

A REVIEW ON THE PHYTOCHEMICAL INVESTIGATION OF SACRED TREES AND PLANTS BY RELIGIONS

Satya Pal Singh,

Department of Chemistry, Government College

Tonk-304001(Rajasthan) India

Abstract

There is a unique intersection of spirituality, culture, and traditional medicine that can be found in sacred trees and plants throughout the main faiths of the globe as well as different indigenous belief systems. This review provides a synthesis of phytochemical investigations of emblematic taxa that are revered in various religions and traditions, including Hinduism (for example, *Ficus religiosa* and *Ocimum tenuiflorum*), Buddhism (*Bambusa* spp. and *Nelumbo nucifera*), Islam (*Nigella sativa* and *Phoenix dactylifera*), Christianity (*Olea europaea* and *Vitis vinifera*), Sikhism (*Azadirachta indica*), and various indigenous traditions (*Tabernaemontana* spp. and *Cedrus* spp.). Across all of these lineages, core metabolite classes, such as polyphenols (flavonoids, tannins), terpenoids (mono-, sesqui-, and triterpenes), alkaloids, lignans, saponins, and glycosides, have been consistently linked to bioactivities. These bioactivities include antioxidant, anti-inflammatory, antimicrobial, cardiometabolic, neuroprotective, and anticancer effects. In terms of methodology, modern processes include ethnobotanical context with targeted and untargeted studies (HPLC/UPLC, GC-MS, LC-MS/MS, NMR-based metabolomics), as well as in vitro and in vivo experiments. This allows for chemotaxonomic insights and interactions between structure and activity. Taxonomic ambiguity, seasonal and regional chemotype variation, and non-standardized extraction and reporting techniques are some of the factors that limit the ability to compare results from different studies on the same subject. Despite the growing interest in bioprospecting, ethical and sustainability concerns, such as benefit-sharing (for example, compliance with the Nagoya Protocol), biocultural rights, and the preservation of keystone holy groves, continue to be underaddressed. A coordinated research agenda is proposed by us, which includes the following components: (i) the utilization of voucher-backed sampling and FAIR data standards; (ii) the establishment of a connection between multi-omics profiles and systems pharmacology; (iii) the prioritization of community-led, sustainable harvesting; and (iv) the development of quality benchmarks for the translation of phytomedicine. The study and preservation of holy plants can be accomplished in a manner that respects the cultural significance of the plants while also improving evidence-based therapies through the integration of religious ethnobotany and rigorous phytochemistry.

Keywords: sacred groves; ethnopharmacology; phytochemistry; polyphenols; terpenoids; metabolomics; systems pharmacology; conservation ethics.

Introduction

There is a profound importance that is held by sacred trees and plants throughout all nations, faiths, and civilizations. These trees and plants serve as symbols of spirituality, health, and ecological balance. Plants have not only served as ceremonial and symbolic entities, but they have also been reservoirs of substances that have curative properties. This has been the case from the earliest Vedic traditions of India to the

Abrahamic religions and indigenous belief systems. This dual role—spiritual veneration and therapeutic utility—forms the foundation for their sustained relevance in both traditional medicine and contemporary phytochemical study. Phytochemicals have been used for centuries. Trees revered in Hinduism include *Ficus religiosa* (also known as Peepal) and *Ocimum tenuiflorum* (also known as Tulsi) due to the divine relationship they have with the religion and the healing capabilities they possess. In the same way, Bodhi trees and *Nelumbo nucifera* (also known as lotus) are considered to be pharmacologically significant in Buddhism. They are also considered to be symbols of enlightenment and purity. *Nigella sativa*, also known as black seed, and *Phoenix dactylifera*, sometimes known as date palm, are both mentioned in prophetic traditions with regard to their curative properties in Islam. Sikhism acknowledges the sacredness of *Azadirachta indica* (Neem) in public places, but Christianity places an emphasis on the symbolic and practical use of plants such as *Olea europaea* (olive) and *Vitis vinifera* (grapevine). Sacred groves are also preserved by a number of indigenous civilizations. These groves contain a variety of plants, including *Cedrus deodara* and *Tabernaemontana* species, which are protected as ecological riches and sources of healing. These sacred plants have been subjected to phytochemical analysis, which has indicated the existence of a wide variety of bioactive substances. These compounds include alkaloids, flavonoids, tannins, terpenoids, saponins, and glycosides. These compounds are associated with a wide range of pharmacological characteristics, including antibacterial, antioxidant, anti-inflammatory, anticancer, and cardioprotective effects, among others. The systematic identification and characterization of such metabolites has been further improved by the utilization of contemporary analytical tools such as gas chromatography-mass spectrometry (GC-MS), high-performance liquid chromatography (HPLC), liquid chromatography-mass spectrometry (LC-MS), and nuclear magnetic resonance (NMR) spectroscopy. In spite of the expanding amount of data, there are still obstacles to overcome. Concerns concerning repeatability and sustainability are raised as a result of the fact that there is a lack of uniformity in extraction techniques, the possibility of overharvesting holy flora, and the variability in phytochemical composition that is caused by ecological variables. Furthermore, ethical issues are essential to responsible bioprospecting. These include the respect for indigenous knowledge systems and the guarantee of benefit-sharing, both of which are defined in international frameworks such as the Nagoya Protocol. The purpose of this review is to offer a complete overview of the phytochemical searches that have been conducted on sacred trees and plants across a variety of religious traditions. Their cultural background, bioactive contents, pharmacological potential, and the methodological techniques that were utilized in their investigation are all elements that are investigated in this article. The study highlights the significance of holy plants not only as cultural icons but also as useful leads for medication development and sustainable healthcare practices. This is accomplished by bridging the gap between traditional ethnobotanical knowledge and contemporary phytochemical science.

Background

In addition to serving as sources of food, housing, and ecological stability, plants have also been revered on a spiritual level for a very long time. This has made them an essential component of human survival. Throughout the history of human civilization, some trees and plants have been elevated to a hallowed position, becoming ingrained in religious texts, mythologies, rituals, and therapeutic practices. This respect frequently resulted in the protection and conservation of these species through the establishment of holy groves, temple plantings, and cultural taboos. Not only did these techniques guarantee the preservation of biodiversity over the course of several centuries, but they also conserved a vast storehouse of

ethnobotanical knowledge. A scientific framework that may be used to decipher the therapeutic potential that is contained within these holy species is provided by phytochemistry, which is the study of bioactive substances found in plants. The validation of age-old wisdom and the discovery of novel medicinal substances can be accomplished by researchers through the correlation of ancient religious usage with current biochemical results.

Table1.: Sacred Trees and Plants Across Religions and Their Significance

Plant	Hinduism	Buddhism	Jainism	Christianity	Islam
Peepal (Ficus religiosa)	Sacred as abode of gods; associated with Lord Vishnu	Buddha attained enlightenment under Peepal (Bodhi tree)	Symbol of meditation, detachment	–	Mentioned in Sufi traditions for shade and meditation
Paras-Peepal	Considered a wish-fulfilling tree in Hindu mythology	–	–	–	–
Banyan (Ficus benghalensis)	Symbol of longevity; associated with Trimurti (Brahma, Vishnu, Shiva)	Shelter for monks	Symbol of non-violence and shelter	–	–
Bilva (Aegle marmelos)	Sacred to Lord Shiva; leaves offered in worship	–	–	–	–
Ashoka (Saraca asoca)	Associated with Kamadeva (god of love); tree of fertility	Buddha's mother gave birth under Ashoka tree	Sacred groves	–	–
Sandalwood (Santalum album)	Used in rituals, incense, and deity anointment	Incense in monasteries	Used in sacred ceremonies	Used in holy anointing oils	Perfume and incense in rituals
Parijat (Nyctanthes arbor-tristis)	Linked to Krishna; celestial plant from Samudra Manthan	–	–	–	–
Coconut (Cocos nucifera)	Offered in temples; symbol of prosperity & purity	–	–	Used in some Christian blessings in South India	Used in Islamic traditions in South Asia

Kadamb (Neolamarckia cadamba)	Associated with Krishna's Ras Leela	—	—	—	—
Kalpavriksha (Mythical wish- fulfilling tree)	Symbol of abundance; celestial tree in Hindu cosmology	Found in Buddhist heaven descriptions	Mentioned in Jain cosmology	—	—
Palash (Butea monosperma)	Sacred to Agni; used in yajnas	—	—	—	—
Amla (Phyllanthus emblica)	Associated with Vishnu; consumed on Amla Navami	—	—	—	Mentioned in Unani medicine
Betel leaf/Paan (Piper betle)	Offered in rituals, symbol of hospitality	—	Used in rituals	Used in wedding customs (Syrian Christians of India)	Social and cultural use
Shami (Prosopis cineraria)	Associated with Shani & Durga; worshiped during Dussehra	—	—	—	Mentioned in desert traditions
Bhaang / Cannabis sativa	Sacred to Shiva; used in Holi & Shivratri rituals	—	—	—	Referenced in Middle Eastern medicinal texts
Gular / Udumber (Ficus racemosa)	Sacred in Puranas; linked to Dattatreya	—	Sacred in Jain texts	—	—
Tulsi (Ocimum sanctum)	Revered as goddess Tulsi; central in daily worship	—	—	Used symbolically in some Christian folk traditions in India	Used in Unani & folk remedies
Neem (Azadirachta indica)	Sacred for its purifying qualities; linked to Goddess Shitala	—	—	—	Used in Unani medicine
Lotus (Nelumbo nucifera)	Symbol of purity,	Symbol of enlightenment	Symbol of detachment	Symbol of purity and resurrection	Mentioned in Qur'an-

	Lakshmi, and Brahma				inspired poetry
Bamboo (Bambusoideae spp.)	Used in rituals, weddings, and festivals	Used in construction of monasteries	Sacred in rituals	Used in Palm Sunday substitutes (in Asia)	Used in folk practices in Southeast Asia

This table is broad and comprehensive, some plants are primarily revered in Hinduism but appear in local traditions of other faiths.

Table2 : Sacred Trees and Plants – Religious Significance, Phytochemical Constituents, and Pharmacological Properties

Plant	Religious Significance (Faiths)	Major Phytochemicals	Pharmacological Properties
Peepal (Ficus religiosa)	Hinduism (Vishnu), Buddhism (Bodhi tree), Jainism (meditation)	Flavonoids, tannins, β -sitosterol, phenolics	Antidiabetic, antioxidant, antimicrobial, wound healing
Paras-Peepal	Hindu mythology (wish-fulfilling tree)	Limited phytochemical studies	Traditionally believed aphrodisiac, spiritual significance
Banyan (Ficus benghalensis)	Hinduism (longevity, Trimurti), Buddhism (shelter)	Flavonoids, sterols, glycosides, tannins	Antidiabetic, anti-inflammatory, wound healing
Bilva (Aegle marmelos)	Hinduism (sacred to Shiva)	Marmelosin, coumarins, alkaloids, tannins	Antimicrobial, hepatoprotective, antidiarrheal
Ashoka (Saraca asoca)	Hinduism (fertility, Kamadeva), Buddhism (birth of Buddha)	Flavonoids, saponins, tannins, saracasin	Uterine tonic, anti-inflammatory, antioxidant
Sandalwood (Santalum album)	Hinduism (rituals, anointment), Buddhism (incense), Christianity & Islam (holy oils, perfumes)	α - and β -santalol, sesquiterpenes	Antiseptic, anxiolytic, anticancer, fragrance use
Parijat (Nyctanthes arbor-tristis)	Hinduism (linked to Krishna, celestial origin)	Iridoid glycosides, flavonoids, alkaloids	Antipyretic, anti-inflammatory, antimalarial
Coconut (Cocos nucifera)	Hinduism (purity, prosperity), Christianity (rituals), Islam (folk traditions)	Lauric acid, capric acid, phenolics	Antimicrobial, antiviral, nutritional value
Kadamb (Neolamarckia cadamba)	Hinduism (Krishna's Ras Leela)	Alkaloids, cadambine, saponins	Antimicrobial, antidiabetic, antioxidant
Kalpavriksha (mythical)	Hindu, Buddhist, Jain cosmology (wish-fulfilling)	–	– (mythological plant, symbolic only)
Palash (Butea monosperma)	Hinduism (sacred to Agni; yajna rituals)	Flavonoids (butrin, isobutrin), tannins	Anti-inflammatory, antimicrobial, antifertility

Amla (Phyllanthus emblica)	Hinduism (sacred to Vishnu), Ayurveda	Vitamin C, tannins, emblicanin A & B	Antioxidant, immunomodulatory, anti-aging
Betel leaf (Piper betle)	Hinduism (rituals), Jainism (ceremonial), Christianity (South India), Islam (social customs)	Eugenol, chavicol, hydroxychavicol	Carminative, antimicrobial, stimulant
Shami (Prosopis cineraria)	Hinduism (worshiped during Dussehra)	Alkaloids, flavonoids, glycosides	Antidiabetic, antioxidant, hepatoprotective
Bhaang (Cannabis sativa)	Hinduism (sacred to Shiva, Shivratri & Holi)	THC, CBD, flavonoids, terpenoids	Analgesic, psychoactive, antiemetic
Gular / Udumber (Ficus racemosa)	Hinduism (linked to Dattatreya), Jainism (sacred tree)	Flavonoids, sterols, tannins	Antidiabetic, anti-inflammatory, hepatoprotective
Tulsi (Ocimum sanctum)	Hinduism (revered as goddess Tulsi), Christianity (folk), Islam (Unani medicine)	Eugenol, ursolic acid, flavonoids	Antimicrobial, adaptogenic, immunomodulatory
Neem (Azadirachta indica)	Hinduism (purification), Islam (Unani medicine)	Azadirachtin, nimbin, quercetin	Antimicrobial, antiparasitic, immunostimulant
Lotus (Nelumbo nucifera)	Hinduism (Lakshmi, Brahma), Buddhism (enlightenment), Jainism (purity), Christianity (purity symbol), Islam (poetry)	Flavonoids, alkaloids (nuciferine), tannins	Antioxidant, hepatoprotective, antidiabetic
Bamboo (Bambusoideae spp.)	Hinduism (rituals), Buddhism (monasteries), Christianity (Palm Sunday substitute in Asia), Islam (folk crafts)	Silica, flavonoids, lignin	Anti-inflammatory, antioxidant, structural uses

Most sacred plants are rich in flavonoids and terpenoids, which may explain their traditional use in rituals and healing..

ETHNOPHARMACOLOGY

Traditional Uses

In Ayurvedic medicine, the *F. religiosa* tree is a well-known example of an ethnomedicinal tree. The utilization of this substance in the ancient folk medicine of India is also widely documented. Table 1 presents the many components of the *F. religiosa* plant that are utilized in traditional medical traditions.

DESCRIPTION

a. Macroscopic characteristics General Morphology

Peepal tree, also known as *Ficus religiosa* Linn (Moraceae), is a huge tree that has a broad range of branches and is characterized by leathery, heart-shaped, long-tipped leaves that are attached to long, thin petioles. Additionally, it bears purple fruits that grow in pairs. This large and older tree is thirty meters in length. Small tree or taller strangling climber, with extensive branches, semi- or completely deciduous in monsoon

regions, and broadly oval, glossy, leathery, dark green leaves that are 5-7 inches (12-18 cm) long and have unusual tips that resemble tails. Pairs of green figs that are spherical and flat-topped, measuring up to half an inch (1.5 cm) in diameter, and maturing to a purple color with red spots. There is a smooth gray bark on the trunk, and as the tree ages, the trunk takes on increasingly irregular shapes. When it is in arid environments, it loses its leaves for a short length of time.



Fig. 1: Folia of the ficus religiosa plant



Fig. 2: Tree of the genus Ficus religiosa (peepal)

Table 3: Utilizations of various components of F. religiosa in traditional medicine

Plant Parts Traditional Uses(as/in)	Plant Parts Traditional Uses(as/in)
Bark	Astringent, cooling, aphrodisiac, antibacterial against Staphylococcus aureus and Escherichia

	coli, gonorrhoea, diarrhoea, dysentery, haemorrhoids and gastrohelcosis, anti-inflammatory, burns
Bark Decoction	Cooling, gonorrhea, skindiseases, scabies, hiccup, vomiting
Leaves and tender shoots	Purgative, wounds, skindiseases ¹³ .
Leaf juice	Asthma, cough, sexual disorders, diarrhea, haematuria, toothache, migraine, eye troubles, gastric problems, scabies
Fruit	Asthma, laxative, digestive
Dried fruit	Tuberculosis, fever, paralysis, hemorrhoids ¹⁵ .
Seeds	Refrigerant, laxative.
Latex	Neuralgia, inflammations, haemorrhages ¹³ .

Leaves

When the leaves initially develop, they have a reddish-pinkish color, but as they mature, they change to a dark green color and grow to be around 12 to 18 centimeters (5-7 inches) in length. The fact that they are tied to long stalks that are flexible causes them to rustle, flutter, and dance whenever there is even the tiniest draft of wind. Frequently, the vegetation is rather thick. The alternating leaves are shaped like hearts and have a glossy, exquisite tip that resembles a tail. This tip is sometimes referred to as a "drip-tip" on account of its ability to efficiently direct water down to the soil. The leaves are protected from the occasionally heavy monsoon rain that may accumulate on them for extended periods of time, which could cause them to get heated in extremely warm weather. In addition to a network of extremely tiny veins, the leaves include anywhere from six to eight pairs of side veins. This delicate venation and the leaf's capacity to breakdown readily in water are both prominently exhibited in the greeting cards that are often manufactured with peepal leaves. Peepal leaves are utilized in the production of greeting cards. After soaking the leaves in a basin of water for eight hours (in nations with warm climates), they are cleaned gently under running water until only the veins are left.

Bark

The outside surface of the bark is brown or ash-colored; the surface is uneven owing to the exfoliation of the cork; the inner surface is smooth and somewhat brownish; the fracture is fibrous; and the taste is astringent. Bark can be found in pieces that are flat or slightly curved, and its thickness can range from one centimeter to two and a half centimeters or more.

Flowers

During the month of February, the little red blossoms emerge. For the tree to produce seeds, the pollinating wasp known as *Blastophaga quadraticeps*, which is connected with the tree, is necessary.

Fruit

The diameter of fruits is around ½ inch, which is comparable to the capacity of an eye pupil. Furthermore, it is compressed and has a round form. Small flat-topped figs, about 12-13 mm or ½ inch in diameter, are produced by the tree between the months of May and June. These figs are arranged in pairs at the angles of the leaves on the twigs, or above the scars in the bark that are left by falling leaves. In the beginning, they are green, but as they mature, they turn a dark purple color (with some reddish spots). They contain three basal bracts. The tree that bears fruit provides a source of sustenance for a wide variety of birds and animals.

Physical constants: Physical constants: Contains 7.86% by weight of total ash, 0.41 percent by weight of acid insoluble ash, 7.21% by weight of alcohol soluble extract, and 15.76% by weight of water soluble extractive.

PHYTOCHEMICAL CONSTITUENTS

The barks of *F. religiosa* were subjected to preliminary phytochemical analysis, which revealed the presence of tannins, saponins, flavonoids, steroids, terpenoids, and cardiac glycosides.

Constituents of the bark

Phytosterols, including lanosterol, β -sitosterol, β -sitosteryl D-glucoside, bergapten, bergaptol, and stigmasterol, have been extracted from the bark of *F. religiosa* using petroleum ether and alcoholic extracts, as seen in Figure 2. There is approximately 8.7% of the total tannin content that is found in the bark of *F. religiosa*. The inner bark of *F. religiosa* has been shown to contain 23 different phenolic components, including acid detergent fiber (ADF), neutral detergent fiber (NDF), acid detergent lignin (ADL), and saponins. The bark also includes tannin, wax, saponin, leucocyanidin-3-O- β -D-glucopyranoside, leucopelargonidin-3-O- β -D-glucopyranoside, leucopelargonidin-3-O- α -L-rhamnopyranoside, lupeol, ceryl behenate, lupeol acetate, α -amyrin acetate, leucoanthocyanidin and leucoanthocyanin.

Constituents of the fruits

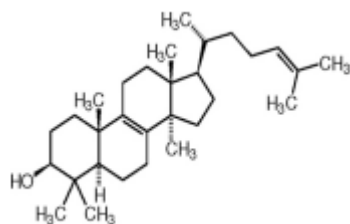
In the fruit pulp of *F. religiosa*, the amino acids that are found in the highest concentrations include tyrosine and asparagine. A significant quantity of flavonoids, specifically kaempferol, quercetin, and myricetin, as well as other phenolic components, may be found in the fruits of the *F. religiosa* plant.

Constituents of the leaves

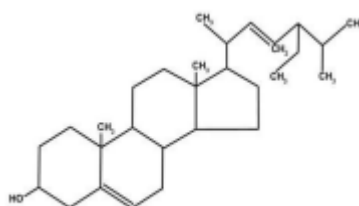
The leaves of the plant contain a variety of compounds, including campesterol, stigmasterol, isofucosterol, α -amyrin, lupeol, tannic acid, arginine, serine, aspartic acid, glycine, threonine, alanine, proline, tryptophan, tyrosine, methionine, valine, isoleucine, leucine, n-nonacosane, n-hentricontanen, hexacosanol, and n-octacosan.

Constituents of the seeds

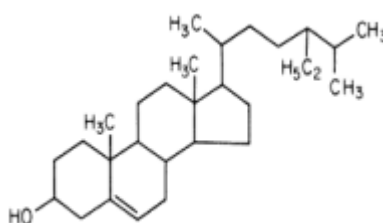
Phytosterol, β -sitosterol, and its glycoside, albuminoids, carbohydrates, fatty matter, coloring matter, and caoutchouc are all found in the seeds, with caoutchouc ranging from zero to five percent. In the following, you will find important structures of active ingredients that are found in *F. religiosa*.



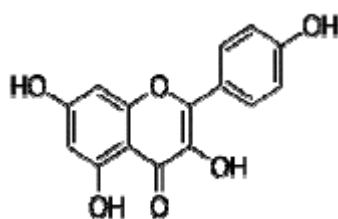
Lanosterol



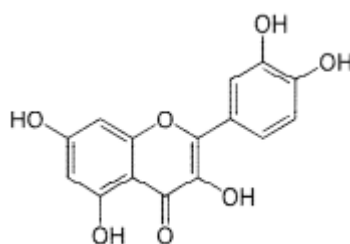
Sigmastrol



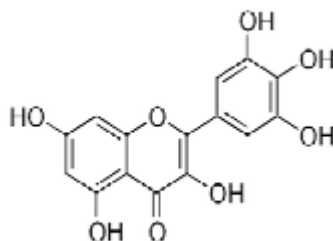
β-sitosterol



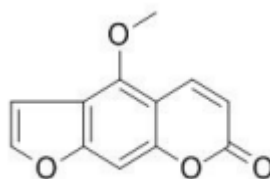
Kaempferol



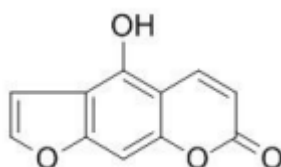
Quercetin



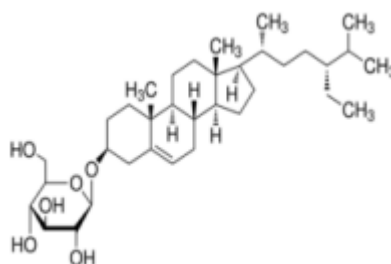
Myricetin



Bergapten



Bergaptol



β-sitosterol-D-glucoside

PHARMACOLOGICAL/PHARMACOGNOSTIC AL ACTIVITIES

Analgesic activity

The acetic acid-induced writhing (extension of hind paw) paradigm was utilized in the study conducted by Sreelekshmi and colleagues to explore the analgesic effect of the methanolic extract of the stem bark of the *F. religiosa* plant. Both aspirin and other medicines were employed as benchmarks. At a dosage of 250 mg/kg and 500 mg/kg, it demonstrated a reduction in the number of writhing that was 71.56 and 65.93%, respectively. A connection may be shown between the sensitivity of nociceptive receptors to prostaglandins

and the constriction of the abdominal region. It is therefore suggested that the extract exhibited an analgesic effect, most likely for the purpose of blocking the manufacture or activity of prostaglandins.

Anti-inflammatory activity

An examination was conducted to determine whether the methanolic extract of the stem bark of *Ficus religiosa* Linn. exhibited anti-inflammatory activity in Wistar albino rats and whether it had analgesic effects in Swiss albino mice. A considerable suppression of carrageenan-induced rat paw oedema was achieved with all three dosages of the extract. This inhibition was significant enough to be equivalent to the inhibition generated by indomethacin, which is the standard anti-inflammatory medicine. The administration of two doses of the extract resulted in a considerable reduction in the amount of writhing that was elicited in mice by acetic acid. The pain-relieving effect was equivalent to that which is caused by the conventional medication, which is aspirin. Significant anti-lipid peroxidant activities were also demonstrated by the methanol extract in vitro experimentation.

Conclusion

There is a special place for sacred trees and plants at the intersection of ecology, medicine, and spirituality. Not only are these species rich in medicinally active chemicals, but they also contain deep cultural meaning and are revered throughout indigenous traditions, Buddhism, Islam, Christianity, Sikhism, and Hinduism. Phytochemical studies have proven that plants contain a variety of bioactive components, including alkaloids, flavonoids, terpenoids, tannins, glycosides, and saponins, lending credence to the medical claims made in ancient literature and inherited wisdom. Scientific evidence supports the hallowed reputation of these substances, since they have shown pharmacological actions ranging from antioxidant and antibacterial to neuroprotective and anticancer. But there are still big obstacles to overcome, even if we've come a long way. Limited clinical validation, non-standardized extraction and analysis procedures, and chemical compositional variability caused by environmental and seasonal variables all work against these plants' translational potential. Furthermore, there are sustainability and ethical issues with the overexploitation of holy animals and the inadequate acknowledgment of the rights to indigenous knowledge. It is essential to protect holy groves and follow protocols like the Nagoya Protocol in order to maintain a balance between respect for culture and scientific inquiry. Ethical conservation approaches, contemporary phytochemical research, and traditional ethnobotanical knowledge must all be part of a unified strategy, as this review has shown. Sustainable harvesting strategies, sophisticated metabolomics, and systems pharmacology should be the areas of future research into holy plants. In addition to enhancing spiritual traditions, these plants provide intriguing leads for medication development and improvements in global healthcare by combining faith and science. The holy trees and plants that people hold in high regard are more than just religious artifacts; they are also living archives of history and bioactive substances. In order to preserve biodiversity, honor traditional wisdom, and advance evidence-based medicine, it is vital to acknowledge their dual significance as spiritual symbols and scientific resources.

References

1. Ahmad, A., Husain, A., Mujeeb, M., Khan, S. A., Najmi, A. K., Siddique, N. A., ... & Anwar, F. (2013). A review on therapeutic potential of *Nigella sativa*: A miracle herb. *Asian Pacific Journal of Tropical Biomedicine*, 3(5), 337–352. [https://doi.org/10.1016/S2221-1691\(13\)60075-1](https://doi.org/10.1016/S2221-1691(13)60075-1)

2. Amirthalingam, M. (2014). Sacred plants and their conservation in India. *Journal of Plant Sciences*, 2(1), 1–6.
3. Gupta, S. K., Prakash, J., & Srivastava, S. (2002). Validation of traditional claim of Tulsi, *Ocimum sanctum* Linn. as a medicinal plant. *Indian Journal of Experimental Biology*, 40(7), 765–773.
4. Kaur, R., & Arora, S. (2015). Phytochemical and pharmacological evaluation of *Azadirachta indica* (Neem): A review. *International Journal of Pharmaceutical Sciences Review and Research*, 31(2), 72–78.
5. Liu, J., Wang, C., Wang, Z., Zhang, C., Lu, S., & Liu, J. (2015). The lotus (*Nelumbo nucifera* Gaertn.): An overview of its phytochemistry and pharmacological activities. *Asian Journal of Traditional Medicines*, 10(2), 87–106.
6. Pandey, M. M., Rastogi, S., & Rawat, A. K. S. (2013). Indian traditional Ayurvedic system of medicine and nutritional supplementation. *Evidence-Based Complementary and Alternative Medicine*, 2013, 376327. <https://doi.org/10.1155/2013/376327>
7. Petroni, K., & Tonelli, C. (2011). Recent advances on the regulation of anthocyanin synthesis in reproductive organs. *Plant Science*, 181(3), 219–229. <https://doi.org/10.1016/j.plantsci.2011.05.009>
8. Soni, H., & Thomas, J. (2017). Sacred groves and their role in biodiversity conservation: A review. *Indian Journal of Ecology*, 44(1), 1–8.
9. Visioli, F., & Galli, C. (2002). Biological properties of olive oil phytochemicals. *Critical Reviews in Food Science and Nutrition*, 42(3), 209–221. <https://doi.org/10.1080/10408690290825529>
10. Xia, E. Q., Deng, G. F., Guo, Y. J., & Li, H. B. (2010). Biological activities of polyphenols from grapes. *International Journal of Molecular Sciences*, 11(2), 622–646. <https://doi.org/10.3390/ijms11020622>