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## Review Paper

# Botanical Characterization, Traditional Applications and Modern Pharmacological Properties of Ficus Religiosa in Healthcare

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## ABSTRACT

Ficus religiosa (F. religiosa), commonly known as the "Peepal" tree, is a sacred fig variety native to India with immense medicinal and cultural importance. The tree, belonging to the Moraceae family, is widely distributed across South and Southeast Asia. Phytochemical screening reveals the presence of various bioactive compounds including tannins, saponins, flavonoids, steroids, terpenoids, and cardiac glycosides. Traditional medicinal systems, especially Ayurveda, have used various parts of the tree for treating different diseases, including asthma, diabetes, diarrhea, and sexual disorders. Modern pharmacological studies have confirmed many of the traditional uses through scientific investigation. The study has shown remarkable antibacterial, anthelmintic, anti-asthmatic, analgesic, anti-inflammatory, anti-diabetic, anticonvulsant, nephroprotective, anti-fertility, anti-Parkinson, and hepatoprotective activities. Its rich phytochemical composition, which includes compounds such as bergapten,  $\beta$ -sitosterol, stigmasterol, and several amino acids, is attributed to its therapeutic potential. The latex, bark, leaves, and fruits of the plant have shown distinct medicinal properties, supporting its role in traditional healthcare systems. This review aims to provide a comprehensive analysis of Ficus religiosa, the botanical features, phytochemical composition, traditional applications, and pharmacological activities of religiosa may be established as its therapeutic potential in modern medicine


## INTRODUCTION

A wealth of medicinal plants with a variety of therapeutic qualities may be found on Earth and are used to cure human illnesses. By using a variety of medicinal plants to provide the populace with affordable medication, a proper health care

system may be built. Typically found in rural regions, medicinal plants are utilized in Ayurveda, Unani, and other alternative medical systems [1]. Ayurveda is a well-established medical system in India. Ayurveda uses minerals, plants, and animals to promote human health. India is also a

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megadiversity hotspot. The prudent use of medicinal plants for therapeutic purposes while maintaining biodiversity is desperately needed. The Indian government has taken a number of steps to create databases, coordinate research and development efforts, and develop technology for the efficient conservation and use of medicinal plants [2]. With more than 850 species of vines, shrubs, and trees, the genus *Ficus* (family Moraceae) makes up a greater portion of the tropical and subtropical forest ecosystem. With a high rate of photosynthesis and a wealth of mineral deposits in their leaves, *Ficus* trees are among the highest oxygen generators in the natural world. In the Indian subcontinent, *Ficus religiosa*, also known as the bo tree or sacred fig, and *Ficus benghalensis*, often known as the Indian banyan, have long held spiritual significance. As the name implies, *F. religiosa* is revered as a spiritual tree in both Buddhism and Hinduism because it was under this tree that Gautama Buddha became enlightened in India, which is where Buddhism

first began [3]. *Ficus religiosa* (FR) L. (Moraceae), often called "Peepal," is a sacred tree and fig variety indigenous to India. Asthma, cough, sexual disorders, diarrhoea, hematuria, ear and toothaches, migraine, eye problems, gastric issues, and scabies have all been treated with its leaf juice; a toothache analgesic has been made from its leaf decoction; fruits have been used to treat scabies, asthma, and other respiratory disorders; stem bark has been used to treat gonorrhea, bleeding, paralysis, diabetes, diarrhoea, bone fracture, antiseptic, astringent, and antidote [4]. *Ficus religiosa* is mentioned in numerous ancient cultural texts, including the Arthashastra, Bhagavad-Gita, Mahabharata, Puranas, Ramayana, Upanishads, and Buddhist literature [5]. It is a huge tree that is epiphytic when it is young. It has pedicellate or sessile petioles that are 5 to 10 cm long, aspen-like lamina, and paired hypanthodia. It also lacks male flowers [6].



Fig. No. 1: *Ficus religiosa* tree



a) Leaves



b) Fruit

Fig. No. 2: Morphology of *Ficus religiosa* a) Leaves b) Fruit

## Geographical Distribution

*Ficus religiosa* is indigenous to Southwest China, India, Nepal, Chad, Thailand, and Southeast Asia, extending eastward to Vietnam. Nonetheless, it is thought that the species first appeared in India, following which people brought it to other parts of Asia. Southern Asia is traversed by the tropic of cancer, which splits India in half at 23.5 degrees north. The subtropics are located just above this latitude, while the tropics are located below it. At an elevation of about 5000 feet, the tree can be

found as far north as subtropical Katmandu, Nepal, and as far south as Kerala, a tropical mountain region on India's southwest coast. The peepal tree can be readily propagated using cuttings or seeds. Any kind of soil will support its growth. Young peepals require the right kind of food. It needs adequate watering and full sun. It has light gray bark that peels in places. Its fruit has a purple hue. Among the longest-living trees is this one [7].

## Vernacular Names [8]

**Table No. 1: Regional Names of *Ficus religiosa* in Different Languages**

Language	Regional Name(s)
Sanskrit	Pippala
Malayalam	Arayal
Hindi	Pipala, pipal
Kannada	Ashwatha, Aralimara,
Bengali	Asvattha, Ashud
English	Pipal tree
Assamese	Ahant
Marathi	Pipal, Pimpal
Gujarati	Piplo, Jari, Pipao, Pipalo

## Scientific Classification [9]

**Table No. 2: Scientific Classification of *Ficus religiosa***

Taxonomic Rank	Classification
Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Urticales
Family	Moraceae
Genus	<i>Ficus</i>
Species	<i>religiosa</i>

## Phytochemistry [10,11]

The bark of *F. religiosa* included tannins, saponins, flavonoids, steroids, terpenoids, and cardiac glycosides, according to a preliminary

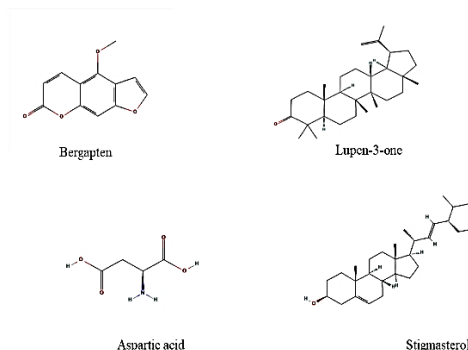
phytochemical screening. Bergapten, bergaptol, lanosterol,  $\beta$ -sitosterol, stigmasterol, lupen-3-one,  $\beta$ -sitosterol-d-glucoside (phytosterolin), and vitamin K1 were all found in the barks of *F. religiosa*.

Leucocyanidin-3-O- $\beta$ -D-glucopyranoside, leucopelargonidin-3-O- $\beta$ -D-glucopyranoside, leucopelargonidin-3-O- $\alpha$ -L-rhamnopyranoside, lupeol, ceryl behenate, lupeol acetate,  $\alpha$ -amyrin acetate, leucoanthocyanidin, leucoanthocyanidin, and leucoanthocyanin are also present in the bark. Campesterol, stigmasterol, isofucosterol,  $\alpha$ -amyrin, lupeol, tannic acid, arginine, serine, aspartic acid, glycine, threonine, alanine, proline, tryptophan, tryosine, methionine, valine, isoleucine, leucine, n-nonacosane, n-hentricontanen, hexa-cosanol, and n-octacosan are all released from the leaves. Asparagine, tyrosine,



undecane, tridecane, tetradecane, (e)- $\beta$ -ocimene,  $\alpha$ -thujene,  $\alpha$ -pinene,  $\beta$ -pinene,  $\alpha$ -terpinene, limonene, dendrolasine, dendrolasine  $\alpha$ -ylangene,  $\alpha$ -copaene,  $\beta$ -bourbonene,  $\beta$ -caryophyllene,  $\alpha$ -trans bergamotene, aromadendrene,  $\alpha$ -humulene,

alloaromadendrene, germacrene, bicyclogermacrene,  $\gamma$ -cadinene, and  $\delta$ -cadinene are all present in *F. religiosa* fruit.



**Fig. No. 3: Representative Chemical Structures of Phytoconstituents in *Ficus religiosa*.**

### Traditional Uses [12]

Ethnopharmacological applications of *Ficus religiosa* are well-established, especially in Indian traditional medical systems. It has a wide range of ethnopharmacological applications and is frequently used in reverse for possible medicinal benefits. Plant parts including leaves, bark, stems, latex, and roots are all beneficial. The bark's aphrodisiac, cooling, and astringent qualities make it useful. Additionally, it has antibacterial properties against *Escherichia coli* and *Staphylococcus aureus*. Additionally, helpful for treating gonorrhoea, diarrhoea, dysentery, haemorrhoids, etc. The fragile shoots and leaves are used as a purgative to treat skin conditions and wounds. *Ficus religiosa* leaf juice is used to cure a variety of conditions, including asthma, cough, sexual dysfunction, diarrhoea, toothaches, migraines, and stomach issues. Asthma is treated with the fruits. The tree's latex is used to treat hemorrhages and inflammations.

### Pharmacological Activities

#### Antibacterial Activity

*Ficus* leaves have been shown to possess antibacterial qualities against *Shigella dysenteriae*, *Salmonella typhi*, and other bacteria. Ethanolic

leaf extracts were found to have antifungal properties against *Candida albicans* [13].

#### Anthelmintic Activity

*Ficus religiosa* bark methanolic extract shown good harm to *Haemonchus contortus* worms. In an in-vivo investigation, *Ficus religiosa* bark extract and steam caused harm to *Ascaridia galli* [14].

#### Anti-asthmatic Activity

The first investigation on the use of *Ficus religiosa* extract to treat asthma was conducted in 1960. The bark of the *Ficus religiosa* is extracted using an alcoholic solvent. In the experiment, 5% of each aerosol is produced in guinea pigs by preventing the administration of 300 mg/kg, 375 mg/kg, and 400 mg/kg intraperitoneally and 75 mg/kg intravenously. The effects of 1.5% histamine at 450 mg/kg intraperitoneal acetylcholine on asthma were greater than those of histamine. The inner bark extract is used with rice pudding (rice, milk, sugar, and cardamom) to reduce all of the consequences of asthma [15].

#### Analgesics and Anti-inflammatory Activity

Steam and bark alcoholic extract has anti-inflammatory properties. Acetic acid is used to provide a writhing test in order to study the anti-inflammatory and analgesic effects of carrageenan, which causes paw edema. The extract

reduced the volume of the paw. The extract dose of 250 mg/kg has the same effect as aspirin (100 mg/kg) and indomethacin (5 mg/kg). In additional investigations, the aqueous bark extract shown anti-inflammatory effects for both acute and chronic models [16].

#### **Anti-Diabetic Activity**

In Streptozotocin-induced type 2 diabetic rats, the animal investigation of a bark aqueous extract (50 and 100 mg/kg of body weight) demonstrated hypoglycemic effects. The mechanism of action reveals that serum insulin levels were raised, and triglycerides were lowered [17].

#### **Anti-convulsant Activity**

Aqueous extracts of roots (100 mg/kg body weight) demonstrated Anti-convulsant effect in mice given Pentylene tetrazol, and the mechanism of action demonstrated a longer latency of convulsion initiation [18].

#### **Bronchoconstriction Activity**

Fruits of *Ficus religiosa* that contain bioactive substances such terpenoids, glycosides, flavonoids, and serotonergic content have bronchoconstriction properties. Methanolic fruit extract demonstrated notable effects in guinea pigs generated by histamine and acetylcholine [19].

#### **Nephroprotective Activity**

An investigation in which the extract was given to rats revealed that *Ficus religiosa* latex extract demonstrates nephroprotective efficacy against cisplatin-induced acute renal failure, suggesting potential advantages in reducing renal damage and enhancing kidney function [20].

#### **Anti-fertility Activity**

Methanolic extract of *Ficus religiosa* fruits was shown to have anti-fertility effects on goat uterus in an animal investigation. The mechanism of action involves decreased myometrial thickness and uterine gland diameter [21].

#### **Anti-parkinson Activity**

In induced experimental rats, the petroleum ether extract of leaves had anti-Parkinson effects, and the mechanism of action revealed that oxidative damage was decreased and motor performance was enhanced [22].

#### **Hepatoprotective Activity**

The hepatoprotective effect of *Ficus religiosa* latex is connected with its content of methionine and good antioxidant capabilities, as it probably functions as a free radical scavenger, lipid peroxidation inhibitor and glutathione levels preservation [23].

#### **CONCLUSION**

*Ficus religiosa* shows potential therapeutic value for a variety of pharmacological activities, thereby establishing its traditional medicinal uses. It contains various bioactive compounds that give it a resourceful role in modern drug discovery. Further clinical trials and scientific research could facilitate the standardization of formulations for use in various therapeutics. The detailed overview of the aspects of its botanical, phytochemical, and pharmacological properties provides obvious evidence that it may be well incorporated into modern healthcare systems and needs further detailed clinical studies to determine its standardized dosages and treatment protocols.

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