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Review Article

A Review on Ficus Religiosa Moraceae: Distribution, Traditional Uses and Pharmacological Properties

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Abstract:
Medicinal plants play a vital role in improving the health of people. Hundreds of medicinal plants have been used to cure various diseases since ancient times. *Ficus religiosa* (Peepal) has an important place among herbal plants. Almost every part of this tree i.e., leaves, bark, seeds, and fruits are used in the preparation of herbal medicines. *Ficus religiosa* is grown by specialty tree plant nurseries for use as an ornamental tree, in gardens and parks in tropical and subtropical climates. Peepul trees are native to Indian subcontinent and thrive in hot, humid weather. They prefer full sunlight and can grow in all soil types, though loam is the best. When planting, use soil with a pH of 7 or below. It is native to the Asia-Tropical (Bangladesh; India, Nepal, Pakistan, China, Myanmar, Thailand, Vietnam, and Iraq) and it is cultivated in wide tropical areas. Peepal is a large, fast-growing deciduous tree. It has a heart-shaped leaf. It is a medium size tree and has a large crown with wonderful wide-spreading branches. The fruits of the Peepal are hidden with the figs. It has fast-growing nature, tolerance to various climate zones and soil types, reported lifespan of over 3,000 years, and its suffocating growth habit as it often begins life as an epiphyte. Different parts of plants have been used in the Indian traditional system of medicine such as: Anti-diabetic, Anti-inflammatory, Antioxidant, Analgesic, Anticonvulsant, Antimicrobial, Wound healing, Anti-amnesic, Anti-fertility, Anti-ulcer, Anti-Parkinson, Anti-asthmatic, Kidney-protective, Toothache and Eye ache.
Keywords: Ficus Religiosa, Leaves, Indian Subcontinent, Figs, Fast-Growing Nature, Heart-Shaped Leaf, Traditional Uses.

Introduction

The planet earth has a treasure of medicinal plants with varied therapeutic properties used for treating ailments of the human race. A proper health care system can be established by supplying low-cost medicine to the population by using various medicinal plants. Medicinal

plants are usually used in ayurvedic, Unani, and other alternative systems of medicine, generally in rural areas [1-5]. Herbal medicine is becoming popular medication all over the world. *Ficus Religiosa* belonging to the family Moraceae, universally known as Peepal, is widely cultivated in Southeast Asia and has been known for its medicinal properties in traditional Unani and folk medicine systems. Its various therapeutic uses in folk medicine have encouraged consideration for disease management such as disorders central nervous system, endocrine system, gastrointestinal tract, reproductive system, respiratory system, and infectious and kidney disorders [6-10].

Medicinal plants play a vital role in improving the health of people. Hundreds of medicinal plants have been used to cure various diseases since ancient times. *Ficus religiosa* (Peepal) has an important place among herbal plants. Almost every part of this tree i.e., leaves, bark, seeds, and fruits are used in the preparation of herbal medicines. The therapeutic properties of this tree in curing a wide range of diseases can be attributed to its richness in bioactive compounds namely flavonoids, alkaloids, tannins, saponins, phenols, etc. Its antimicrobial, anti-diabetic, anticonvulsant, wound healing, anti-inflammatory, and analgesic properties have made it a popular herbal tree, and its parts are placed as important ingredients in the modern pharmacological industry. The documentation of traditional and modern usage of F. religiosa under one heading can help researchers to design and develop new functional foods from F. religiosa [6,11-13].

2. Plant Profile

Figure 1: *Ficus religiosa* (Peepal)

2.1. Classification [14-16]

- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Rosales
- Family: Moraceae
- Genus: Ficus
- Species: religiosa
- Vernacular name: Peepal

2.2. Common Names [17-20]

- **India:** Peepal,Pupil
- **China:** Pu ti shu
- **Sri Lanka:** Bodhi tree
- **Arabic:** teen mukadas, teen Asnam, shajarat bebal, Ficus abu lesan
- **English:** botree, peepultree, sacred fig
- **French:** arbre de dieu, figuier de pagodes
- **German:** bobaum, heiliger feigenbaum, indischer pepulbaum, pepulbaum
- **Italian**: fico del diavolo
- **Portuguese:** figueira-dospagodes, figueira-religiosa
- **Spanish:** higuera de agua;

- **Swedish:** tempelfikus

2.3. Association

Ficus religiosa is associated with Blastophaga quadriceps, an agaonid wasp which acts as its pollinator as this wasp lays its eggs only on trees of this species.

2.4. Environment

Ficus religiosa is tolerant to various climate zones (Köppen climate classification categories of Af, Am, Aw/As, Cfa, Cwa and Csa) and various types of soils. In Paraguay the tree species occurs in forests at lower elevations, and in China the species has been reported growing at altitudes ranging from 400 metres (1,300 ft) to 700 metres (2,300 ft). In India, being a native species, it occurs both naturally in wild as well as cultivated up to altitudes of 1,520 metres (4,990 ft).

2.5. Climate

Ficus religiosa is tolerant to widely varying climatic conditions such as Tropical rainforest climate where the region receives more than 60 millimetres (6.0 cm) of precipitation per month, Tropical monsoon climate where average precipitation ranges from 60 millimetres (6.0 cm) in the driest month to 100 millimetres (10 cm), Tropical savanna climate with dry summer where average precipitation ranges from 60 millimetres (6.0 cm) per month in summers to 100 millimetres (10 cm) per month in winters, Warm temperate climate, wet all year where average temperature ranges from 0 °C (32 °F) to 10 °C (50 °F) and it is wet all year, as well as Warm temperate climate with dry summer where average temperature ranges from 0 °C (32 °F) to 10 °C (50 °F) and summers are dry.

2.6. Invasiveness

Unlike most epiphytic jungle figs, which ring the stems of dicotyledonous support trees from the outside, the epiphytic bushes of F. religiosa are not true stranglers. Their roots penetrate inside the stem of the support, eventually splitting it from within. Ficus religiosa has been listed as an "environmental weed" or "naturalised weed" by the Global Compendium of Weeds (Randall, 2012). It has been assigned an invasiveness high risk score of 7 in a risk assessment prepared for the species' invasiveness in Hawaii by PIER. Such a high score predicts it will become a major pest in suitable climate zones. The major reasons for its invasive behaviour are its fast-growing nature, tolerance to various climate zones and soil types, reported lifespan of over 3,000 years, and its suffocating growth habit as it often begins life as an epiphyte.

2.7. In heritage

Figure 2: Painted goblet, with peepal leaf motif, from Mundigak (Afghanistan), period IV, c. 2700 BC. Musée Guimet.

The earliest known record of *Ficus religiosa* in human culture is the use of peepal leaf motifs in the pottery of the Helmand culture, found at Mundigak site, in Kandahar, Afghanistan, dating back to third millennium BCE.

The peepal tree is considered sacred by the followers of Hinduism, Jainism and Buddhism. In the Bhagavad Gita, Krishna says, "I am the Peepal tree among the trees, Narada among the Deva Rishi (Divine sages), Bhrigu among the Saptha-Maharishis, Chitraratha among the Gandharvas, and sage Kapila among the Siddhas."

Buddhism

Gautama Buddha attained enlightenment (*bodhi*) while meditating underneath a *Ficus religiosa*. The site is in present-day Bodh Gaya in Bihar, India. The original tree was destroyed, and has been replaced several times. A branch of the original tree was rooted in Anuradhapura, Sri Lanka in 288 BCE and is known as Jaya Sri Maha Bodhi; it is the oldest livinghuman-planted flowering plant (angiosperm) in the world.

Figure 3:

The Bodhi Tree at the Mahabodhi Temple was propagated from the Sri Maha Bodhi, which in turn was propagated from the original Bodhi Tree at this location.

In Theravada Buddhist Southeast Asia, the tree's massive trunk is often the site of Buddhist or animist shrines. Not all *Ficus religiosa* can be called a *Bodhi Tree*. A Bodhi Tree must be able to trace its parent to another Bodhi Tree and the line goes on until the first Bodhi Tree under which Gautama is said to have gained enlightenment.

Hinduism

Sadhus (Hindu ascetics) still meditate beneath sacred fig trees, and Hindus do pradakshina (circumambulation, or meditative pacing) around the sacred fig tree as a mark of worship. Usually seven pradakshinas are done around the tree in the morning time chanting "*vriksha rajaya namah*", meaning "salutation to the king of trees". It is claimed that the 27 stars (constellations) constituting 12 houses (*rasis*) and 9 planets are specifically represented precisely by 27 trees—one for each star. The Bodhi Tree is said to represent Pushya (Western star name γ, δ and θ Cancri in the Cancer constellation).

Plaksa is a possible Sanskrit term for Ficus *religiosa*. However, according to Macdonell and Keith (1912), it denotes the wavy-leaved fig tree (*Ficus infectoria*) instead. In Hindu texts, the Plaksa tree is associated with the source of the Sarasvati River. The *Skanda Purana* states that the Sarasvati originates from the water pot of Brahma flows from Plaksa on the Himalayas. According to Vamana Purana 32.1-4, the Sarasvati was rising from the Plaksa tree (Pipal tree). *Plaksa Pra-sravana* denotes the place where the Sarasvati

appears. In the Rigveda Sutras, Plaksa Prasravana refers to the source of the Sarasvati.

2.8. Cultivation

Ficus religiosa is grown by specialty tree plant nurseries for use as an ornamental tree, in gardens and parks in tropical and subtropical climates. Peepul trees are native to Indian subcontinent and thrive in hot, humid weather. They prefer full sunlight and can grow in all soil types, though loam is the best. When planting, use soil with a pH of 7 or below. While it is possible for the plant to grow indoors in a pot, it grows best outside. Young peepul needs proper nourishment. It requires full sunlight and proper watering. Sacred fig occurs naturally in submontane forest regions. As with many Ficus trees, these are well suited for Bonsai training.

In the Middle East, it is preferably planted as an avenue or road verge tree. In the Philippines and in Nicaragua the species is cultivated in parks and along roadsides and pavements, while in Paraguay it occurs in forests at lower elevations.

In Thailand โพ or "Pho" trees grow everywhere, but in the Wats (temples) they are revered, and usually are several hundred years old, with trunks up to 20 feet / 6 meters wide. As with all sacred trees in Thailand, they have a saffron cloth wrapped around the base. A yearly ritual involving the Bo Trees at wats is the purchasing of "mai kam sii" ไม้คำ ัศริ, which are "supports" that look like crutches and are placed under the spreading branches as if holding them up. The purchase money helps fund the wat, a central part of Thai life [12,13,21-33].

2.9. Distribution

It is native to the Asia-Tropical (Bangladesh; India, Nepal, Pakistan, China, Myanmar, Thailand, Vietnam, and Iraq) and it is cultivated in wide tropical areas.

Peepal is a large, fast-growing deciduous tree. It has a heart-shaped leaf. It is a medium size tree and has a large crown with wonderful wide-spreading branches. It shed its leaves in the month of March and April. The fruits of the Peepal are hidden with the figs. The figs are ripened in the month of May. The figs which contain the flowers grow in pairs just below the leaves and look like berries. Its bark is light gray and peels in patches. Its fruit is purple in color. It is one of the longest living trees. Peepal tree is easily propagated through the seeds or the cuttings. It can grow in any type of soil. Young peepal needs proper nourishment. It requires full sunlight and proper watering [10-15, 34,35].

2.10. Traditional Use [36-44]

Ficus Religiosa is the wholesome plant used traditionally in the Indian medicine system which has many health benefits. Different parts of plants are useful such as leaves, bark, stem, latex, and root. The plant also contains various useful active contents.

Different parts of plants have been used in the Indian traditional system of medicine such as:

- Anti-diabetic
- Anti-inflammatory
- Antioxidant
- Analgesic (pain-killing)
- Anticonvulsant (reduces or prevents the severity of fits)
- Antimicrobial (kills microbes)
- Wound healing
- Anti-amnesic (prevents loss of memory)
- Anti-fertility
- Anti-ulcer
- Anti-Parkinson (Parkinson's disease is a disorder of the brain that affects body movements)
- Anti-asthmatic
- Kidney-protective
- Toothache
- Eye ache

Review of Literature

- **Anti-Oxidant Activity:** Enit Beena Devanesan *et al* (2018) studied the anti-oxidative properties of extract *of F. religiosa* bark and fruit extracts have been proved by using different solvents. The radical scavenging ability was calculated on the basis of the oil stability index

against 1, 1-diphenyl-2-picrylhydrazyl (DPPH). In chronic diseases such as rheumatoid arthritis, atherosclerosis, diabetes, and oxidative damage and oxidative stress to tissues are common. In diabetic rats, oxidative stress harmonizes the reduction of anti-oxidant status and increases the toxicity of free radicals. When the type 2 diabetes rats are treated with the aqueous extract of *F. religiosa*, it was found that the oxidative stress was reduced. Not only had that, during the progression of development when compared to the normal rats, the type 2 diabetes rats showed less weight. The weight loss is due to the less usage of glucose and induced β-oxidation in the adipose tissue. The aqueous extract of *F. religiosa* increases the body weight of diabetic rats. The aqueous extract of *F. religiosa* modifies the superoxide dismutase (SOD) activities and minimizes the catalase (CAT) activity. This is conceivable due to less accessibility of NADPH. The action of the catalase and glutathione peroxidase (GSH-Px) is upregulated by the aqueous extract of *F. religiosa* bark. The nitric oxide production and pro-inflammatory cytokines in lipopolysaccharide (LPS) are inhibited by the methanolic extract of *F. religiosa* leaf. The strong anti-inflammatory properties in microglial activation are carried out by the extract. It is expected that extract has inflammatory mediators like cytokines and nitric oxide that act as a neuroprotective effect against inflammation. Neurotrophic effects and acetylcholinesterase inhibitory activity is affected by the methanolic extract of *F. religiosa* is found [46].

- **Anti-convulsant Activity:** Singh *et al*., (2018) studies the anti-convulsant activity of *Ficus religiosa* of roots containing bioactive compounds such as Tannins, alkaloids, saponin, β-sitosteryl-D-glucoside. The animal study of Aqueous extracts of roots (100 mg/kg of body weight) showed anti-convulsant activity in pentylenetetrazol-induced mice and the mechanism of action showed the increased latency of onset of convulsions [47].

- **Wound healing Activity:** Charde *et al*., (2017) wound healing activity of *Ficus religiosa* of Leaves containing bioactive compounds such as Flavonoids, terpenoids, tannins, phenols, sterols. The animal study of Ethanolic extract of leaves (300 mg/kg of body weight) showed wound healing activity in wistar albino strain rat and shows the mechanism of action of Significant increase in wound closure rate, skin breaking strength, granuloma breaking strength was observed [48].

- **Anti-Parkinson Activity:** Bhangale et al., (2016) Anti-Parkinson Activity of *Ficus religiosa* of Leaves containing bioactive compounds such as Flavonoids, terpenoids, tannins, phenols, sterols. The animal study of Petroleum ether extract of leaves (400 mg/kg of body weight) showed anti-Parkinson effects in induced experimental rats and the mechanism of action was shown Motor performance improved and oxidative damage was reduced [49].

- **Hepatoprotective Activity:** Yogesh (2015) Hepatoprotective effect of *Ficus religiosa* latex on cisplatin-induced liver injury in Wistar rats by preparing methanolic extracts of latex (300mg/kg of body weight) showed a hepatoprotective effect in cisplatin-induced liver injury in Wistar rats. Finally, on the basis of these investigations, it concludes that the administration of methanol *F. religiosa* latex caused a general protective and ameliorative effect against cisplatin-induced liver injury. The protective effect of *F. religiosa* latex is associated with its content of methionine and good antioxidant properties, as it possibly acts as a free radical scavenger, lipid peroxidation inhibitor, and glutathione levels preservation [50].

- **Antidiabetic Activity**: Sanskriti Gautam *et al.,* (2014). It has been reported that aqueous extract of *F. religiosa* in doses of 50 and 100 mg/kg showed a pronounced reduction in blood glucose levels. The effect was compared with glybenclamide, a well-known hypoglycaemic drug. Thereafter aqueous extract of F. religiosa showed a significant increase in serum insulin, body weight, and glycogen content in liver and skeletal muscle of experimental diabetic rats,

also reducing the serum triglyceride and total cholesterol level. The results suggested potential traditional use of F. religiosa Also the bark root showed a maximum fall in the blood sugar level. Aqueous extract of F. religiosa orally decreases the fasting blood glucose. *F. religiosa* modulates the enzymes of the antioxidant defense system to combat oxidative stress. As a result, glutathione was restored and inhibited the formation of malondialdehyde, proving its anti-diabetic activity along with antioxidant potential [51].

- **Nephroprotective Activity:** Yogesh D N Srivastava (2013) studied the Nephroprotective effect of *Ficus Religiosa* against Cisplatin to induce acute renal failure in rats by preparing methanolic extract latex (200mg/kg) of body weight and showed nephroprotective activity in cisplatin induce acute renal failure in Wistar adult male rats. These findings demonstrated that F. religiosa latex and constituents have excellent nephroprotective and curative activities and thus have great potential as a source for natural health products [52].

- **Anti-asthmatic Activity:** Gregory *et al*., (2013) Anti-asthmatic activity of *Ficus Religiosa* leaves containing Flavonoids, terpenoids, tannins, phenols, sterols bioactive compounds. The animal study of Aqueous extract of leaves (150 and 300 mg/kg of body weight) showed anti-asthmatic property in guinea pigs and the mechanism of action was shows development of histamine induced pre-convulsion dyspnea was delayed [53].

- **Anti-fertility Activity:** Goyal *et al*., (2013) [13] Anti-fertility activity of *Ficus Religiosa* Fruits containing bioactive compounds such as Terpenoids, glycosides, flavonoids, serotonergic content. The animal study of Methanolic extract of fruits (1%) showed anti-fertility effects on uterus of goats and the mechanism of action was shows decreased diameter of uterine glands and myometrium thickness [54].
- **Anti-inflammatory Activity:** Murugesan *et al*., (2012) studied the anti-inflammatory activity of extract of F. religiosa bark containing bioactive compounds such as Steroids, flavonoids, alkaloids, phenol content, glycosides, tannins, saponins, polyphenolic compounds, sterols. The animal study of Ethanolic extract of bark (100 mg/kg of body weight) showed anti-inflammatory effects in carrageen-induced golden Syrian hamsters and the mechanism of action was shows reactive oxygen species were increased in their body [55].

- **Bronchoconstriction Activity:** Ahuja *et al*., (2011) (Chandrasekar et al., 2010) Bronchoconstriction activity of *Ficus Religiosa* Fruits containing bioactive compounds such as Terpenoids, glycosides, flavonoids, serotonergic content. The animal study Methanolic extract of fruits (0.5, 1 and 2 mg/ kg of body weight) showed significant effects in histamine and acetylcholine induced guinea pig and the mechanism of action shows the Significantly potentiated the EC (50) doses of both histamine and acetylcholine [56].

- **Anti-Diabetic Activity:** Pandit *et al.,* (2010) (Kumar et al., 2018) studied the anti-diabetic activity of extract of F. religiosa bark containing bioactive compounds such as Steroids, flavonoids, alkaloids, phenol content, glycosides, tannins, saponins, polyphenolic compounds, sterols. The animal study of Aqueous extract of bark (50 and 100 mg/kg of body weight) showed hypoglycemic effects in streptozotocin-induced type 2 diabetic rats and the mechanism of action shows serum insulin levels were increased and triglycerides were decreased [57].

Conclusion

Medicinal plants are usually used in ayurvedic, Unani, and other alternative systems of medicine, generally in rural areas. Herbal medicine is becoming popular medication all over the world because of its least side effect. *Ficus Religiosa* belonging to the family Moraceae, universally known as Peepal, is widely cultivated in Southeast Asia and has been known for its medicinal properties in traditional Unani and folk medicine systems. It is one of the longest living trees. Peepal tree is easily

propagated through the seeds or the cuttings. It can grow in any type of soil. The therapeutic properties of this tree in curing a wide range of diseases can be attributed to its richness in bioactive compounds namely flavonoids, alkaloids, tannins, saponins, phenols, etc. Different parts of plants have been used in the Indian traditional system of medicine such as: Anti-diabetic, Anti-inflammatory, Antioxidant, Analgesic, Anticonvulsant, Antimicrobial, Wound healing, Anti-amnesic, Anti-fertility, Anti-ulcer, Anti-Parkinson, Anti-asthmatic, malondialdehyde, proving its anti-diabetic activity along with antioxidant potential, Nephroprotective Activity, Anti-asthmatic Activity, Anti-fertility Activity, Anti-inflammatory Activity, Bronchoconstriction Activity, Anti-Diabetic Activity, Kidney-protective, Toothache and Eye ache have made it a popular herbal tree, and its parts are placed as important ingredients in the modern pharmacological industry..

Thus, as folk medicine *Ficus Religiosa* family Moraceae has many uses as a multipurpose medicinal agent so further clinical trials should be performed to prove its efficacy. Because of their wide utilization, the plant deserves special research attention of these uses and compound as it may be a source of natural health products.

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