

## Pharmacognostic Evaluation and Metal Analysis on the Leaf of *Nyctenthus arbortristis* Linn.

\*G. Prabhakar<sup>1</sup>, K. Shailaja<sup>2</sup>

<sup>1</sup>Plant Physiology and Bio chemistry Laboratory, Dept of Botany, Osmania University, Hyderabad.

<sup>2</sup>University College for Women, Dept of Botany, Osmania University, Koti, Hyderabad.

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### ABSTRACT

*Nyctenthus arbortristis* Linn is a small tree, commonly known as 'Nyctenthus' and 'Night Jasmine' in English, belonging to the family Oleaceae. The leaves are simple, opposite, ovate, acute or acuminate, densely pubescent on both sides. The leaf is hypostomatic, with tetracytic, monocytic and anisocytic stomata. In surface view the epidermal cells contain dense calcium carbonate crystals. Trichomes are two types viz., unicellular conical and uniseriate conical hairs on adaxial and abaxial side. In Transverse Section (T.S.) the midvein is slightly grooved adaxially, prominently ribbed abaxially. Epidermis is 1-layered with larger cells on adaxial. Lamina differentiated into palisade and spongy tissue. Vascular tissue of midvein consists of a large crescent shaped vascular bundle at the centre. Quantitative analysis of metals studies were carried by Scanning electron microscope – Energy dispersive Spectroscopy.

**Key words:** *Nyctenthus arbortristis* Linn., Pubescence, Pharmacognosy, Metal analysis.

### INTRODUCTION

*Nyctenthus arbortristis* Linn., commonly called as 'Nyctenthus' and 'Night Jasmine' in English belonging to the family Oleaceae. *Nyctenthus* means flowering and *arbortristis* means as it loses its brightness in during day time<sup>[1]</sup>. A Small tree it is a native of India occurring wild in the sub – Himalayan region, from Chenab to Nepal and Southwards to Godavari<sup>[9]</sup>. It is cultivated in gardens almost throughout India<sup>[2]</sup>. It is rough all over with stiff whitish hairs; leaves opposite, ovate, acute or acuminate, densely pubescent on both sides, base rounded or slightly cuneate, flowers small, sessile, slender hairy, corolla glabrous, orange coloured and lobes are white, fruits are capsules of 1-2 mm in diameter<sup>[3]</sup>. Leaves contain an alkaloidal principle named nyctenthine; they also contain an astringent principle, a resinous substance, colouring matter sugar and a trace of an oily substance. It is given with honey in chronic and bilious fevers. A decoction of the leaves, prepared over a gentle fire, is recommended as a specific for obstinate sciatica. Some preparation of Iron is also given along with it<sup>[4]</sup>. Leaves are responsible for some CNS activities like hypnotic, tranquilizing and local anesthetics and anti asthmatic activity. - sitosterol isolated from *Nyctenthus arbortristis* leaves showed analgesic and anti-inflammatory activity. It has heavy metal / chemical elements like Chromium (Cr), copper (Cu), Iron (Fe), Magnesium, and Zinc (Zn) have been studied<sup>[5]</sup>. Hence the objective of present study is to evaluate various Pharmacognostic parameters such as macroscopy, microscopy and quantitative analysis of the plant leaves.

### MATERIALS AND METHODS

*Nyctenthus arbortristis* Linn., was collected from Harithavanam garden beside Osmania University and deposited in Herbarium Hyderabadense, Dept of Botany, Osmania University. The leaves of *Nyctenthus* were boiled and fixed in F.A.A. (Formaldehyde: Acetic acid: Alcohol) and processed for microtomy (Paraffin Method) and sectioned, stained of slides prepared following by Johnson method<sup>[6]</sup>. The epidermal peels were obtained by scraping with razor blade and acid treatment. Powder microscopy characters were studied by boiling the powder drug in distilled water, stained in Safranin and mounted with glycerin. Beside the concentration of metal ions in the leaf powder were carried out by SEM (JEISS – VO18) – EDS (Oxford Instrument)

### OBSERVATIONS AND RESULTS

**Macroscopy:** Leaves are opposite, ovate, acute or acuminate, entire, rough and scabrous, short bulbous hairs rounded, densely pubescent beneath with appressed hairs and with large distant teeth, base rounded, petiole long hairy<sup>[3]</sup>.

**Microscopy:**

Table 1: Concentration of metal in plant leaves (in %)

S. No.	Metal	Percentage (%)
1.	Ca	11.60
2.	Mg	0.36
3.	Zn	0.10
4.	Cr	0.08
5.	Fe	0.06



Fig. 1: A. Adaxial epidermis in surface X 490, B. Abaxial epidermis in surface X 525, C Abaxial epidermis with stomata X 540

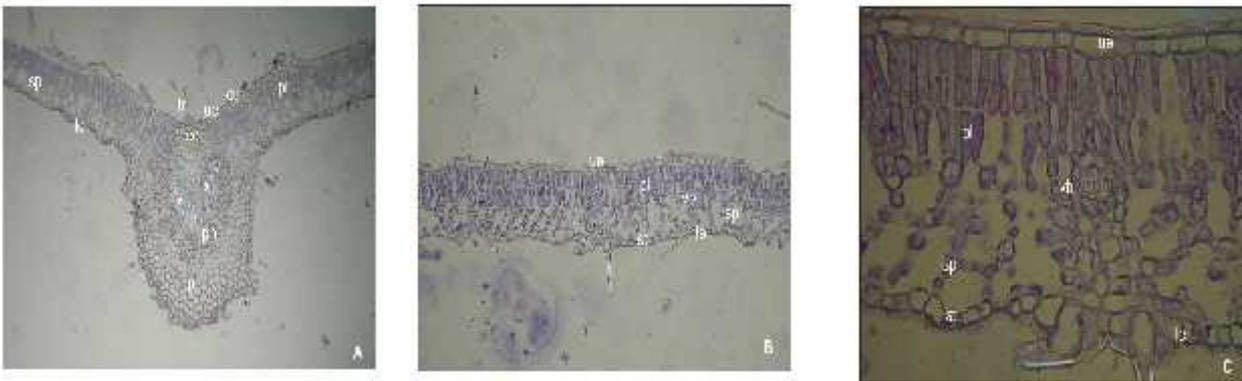


Fig. 2: A. T.S. of leaf at midvein X 55, B. T.S. of leaf lamina X 210, C. T.S. of leaf lamina (enlarged) X 350

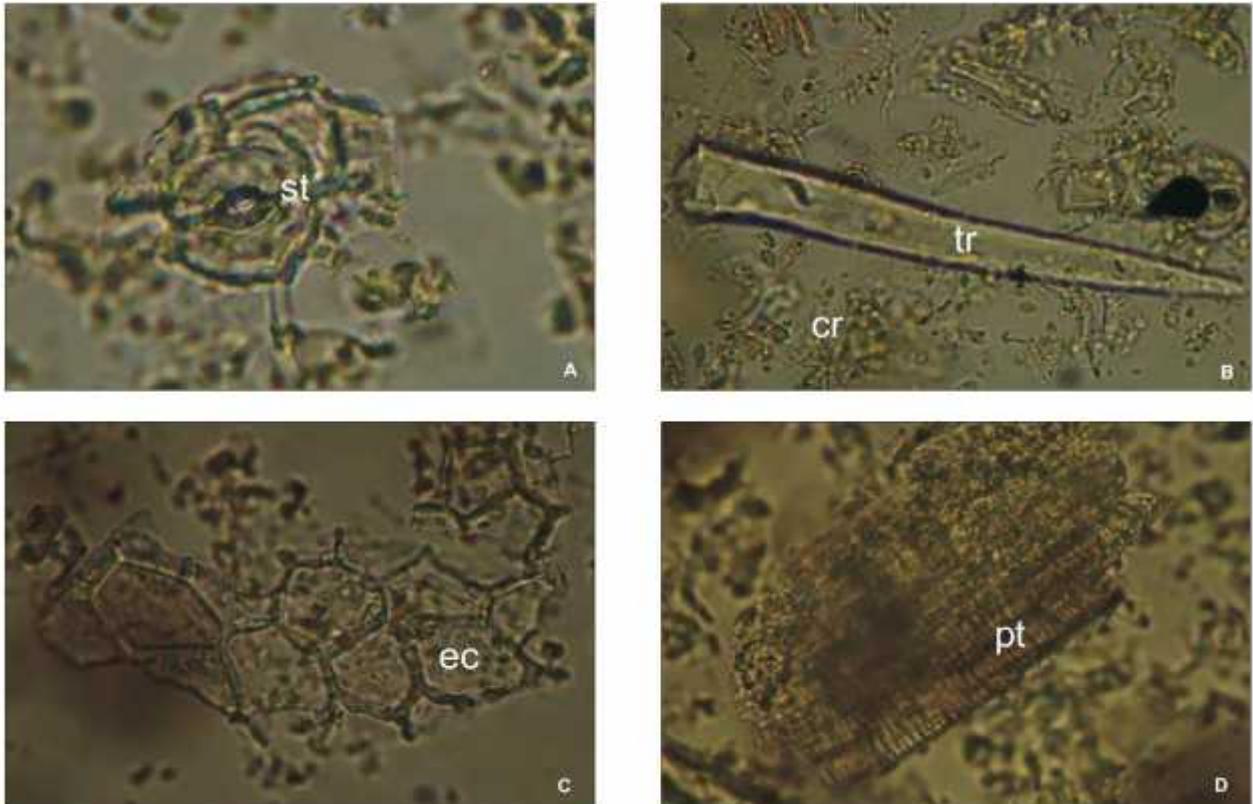


Fig. 3: Powder Microscopy with stomata, unicellular conical hairs and vessel thickenings X 192  
 Leaf – surface: Adaxial epidermal cells 5-6 sided, polygonal isodiametric to anisodiametric, sides thin, straight to curved, surface smooth, contents slightly dense with calcium carbonate crystals. E.C.F 5200 per sq.mm

(Fig.1A). Abaxially cells are similar except sides curved to wavy and few wavy; E.C.F 2900 per sq.mm. Costal cells are 4-6 sided, polygonal to linear and anisodiametric, sides thick, straight to curved; surface finely striated, contents slightly dense with calcium carbonate crystals; parallelly oriented and present on primary and secondary veins (Fig.1 B,C).

Stomata confined on abaxial, mostly tetracytic, few anocytic and rarely anisocytic, subsidiaries 3-5, monocyclic, indistinct, mostly f- type, rarely c-type, guard cells linear to reniform. S.F. 800 per sq.mm. S.I. 12.2, Dist: common, all over except on veins. (Fig.1B,C,3A)

Trichomes are of two types 1. Uniseriate conical hairs: Foot: 1 – celled, projected above, surrounded by thickwalled in encircling cells. Body: 2-5 celled, walls thick, contents scanty.

2. Unicellular conical hairs: Foot: 1 – celled, rounded, walls slightly thick, embedded, surrounded by encircling epidermal cells; Body: Extension from the foot, conical, walls thick, contents slightly dense. Dist: Common, all over more on veins ((Fig.3B)

Transection: In T.S. slightly grooved adaxially, prominently ribbed abaxially at midvein; Epidermis is 1-layered, cells adaxially larger on lamina, barrel shaped, few rectangular, elongated cells 15- 44 µm and 10-32 µm wide; cells abaxially smaller, elongated cells 12-34 µm long and 8-24 µm wide; walls thin, contents slightly dense. Cells are covered by thick cuticle; abaxial surface interrupted by stomata; epidermis contents often with unicellular and uniseriate conical hairs (Fig. 2A). Lamina differentiated into palisade and spongy parenchyma; palisade 2 – layered, cells columnar, cylindrical and closely packed with small intercellular spaces; interrupted at midvein, contents dense with chloroplasts. Spongy parenchyma loosely arranged beneath the abaxial surface, cells oval to spherical, few dumbbell shaped with large intercellular spaces; and dense with chloroplasts. (Fig.2 B,C)

Ground tissue of midvein consists collenchyma, parenchyma and sclerenchyma tissues. Collenchyma cells 15-18 arranged as a clustered or group beneath the adaxial epidermis and 6-8 layered beneath the abaxial surface, cells polygonal to spherical, angular without intercellular spaces, contents scanty and dense in few; Parenchyma is present as a group of cells on the adaxial side, 5-8 layered in the abaxial region, cells polygonal to spherical, walls thin, intercellular spaces are present in between, contents slightly dense in few (Fig.2A)

Sclerenchyma tissue is arranged as patches surrounding the vascular bundle; cells oval to spherical, polygonal, thick walled with small lumen;

Vascular tissue of midvein consists of a large crescent shaped vascular bundle at the centre, endarch, conjoint, and collateral with a cambium between. Tracheary elements several, arranged in radial rows, few laterally aligned, mostly polygonal to spherical, walls thick, 15-22 µm in diameter. tracheary elements interspersed with xylem parenchyma. Secondary wall thickenings of tracheary elements mostly helical and few scalariform thickened and rarely annular pitted (Fig. 3D). Phloem

consists phloem parenchyma, companion cells, sieve cells and phloem fibers. Phloem parenchyma cells closely arranged without intercellular spaces, contents dense in few (Fig.2A)

**Metal Analysis:** The leaf powder of *N. arbortristis* L. metal analysis by SEM – EDS and an examination of the data from the table 1. shows distribution of elements like calcium (Ca), Chromium (Cr), Iron (Fe), Zinc (Zn) and Magnesium. Among the essential metal analyzed was found to be maximum Ca (11.60%), Zn 0.10 % Cr (0.08%) Iron (0.06%) respectively (Table 1). Chromium has toxicity and known human carcinogens. If birthing high levels can cause irritation to the lining of the nose. Zinc plays an important role in various cell processes including normal growth, brain development and wound healing. Iron, Magnesium, Zinc supports for the treatment of diabetes.

## DISCUSSION

*Nyctenthus arbortristis* Linn., belonging to the family Oleaceae. Morphologically leaves are opposite, ovate, acute or acuminate, entire, rough and scabrous, short bulbous hairs rounded, densely pubescence on both sides [3]

Epidermal cells in surface of adaxial mostly polygonal isodiametric to anisodiametric, sides thin, straight to curved, surface smooth; contents slightly dense with calcium carbonate crystals reported earlier [7]. E.C.F. 5200 per sq.mm. Abaxially cells similar except sides curved to wavy and few wavy; E.C.F. 2900 per sq.mm. Stomata confined on abaxial, mostly tetracytic, anocytic, reported earlier [8] and few anisocytic stomata observed in the present study. S.F. 800 per sq.mm. S.I 12.2. Stomata are absent on adaxial surface, Unicellular and uniseriate conical hairs occur on both surface [7].

The midvein in T.S. slightly grooved adaxially, prominently ribbed abaxially; Lamina dorsiventral and differentiated into palisade and spongy parenchyma. Epidermis is 1 – layered with larger cells on adaxial and covered by a thick cuticle. Palisade is 2 – layered on adaxial side. Spongy parenchyma loosely arranged with large intercellular spaces [8]. A single large crescent shaped vascular bundle present at midvein and surrounded by a discontinuous of sclerenchyma tissue [10,11].

The leaf powder of *N. arbortristis* L. metal analysis by SEM – EDS and an examination of the data from the table 1. shows distribution of elements like calcium (Ca), Chromium (Cr), Iron (Fe), Zinc (Zn) and Magnesium. Iron is an essential element for human beings, animals and is an essential component of hemoglobin. Zinc plays an important role in various cell processes including normal growth, brain development and wound healing. Among the essential metal analyzed was found to be maximum Ca (11.60%), Zn 0.10 % Cr (0.08%) Iron (0.06%) respectively [5].

## ABBREVIATIONS:

tr – trichome; ec – epidermal cell; cr – crystals; st – stomata; ue – upper epidermis; cu – cuticle; pl – palisade; sp – spongy tissue; co – collenchyma; le- lower epidermis;

p – parenchyma; vb – vascular bundle; v – vessels; x – xylem; ph – phloem; pt – pitted.

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