

Pharmacognostical studies on the leaves of *Ficus altissima* blume

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ABSTRACT

Ficus altissima Blume belonging to family *Moraceae* is perennial tree with 20-30 ft tall distributed in the hills of northern India and deccan peninsula, up to an altitude of 100-2000 m. It is commonly known as Council Tree. Leaves and bark are used in skin diseases. The tree is one of the recorded hosts of the Indian lac insect and is a source of red colour. Owing to its unexplored medicinal importance, the macroscopic and the microscopic characters of the leaves were studied which will serve as reference standard in identification of the tree.

INTRODUCTION

Ficus is a huge tropical, deciduous, evergreen tree with more than 800 species. Bark, root, leaves, fruit and latex of this plant are frequently used for the treatment of various illnesses. *Ficus* produces a unique fruit which is actually a inverted flower. *Ficus* species are rich source of polyphenolic compounds, flavanoids which are responsible for strong antioxidant properties that help in prevention and therapy of various oxidative stress related diseases such as neurodegenerative and hepatic diseases. All *Ficus* spp. possess latex-like material within their vasculatures, affording protection and self-healing from physical assaults (Lansky *et al.*, 2008). *Ficus altissima* Blume belonging to family *Moraceae* is perennial tree with 20-30 ft tall, native of China and Japan and distributed in the hills of northern India and deccan peninsula, up to an altitude of 100-2000 m. It is commonly known as Council Tree in English, Goli in Kannada, Nandivrksha in Sanskrit and Kallatti in Tamil. The trees, 25-30 m tall, d.b.h. 40-90 cm. Bark gray, smooth. Branchlets green, ca. 1 cm thick, pubescent. Stipules 2-3 cm, thickly leathery, with gray silky hairs. Petiole robust, 2-5 cm; leaf blade broadly ovate to broadly ovate-elliptic, 10-19 × 8-11 cm, thickly leathery, glabrous, base broadly cuneate, margin entire, apex obtuse, acute; basal lateral veins

long, secondary veins 5-7 on each side of midvein, reticulate venation clearly defined in dry leaf. Figs axillary on leafy branchlets, paired, red or yellow when mature, ellipsoid-ovoid, 1.7-2.8 cm, sometimes pubescent when very young, glabrous when mature, apical pore navel-like, convex, sessile; involucre bracts hoodlike, covering young fig, caducous, apex broadly obtuse, scar ring like. Male, gall, and female flowers within same fig. Male flowers: scattered; calyx lobes 4, transparent, membranous; stamen 1. Gall flowers: sepals 4; style subapical, long. Female flowers: sessile; sepals 4; style elongated. Achenes tuberculate. Fl. Mar-Apr, fr. May-Jul (Zipcodezoo, 2013; Eflora, 2013; Berg, 2005, Chaudhary, 2012). Leaves and bark are used in skin diseases. The tree is one of the recorded hosts of the Indian lac insect (Khare, 2007). Several reports of colouring material from various species of *Ficus* Red colour is observed in *Ficus altissima* Blume (Tiwari and Mahanta, 2005). Methylated flavonoids were found only in *Ficus altissima*, indicating that flavonoids could play an important role in the systematics of the genus (Sharaf *et al.*, 2000). There are scanty reports found on the medicinal uses of *Ficus altissima* and there is a great potential for exploring this plant. The plant is not studied for its pharmacognostic attributes. Therefore the authors have attempted to study the pharmacognosy of the leaves. In the present investigation the macro- and microscopic studies were carried out in addition to the quantitative analysis.

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MATERIALS AND METHODS

Plant Collection and Identification

Ficus altissima Blume (*Moraceae*) was collected from Nallamala region of Kurnool district, Andhra Pradesh, India. The collected plant material was authenticated by Taxonomist Dr.S.Vadavathi at Herbal Folklore Research center, Tirupati, India.

Macroscopic and microscopic examination

Macroscopic examination of the leaf was carried out according to the standard procedures (Wallis, 1985; Trease and Evans, 1996; Khandelwal *et al.*, 1996; WHO, 2002). Fresh leaf was selected for the microscopical studies. Sections were cut on microtome and by free hand sectioning. Numerous temporary and permanent mounts of the microscopical sections of the leaf specimen were made and examined using microscope.

Physicochemical parameters

Quantitative values of the leaves of *Ficus altissima* were determined by using standard procedures. The percentage of total ash, water soluble ash, acid insoluble ash, water soluble extract, alcohol soluble extractive, chloroform soluble extractive, benzene soluble extractive and petroleum ether soluble extractive were established.

The palisade ratio stomatal number, stomatal index and vein islet number were calculated and photomicrographs of the microscopical sections were captured with the help of photomicroscope (Kokate, 1996; Ambasta, 1986).

RESULTS AND DISCUSSION

Macroscopy

Leaves are alternate, cariceous, 5-10 cm long with entire or serrate margin and nearly as broad, elliptic, ovate or obovate in shape, with rounded or shortly and bluntly acuminate at the apex polishing and shining base narrowed into petioles of 6-13 mm

length and stipules 10 mm long and lanceolate. Reticulate venation is seen in these leaves. Leaves possess pungent odor and bitter taste.

Microscopy

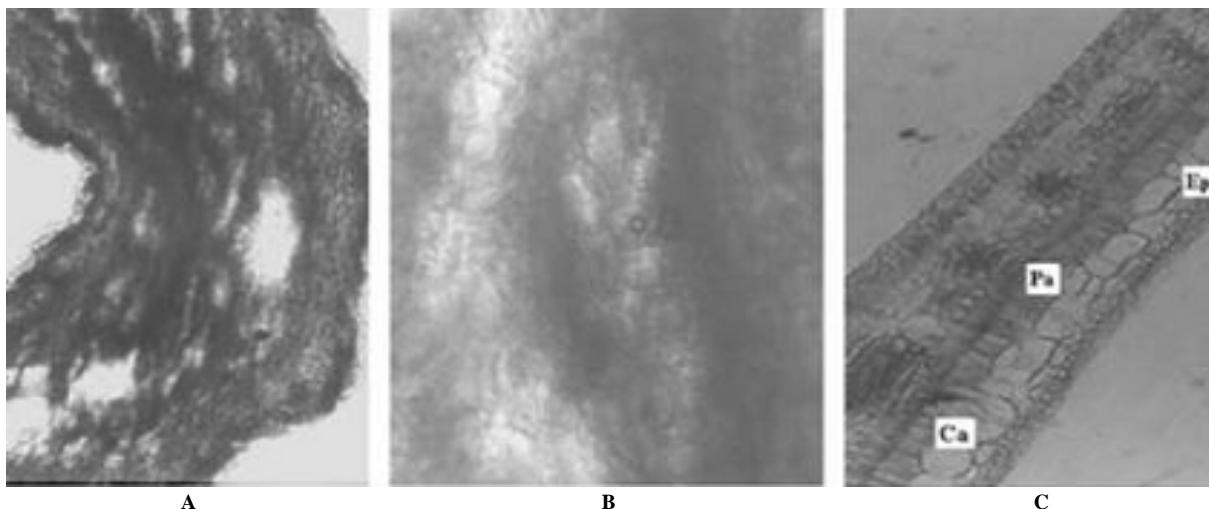
The T.S. of the petiole is convexo- concave shape in out line, adaxial surface is flat and the abaxial surface is convex in shape. (Fig.1-A). The epidermis is single layered and covered by thick cuticle. The cortex consists of several layers of closely arranged collenchymatous cells. It exhibits a closed cylinder of xylem and phloem vessels. (Fig.1-B).

The central portion of vascular region is parenchymatous. Discrete vascular bundles are not visible. Each vascular bundle is surrounded by the distinct bundle sheath. T.S. of lamina reveals isobilateral constructions. (Fig.1-C). The adaxial epidermis consists of multiples of calcium carbonate crystals in form of bunch of grapes. These deposits are known as cystoliths. Stalk of bunch of cellulose is also present. Mesophyll is differentiated into palisade and spongy tissue. Upper region of mesophyll palisade is in two layers. Lower mesophyll also has a layer of palisade. T.S of midrib shows a large vascular bundle surrounded by bundle sheath at the center. (Fig.1-D). The bundle is sclerenchymatic in nature. The remaining portion of the midrib is collenchymatous. The adaxial or lower epidermis has two layers of cells with a thick cuticle. Pit-sunken stomata are present (Fig.1-F). Abaxial epidermis consists of epidermal cells and guard cells (Fig.1-G).

Quantitative values

Quantitative values of the leaves of *Ficus altissima* indicate palisade ratio 7.99 – 8.8, Stomatal number 3-6, Stomatal index 4.8-8.87-11.1, Vein islet number 3.4-7.2.

In this study the pharmacognostic evaluation of the leaves of *Ficus altissima* Blume were carried out which include macro- and microscopic characteristics in addition to the quantitative analysis. Distinctive characteristics of the leaves were observed which are specific to this species.



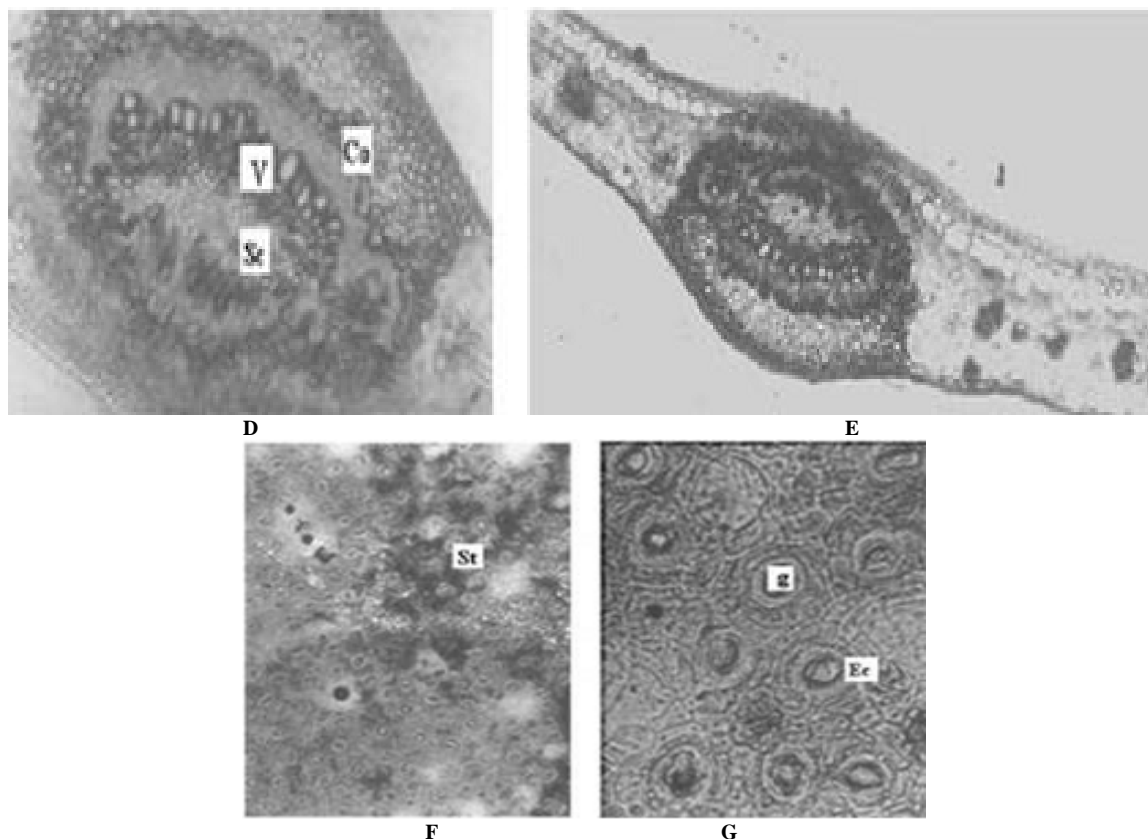


Fig. 1: A - T.S. of Petiole (40 x), B - Vascular bundles of petiole (100 x), C - T.S. of lamina (40 x), D - T.S. of Midrib, E - T.S. of leaf let (40 x), F - Adaxial epidermal cells with stomata (100 x), G - Abaxial epidermal cells with stomata (40 x), Ca - Calcium Carbonate crystals, Co - Collenchyma, Ec - Epidermal cells, Ep - Epidermis, g - Guard cells, Pa - Palisade tissue, Sc - Sclerenchyma, St - Stoma, V - Vascular bundles.

CONCLUSIONS

In this present investigation various pharmacognostical standardization parameters such as macroscopy, microscopy and quantitative values were carried out which could be helpful in authentication of *Ficus altissima* Blume. The results of the present study will also serve as a reference material in the preparation of herbal monograph.

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