected
1	Aqueous	Saponin, Tannin, Flavonoids, Phenolic compound, Reducing sugar and Carbonyl.
2	Methanolic aqueous	Saponin, Tannin, Terpenoids and Phenolic compound.
3	Acetone-aqueous	Tannin, Flavonoids, Phenolic compound and Reducing sugar.

## CONCLUSION

The present study was done on the Phytochemical assay (Leaf extract of *Nyctanthes arbor-tristis*) and reveals that some bioactive compounds like flavonoids, terpenoids, phenolic compounds, tannin, saponin and reducing sugars for which it might be used as medicine and act as anti-diabetics, antiviral, anti-malarial etc. The literature study reveals the uses of the plant in Odisha and Jharkhand. As it has medicinal values, hence, more study needs to do to know more about its Medicinal properties and other uses.

## ACKNOWLEDGEMENT

We would like to thank Ambika Prasad Research foundation for giving us this opportunity to work with them and providing us with all the necessities. We would also like to thank Dr M. K. Janarthanam (Goa University) and Prof Ramesh Londonkar (Department of Biotechnology, Gulbarga University) for enabling us to explore this area of phytochemistry.



**Figure 1:** A) Plant of *Nyctanthes arbor-tristis*; B) Leaf extracts; C) Methanol-aqueous solvent; D) Acetone-aqueous solvent.

**Table 3:** Supporting literature on correlation of bioactive compounds detected in Phyto-chemical testing along with medicinal uses

Medicinal use	Correlation with bioactive compounds	Supporting literature
Antioxidant activity and against cough	Flavonoids, Phenolic compound, saponin were found in all solvents of leaf extract of the tested plant species which indicates that it might be used as antioxidant activity.	Hassan <i>et al.</i> , (2016)
Viral fever	Terpenoids is present in methanolic aqueous which indicates that the tested plant might be used against viral fever.	Sah <i>et al.</i> , (2012)
Antidiabetic activity	Presence of Saponin, Flavonoids and Reducing Sugar indicates that the tested plant species might be act as antidiabetics.	Gothai <i>et al.</i> , (2016).
Antimalarial activity	Terpenoids is present in acetone aqueous extract so it might be responsible for anti-malarial activity of this plant species.	Zhu Y <i>et al.</i> , (2014)

### REFERENCES

Bhalakiya, H. and Modi, N.R. (2019). Traditional Medicinal uses of *Nyctanthes arbor-tristis*. *Research Journal of Life Science, Bioinformatics, Pharmaceutical and Chemical Sciences*, 5(2): 1003-1023, DOI:10.26479/2019.0502.76.

Bordoloi, P.; Devi, T. and Lahkar, M. (2018). Evaluation of anti-inflammatory and anti-arthritic activity of ethanolic extract of leaves of *Nyctanthes arbor-tristis* an experimental animal mode. *Journal of Evolution Medicinal and Dental Sciences*, 7(10):1247-1251.

Gothai, S.; Ganesan. P.; Park, S.Y.; Fukurazi, S.; Choi, D.K.; and Arulselvan, P. (2016). Natural Phyto-Bioactive compounds for the Treatment of Type-2 Diabetics: Inflammation as target. *Nutrients*, 8(8):461.

Gulsan, B.; Suri, K.A. and Parul, G. (2018). A comprehensive review on *Nyctanthes arbor-tristis*. *International Journal of Drug Development and Research*, 7(1): 183-193.

Hains, H.H. (1924). *The Botany of Bihar and Orissa*. Adlard and Sons & West Newman, Ltd. London.

Harborne, J.B. (1998). "Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis." 2nd Edition, Chapman and Hall Publishers, London.

Hassan, L.E.A.; Dahham, S.S.; Saghir, S.A.M.; Mohammed, A.M.A.; Eltayeb, N.M.; Majis, A.M.S.A. and Majid, A.S.A. (2016). Chemotherapeutic potentials of the stem bark of *Balanites aegyptiaca* (L.) Delile: An antiangiogenic, antitumor and antioxidant agent. *BMC Complementary and Alternative Medicine*, 16(1): 396. DOI 10.1186/s12906-016-1369-5.

- Kiew, R. and Baas, P. (1984). *Nyctanthes* member of Oleaceae. *Proceeding Indian Academic Science*, 3:349-58.
- Meshram, M.M.; Rangari, S.B.; Kshirsagar, S.B.; Gajbhiye, S.; Trivedi, M.R. and Sahane, R.S. (2012). *Nyctanthes arbor-tristis*- A herbal Panacea. *International Journal of Pharmaceutical Sciences and Research*, 3(8): 2432-40.
- Sah, A.K.; and Verma, V.K. (2012). Phytochemicals and Pharmacological potential of *Nyctanthes arbor-tristis*: A Comparative Review. *International Journal of Research in Pharmaceutical and Biomedical Science*, 3(1): 420-427.
- Saxena, H.O. and Bramham, M. (1995). The Flora of Orissa, Orissa Forest Development Corporation Ltd & Regional Research laboratory.
- Trease, G.E. and Evans, W.C. (1989). Pharmacognosy WB Scanders Company Ltd. London, 89-300.
- Vats, M.; Sharma, N. and Sardana, S. (2009). Antimicrobial activity of stem bark extracts of *Nyctanthes arbor-tristis* Linn. (Oleaceae). Inter *Nyctanthes arbor-tristis*. *Journal of Pharmacognosy and Phytochemical Research*, 1: 12-14.
- Venkataraman, S.; Harinya, S.; Chidiuto, D.V. and Raja, R.R. (2019). Phytochemical constituents and Pharmacological activities of *Nyctanthes arbor-tristis*. *Research Journal of Pharmacy and Technology*, 12(10): 4639-4643.
- Zhu, Y.; Pu, B.Q.; Xie, G.Y.; Tian, M.; Chen, Y.J and Qin, M.J. (2014). Dynamic Changes of Flavonoids Contents in the Different Parts of Rhizome of *Belamcanda chinensis* During Thermal Drying Process. *Molecules*, 19 (7):10440-10454.