



***Ficus benghalensis* Linn – The Sacred Indian Medicinal Tree with Potent Pharmacological Remedies**

S.T. Gopukumar, P.K. Praseetha*

Department of Nanotechnology, Noorul Islam Centre for Higher Education, Noorul Islam University, Kumaracoil, Tamilnadu, India.

*Corresponding author's E-mail: crkpkp@gmail.com

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ABSTRACT

There are diverse varieties of plants and trees with humongous medicinal properties. Indian and other ancient civilization were leveraging these plants for curing and treating various diseases and ailments. One such tree with remarkable medicinal properties is the *Ficus benghalensis*, also known as Indian Banyan Tree. It has exceptional medicinal property which helped in curing various life-threatening diseases. The ancient medicine systems such as Ayurveda, Siddha, Unani and Homeopathy were using this tree extensively to as medicine for various diseases. Various parts of these trees were used to cure many deadly diseases such as dysentery, diarrhea, diabetes leucorrhoea, menorrhagia, nervous disorders, tonic and astringent. The present review is therefore, an initiative to give a broad survey of the literature on its phytochemistry, pharamacognosy, traditional and pharmacological uses.

Keywords: *Ficus benghalensis*, Phytochemistry, Anti-tumor, Anti-microbial, Anti-diabetic

INTRODUCTION

B

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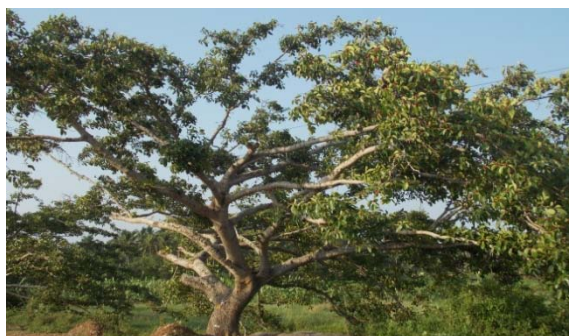


Figure 1: *Ficus benghalensis* tree

Taxonomical Classification

Kingdom	Planate –Plants
Sub kingdom	Tracheobionta
Super division	Spermatophta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Hamamelididac
Order	Urticales
Family	Moraceae
Genus	Ficus
Species	benghalensis (L)

A majority of chemical compounds which perform vital biological functions are synthesized in plants.¹ Banyan tree one of most glorified tree from the past has properties which can cure some of the most deadly diseases.^{2,3}

Ficus benghalensis, large evergreen tree, belongs to the family Moraceae. It is commonly known as “Indian

Banyan Tree”.^{2,4} It one among the four sacred trees “Nalpamara” (Ksirivarkas) meant to be planted around the home and temples. Their ever-extending branch symbolizes eternal life, which is why it considered as sacred. The banyan tree also comprises of numerous spiritual and mythological contexts.⁵

Religious Background

The banyan symbolizes Lord Shiva and is even sacred to Hindu Gods like Vishnu, Brahma, Kali, Lakshmi and Kubera. The tree depicts the Trimurti – Vishnu, Brahma and Shiva. Vishnu is believed to be the bark, Brahma, the roots and Shiva, the branches. It also depicts life and fertility in many Indian cultures, the very reason why banyan tree is worshipped by those who are childless and also, it is never cut. Vishnu is also compared to the seed of the Banyan tree, by our ancient poets, as the entire universe is said to have emanated from him, just as the gigantic Banyan tree originates from a single minute seed.⁵ The Banyan tree is so sacred that only in times of dire need people would pick its leaves or otherwise interfere with it. Its ashes are believed to have the power to eradicate sin.⁶

The banyan tree is considered as India's National Tree and it also symbolizes spiritual knowledge. Lord Shiva in his form of Dakshinamurti, the universal Teacher sits under a Vatavrksha and illumines the minds of sages seated at his feet. He represents Lord Shiva and is seen as the embodiment of knowledge and the destroyer of ignorance. In the great Cosmic Deluge, Pralaya, nothing survives of the entire creation except for the Lord in the form of an infant Krishna floating on a banyan leaf (vata-patrashaayi), sucking his toe, a familiar theme for Tanjore paintings.⁷

According to Indian mythology of *Savitri and Sathyavaan*, Savitri, soon after her marriage, had to face the loss of



her spouse, as predicted astrologically. When Sathyavaan's spirit was dragged away by Yama Dharma, while he was resting, tired and unprotected, under a banyan tree, after he had cut wood for the family fire, Savitri followed Yama, impressed him with the power of her paativratya and won back her husband from him. In honour of this victory of the great sati, a vrata known as Vata-Saavithri-Vrata came into being. On the poornima of the month of Jyeshtha, the sumangali fasts and circumambulates the Banyan tree praying for her husband's longevity. It is interesting to note that the Jains have also included Sati Savithri in their roll-call prayers as one of the satis to whom prayers are to be offered every day.⁸

Furthermore, the Banyan tree has also the mystic power to stimulate a barren woman overcome her socially ostracizing condition. The Banyan Tree is believed to have had its origin in Vasuki's garden. Vasuki is one of the divine Navanaagas or nine snake gods. It may be noted that, in India, the snake is regarded as a symbol of fertility. The tree is said to have been brought to earth by the power of Goddess Amba. Amba wanted it on earth for the benefit of her human progeny. When her battle with Vasuki did not bring victory to her, she invoked Lord Shiva's assistance, and managed to bring the banyan tree to our earth to assure fertility to her human progeny. The tree is also sacred to the Buddhists. After attaining enlightenment, Buddha is believed to have sat under a banyan tree for seven days.

It is said that when Satyavan was cutting the branches of this tree, he accidentally stabbed his wife Savitri and she succumbed to her injury. In the state of Maharashtra and Pujarat, women worship this tree to honor the memory of Savitri on the 15th day of the dark half of the month of Iyesth (May-June). In Uttar Pradesh and Bihar also women offer their puja (worship) to this tree and recite the story of Bat-Savitri.

Distribution

Banyan tree is aboriginal to South Asia especially India, Sri Lanka and Pakistan. It is often being planted around temples and a place of religious importance. It is considered as sacred tree by both Hindus and Buddhists. Banyan tree is widely cultivated in city parks and botanical gardens throughout the New World and Old World tropics. It grows well in tropical, semi-tropical regions, monsoon and rain forests with moderate to ample rainfall. Humid air and moist soil and is hardy, drought resistance and withstands mild frost is well suited for its growth.⁹

Morphology

Banyan is a humongous tree, with branches spreading across wide area; it attains a height of about 100 feet tall and, with its massive limbs supported by prop roots, spread over an area of several acres. Its bark is smooth, thick, green when young, grayish white when mature,

turning pink when cut, exfoliating in sheaths; Wood is soft and porous with milky, sticky latex.¹⁰

Leaves

Leaves are glossy, leathery and glabrous when mature, approximate near the end of branches, ovate, mostly obtuse, base cordate or rounded, thickly coriaceous, basal nerves 3-7, the midrib with 4-6 pairs of secondary nerves, blade 10-20 cm, petiole 2-5 cm long, shoot pubescent, 1.5 to 2 cm in diameter, sessile, scarlet, red when ripe.¹⁰

Flowers

It has very small, separate, male and female flowers. The male flowers crowded near the mouth of the receptacle, whereas female flowers with shorter perianth, style long, male and female in the same receptacle.¹¹

Fruits

Fruits globose, sessile in axillary pairs, fleshy pericarp and with acheneses trenching in them, they are dark red in colour, 1.5-2.0 cm diameter, red to dark purple when ripe; seeds are tiny. Fruit is not edible for humans but is eaten by birds and monkeys.¹¹

Chemical Constituents

Stem bark consists of number of anthocyanidin derivatives (methyl ethers of leucodelphinidin-3-O-L-rhamnoside,¹² leucopelargonidin-3-O-L-rhamnoside. Lecocyanidin-3-O-D-galactosylcellobioside)¹³ and aliphatic long chain ketones (pentatriacontan-5-one, tetratriacont-20-en-2-one, heptatriacont-6-en-10-one),¹⁴ besides-beta-sitosterol glucoside and mesoinositol.¹⁵ Leucodelphinidin derivative, bengaleno side: Aglucoside,¹⁶⁻¹⁹ Leucopelargoninderivative,²⁰ leucocynidinderivative,²¹ glycoside of leucopelargonidin²² have been isolated from the bark of the *Ficus benghalensis*.

The leaves contain 9.63% crude protein, 26.84% crude fibres, 2.53% calcium oxalate and 0.4% phosphorous. Number of qualitative chemical tests of ethanol extract and aqueous extract of leaves contain sterols, flavanoids, phenol, tannins, and saponins in large amount whereas aromatic acids, carbohydrates, triterpenoids, gums, mucilage, and volatile oils were totally absent in this plant. The flavonols of the leaves have been identified as quercetin-3-galactoside and rutin. Leaves yield quercetin-3-galactoside, rutin, friedelin, taraxosterol, lupeol, β -amyryn along with psoralen, bergapten and β -sisterol.²³

Pharmacological Activities

Anti-inflammatory Activity

The ethanolic (300 mg) and petroleum ether extracts (600 mg/kg/day) of *Ficus benghalensis*, considerably abridged (P <0.05) carrageenan-induced paw edema in rats. The ethanolic and petroleum ether extracts showed a greater anti-inflammatory effect compared with the standard drug Indomethacin. The results indicated the ethanolic extract of *Ficus benghalensis* exhibited more significant



activity than petroleum ether in the treatment of inflammation.²³

Anti-helminthic Activity

The extracts from *Ficus benghalensis* not only to paralyze, but also to kill the earthworms. The aqueous and methanolic extract were found to be more effective to execute the earthworm when compared to anti-helminthic drugs.²⁴

Anti-stress and Anti-allergic

Various extracts of *Ficus benghalensis* bark was screened for its anti-allergic and anti-stress potential in asthma by milk-induced leucocytosis and milk-induced eosinophilia. Aqueous, ethanol, and ethyl acetate extracts showed significant decrease in leucocytes and eosinophils in the order given while petroleum ether and chloroform extracts were inactive. This shows the application of polar constituents of *F. benghalensis* bark as anti-stress and Anti-allergic agents in asthma.²⁵

Anti-oxidant Activity

The extract was examined for its antioxidant activity by DPPH radical scavenging activity, hydroxyl radical scavenging activity, reducing capacity, hydrogen peroxide activity, total phenolic content using Folin-Ciocalteu's phenolic reagent. The extract showed extreme scavenging of DPPH radical (96.07%) at 250 µg mL⁻¹ concentration and hydrogen peroxide (69.23%) at 1000 µg mL⁻¹ concentration. The extract shows good results when compared with other compounds. This shows the scavenging activity of the extract.²⁶

Anti-tumor Activity

The chloroform extract of the fruit of *Ficus benghalensis* has shown toxicity in the brine shrimp (*Artemiasalina*) bioassay (LC50 < 1000µg/ml). It also possessed anti-tumor activity in the potato disc bioassay (% tumor inhibition >20%).

The other tested extracts showed no marked inhibition on the uptake of calcium in to rat pituitary cells GH4C1. The results support the traditional use of these plants in folk medicine for respiratory disorders and certain skin diseases.²⁷

Anti-diarrhoeal Activity

The ethanol extract of the hanging roots of *Ficus benghalensis* has been evaluated for anti-diarrhoeal activity against different investigational models of diarrhoea in rats. The extract (400 mg/kg, orally) has shown significant inhibitory activity against castor oil induced diarrhoea (extract fed rats had 2.21 ± 0.27 defecations per animal in 4 hr; control 4.0010.33, P < 0.001) and PGE2 induced enteropooling (for extract fed rats the value reported is 1.25 ± 0.15 in terms of intestinal fluid; control 0.78 ± 0.11, P < 0.02) in rats.

The extract has also been significantly effective in reducing gastrointestinal mobility (extract fed rats:

50.2±2.7%; control 79.412.76%, P< 0.001) in charcoal meal test in rats.²⁸

Anti-microbial Activity

The chloroform extract of the fruit of *Ficus benghalensis* has also shown inhibitory activity (0.5 mg/disc) against the bacterium *Micrococcus luteus* (18-26 mm diameter inhibition zone), which was not inhibited by kanamycin (100 µg/disc), streptomycin (100 µg/disc) or penicillin (5 µg/disc). *Streptococcus faecalis* and *Streptococcus faecium* were also inhibited by the fruit extract (17-20 mm inhibition zone). Other bacteria such as *Bacillus cereus*, *B. megaterium*, *Staphylococcus aureus*, *Streptococcusepidermis*, *Streptococcuslactis*, *Escherichia coli*, *Klebsiella pneumonia*, *Proteus vulgaris* and *Pseudomonas aeruginosa* were inhibited to a lesser extent (16-19 mm inhibition zone).²⁷

Anti-fungal Activity

Mitosporic fungi and several sterile forms were isolated as endophytes from the leaf tissues and aerial roots of *Ficus benghalensis*. Although similar number of endophyte species was present in lamina and petiole, the endophytic fungi more densely colonized the petiole. The species composition and the colonization frequency of the endophytes were more for the aerial roots entering the soil when compared with those growing in the air since the roots recruited some endophytes from the soil. The endophyte assemblages of the leaf and aerial root and of the aerial root growing in the air and soil showed little overlap suggesting that the nature of the host tissue as well as the environment determine the endophyte Composition of a host.²⁹

Analgesic and Antipyretic Activity

The antipyretic activity of bark of *Ficus benghalensis* was studied in Brewer's yeast-induced pyrexia in rats. The extract at all the doses used and the Aspirin considerably inhibited both the analgesic activity for hot plate and tail immersion method also in the antipyretic activity for the method of Brewer's yeast-induced pyrexia in rats inflammation in a manner that was not dose dependent. The higher analgesic effects of various extracts tested might back to the presence of flavonoids and phenolic compounds. These data suggest that the different extracts of the bark of *Ficus benghalensis* produce analgesic and antipyretic activities that could be due to the effects of bio active components in the extract.³⁰

Allelopathic Activity

Well grown trees of *Ficus benghalensis* produce one or more potential inhibitors of seed germination and seeding growth. The aqueous extract of ficus leaf and bark enhanced the shoot length and root length of *Vigna radiate* when plants were exposed to 5% and 6% concentration of aqueous leaf extract of *Ficus benghalensis*. Bark extract of *Ficus benghalensis* inhibited the shoot length and root length of the plant at high concentration. Both the bark and leaf extract inhibited



the seed germination. The result suggests that *Ficus benghalensis* may have potential alleochemicals which may be developed as natural herbicides.³¹

Hypolipidaemic Activity

Three groups of rabbits were fed with cholesterol suspended in ground nut oil to make hyper cholesterol condition (100mg/kg/day), another group is fed with bark extract of *Ficus benghalensis* at a dose of 50mg/kg/day. Treatment with bark extract reduced the serum cholesterol level by 59%, triacylglycerol by 54% and a decrease in lipid peroxidation. Substantial increase in the activities of antioxidant enzymes; superoxide dismutase, catalase, glutathione peroxidase which were depressed in other groups after cholesterol feeding.

This results shows that the water extract of the bark of *Ficus benghalensis* has noteworthy hypolipidaemic effects.^{32,33}

Immunomodulatory Activity

The immunodulatory activity of the aerial roots of *Ficus benghalensis* has using *in vitro* polymorpho nuclear leukocyte (human neutrophils) function test. The methanol

extract was evaluated for immune modulatory activity *in vivo* studies, using rats as the animal models. The extracts were tested for hypersensitivity and hem agglutination reactions, using sheep red blood cells (SRBC) as the antigen.

In the *in vivo* studies, the successive methanol extract was found to exhibit a dose related increase in the hypersensitivity reaction, to the SRBC antigen, at concentrations of 100 and 200 mg/kg. It also resulted in a significant increase in the antibody titer value, to SRBC at doses of 100 and 200 mg/kg in animal studies.³⁴

Wound Healing

Some of these plants have been screened scientifically for the evaluation of their wound healing activity in different pharmacological models and patients, but the potential of most remains unexplored. In a few cases, active chemical constituents were identified.

In Ayurvedic medicine, the *Ficus bengalensis* were found to be effective wound healing medicine and tested in various experimental models.³⁵

Table 1: List of Chemical Constituents present in different parts of *Ficus benghalensis L*

S. No	Activity	Parts Used	Compounds Isolated
1	Anti-diabetic action and Insulin raising effect	Stem bark	3',5-dimethylether of leucocyanidin-3 -O-P-D ¹⁴
2	Insulin sparing action	Stem bark	3',5-dimethylether of leucocyanidin-3-O-P-D-galactosylcellobioside ²¹
3	Hypolipidemic effect	Stem bark	5,7-dimethylether of leucopelargonidin-3-O-a- L-rhamnoside ¹³
4	Antioxidant effect	Stem bark	5,7-dimethylether of leucopelargonidin-3-O-a- L-rhamnoside ²⁶
5	Effects on glucosesphosphate, Hexose kinase and HMGCo A reductase enzyme activity	Stem bark	3', 5 -dimethylether of leucocyanidin-3-O-P-D-galactosylcellobioside ¹⁴
6	Anti-tumour	fruits	Not isolated
7	Anti-microbial	fruits	Not isolated
8	Anti-diarrhoeal	Hanging roots	Not isolated

CONCLUSION

In the present investigation on *Ficus benghalensis*, it is noticeable that most of the Pharmacological activities were evaluated different parts of the *Ficus benghalensis*.

But the drug obtained from this plant is little low when compared to other medicinal plants.³⁶

Since researches are working on this plant over different scenarios such as diabetes, cancer, leprosy etc.³⁷

The production and usage of drugs from *Ficus benghalensis* will boost the growth of medical word.

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