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Review Article

A Note on Natural Habitat, Ecological, Medicinal, and Mythological Significance of *Saraca asoca* (Fabaceae)

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Abstract: *Saraca asoca* (Roxb.) Willd., commonly known as the Ashoka tree, holds profound ecological, medicinal, and mythological importance in the Indian subcontinent. As an endemic member of the Fabaceae family, this evergreen tree is revered for its cultural symbolism and its pivotal role in traditional systems of medicine, particularly Ayurveda and Unani. The tree thrives in tropical and subtropical climates, serving as a keystone species in moist deciduous forests. Ecologically, it provides critical habitat and food resources for various faunal species, while medicinally, it is an essential source of bioactive compounds like catechins, flavonoids, and saponins that exhibit estrogenic, antimicrobial, and anti-inflammatory properties. Mythologically, the tree is sacred in Hindu and Buddhist traditions, often associated with fertility, love, and purity. However, habitat loss, overexploitation, and limited natural regeneration threaten its survival. This review synthesizes the ecological, pharmacological, and cultural dimensions of *S. asoca*, emphasizing the urgent need for conservation strategies and sustainable utilization practices.

Keywords: Conservation, ecology, ethnomedicine, Fabaceae, mythology, phytochemistry

Introduction

Saraca asoca (Roxb.) Willd., popularly known as the Ashoka tree, is one of the most venerated and biologically valuable plant species of the Indian subcontinent (Plate 1). Belonging to the family Fabaceae, this evergreen tree has been deeply embedded in the ecological, medicinal, and cultural fabric of South and Southeast Asia. Its beautiful orange-red blossoms and graceful canopy have made it a symbol of love, fertility, and purity in ancient Indian scriptures such as the *Ramayana*, *Mahabharata*,

and *Charaka Samhita* (Urumarudappa et al., 2023). Beyond its mythological sanctity, *S. asoca* is an ecologically significant component of tropical forests, contributing to biodiversity maintenance, microclimatic regulation, and soil fertility. Moreover, it has been a cornerstone of Ayurvedic and Unani medicine, used particularly in treating gynaecological and inflammatory disorders for centuries (Yadav et al., 2019). Despite its multifaceted importance, *S. asoca* is facing serious ecological and conservation challenges due to habitat loss, overexploitation, and poor natural regeneration. The escalating commercial demand for its bark, used in herbal formulations like *Ashokarishta*, has led to unsustainable harvesting practices, pushing the species towards vulnerability in several regions (Akhilraj et al., 2021). Although numerous medicinal plants have been studied in India, *S. asoca* stands apart for its deep spiritual relevance and its critical ecological role in sustaining tropical forest systems. However, comprehensive studies that integrate its natural habitat ecology, phytochemical potential, and mythological-cultural associations remain limited. Therefore, a consolidated understanding of its multi-dimensional significance is essential for its sustainable utilization and conservation. The present review aims to synthesize and critically analyze the available literature on the natural habitat, ecological functions, medicinal properties, and mythological importance of *S. asoca*. By integrating scientific and traditional perspectives, this study underscores the need for a holistic conservation strategy that bridges ethnobotanical wisdom with modern ecological research (Saranraj et al., 2025). Such an integrated approach not only helps preserve a species of profound biological and cultural heritage but also contributes to the global agenda of conserving medicinal plants for future generations. This work thus holds significance for biodiversity conservation, pharmacological research, and cultural heritage preservation, highlighting *S. asoca* as both a sacred and scientifically valuable species.

Methodology

The present review was conducted through a systematic and comprehensive analysis of scientific literature, ethnobotanical records, and traditional knowledge sources related to *S. asoca* (Fabaceae). Published materials were collected from reputed databases such as Scopus, Web of Science, PubMed, and Google Scholar, as well as from government and institutional repositories, Ayurvedic pharmacopoeias, and classical texts (Kumar, 2025). Keywords including *Saraca asoca*, *Ashoka tree*, *ecology*, *phytochemistry*, *medicinal value*, and *mythological significance* were used to retrieve relevant publications (Ahmad and Ghosh, 2022). Studies from the period 2020-2025 were prioritized to capture both historical and contemporary perspectives. Data were critically reviewed to extract information on the species' natural habitat, ecological roles, phytochemical constituents, pharmacological properties, and cultural importance. Thematic synthesis was then applied to integrate findings across ecological, medicinal, and socio-cultural domains, ensuring a holistic understanding. Only peer-reviewed and authentic sources were considered to maintain scientific accuracy and reliability.

Results and discussion

The present review reveals that *S. asoca* holds exceptional ecological, medicinal, and cultural significance, yet faces growing threats to its natural existence. Ecologically, it thrives in the moist deciduous and evergreen forests of India, playing a vital role in maintaining forest structure, soil fertility,

and biodiversity. Phytochemical investigations have confirmed the presence of flavonoids, tannins, saponins, and glycosides, which are responsible for its potent antioxidant, anti-inflammatory, antimicrobial, and estrogenic activities, validating its traditional use in treating gynaecological disorders and other ailments (Scaria et al., 2023). Culturally, the species is deeply revered in Hindu and Buddhist traditions, symbolizing purity, fertility, and divine grace, and its historical prominence has contributed to its preservation in sacred groves and temple landscapes (Saxena et al., 2024). However, unsustainable bark harvesting, habitat destruction, and poor natural regeneration have led to declines in its population. The integration of scientific conservation approaches such as tissue culture, vegetative propagation, and community-based management with traditional ecological knowledge is essential for ensuring the sustainable survival of this sacred and scientifically valuable species.

Natural habitat and ecological adaptation

S. asoca is predominantly distributed across the moist deciduous and evergreen forests of India, Sri Lanka, and parts of Southeast Asia (Devan and Warrier, 2021). It thrives under partial shade, preferring humid, loamy soils with rich organic matter. The review of floristic and ecological studies indicates that natural populations are concentrated in the Western Ghats, Eastern Himalayas, Odisha, Assam, and the Andaman Islands, where the climatic conditions favour continuous growth and flowering. Ecologically, *S. asoca* acts as an understory species that contributes to soil stabilization, moisture conservation, and microclimatic regulation. Its presence enhances biodiversity by supporting pollinators such as bees, butterflies, and birds (Smitha and Thondaiman, 2025). However, studies consistently report reduced natural regeneration, primarily due to poor seed viability and anthropogenic disturbances. Deforestation, urbanization, and unregulated bark collection have caused a significant decline in natural populations, emphasizing the urgent need for in-situ and ex-situ conservation strategies.

Phytochemical composition and medicinal attributes

Phytochemical analyses from various studies reveal that *S. asoca* is a rich reservoir of flavonoids, tannins, saponins, glycosides, and steroids (Sasmal et al., 2012). Key active compounds identified include quercetin, kaempferol, β-sitosterol, catechins, epicatechins, and leucocyanidin. These bioactive molecules are responsible for their wide range of pharmacological properties. Experimental studies confirm that extracts of *S. asoca* exhibit antioxidant, anti-inflammatory, antimicrobial, estrogenic, and cytoprotective activities. In Ayurvedic formulations like *Ashokarishta*, the bark extract is widely used to treat menorrhagia, dysmenorrhea, and leucorrhea, aligning with its traditional classification as a uterine tonic (Chowdhury et al., 2024). Modern pharmacological assessments further validate its estrogenic effects, supporting uterine contraction and menstrual regulation. Additionally, the plant demonstrates potential in managing oxidative stress, gastrointestinal disorders, and certain metabolic dysfunctions. These findings reinforce the therapeutic relevance of *S. asoca* and encourage the development of standardized plant-based drugs for women’s health and general wellness.

Mythological and cultural perspectives

The review of mythological and cultural literature highlights that *S. asoca* is deeply intertwined with spiritual and religious traditions of South Asia. In Hindu mythology, the Ashoka tree is sacred to Kama Deva, the god of love, and is often associated with fertility, prosperity, and renewal of life. It is mentioned in ancient Sanskrit texts like the *Ramayana* and *Mahabharata*, where its presence symbolizes purity and divine grace (Sari and Jayanthi, 2024). In Buddhist tradition, it holds a unique position, as Queen Māyā is believed to have given birth to Lord Buddha under an Ashoka tree in the *Lumbini Garden*. The tree is also planted near temples, monasteries, and sacred groves as a symbol of auspiciousness and environmental sanctity. This cultural reverence has historically contributed to its protection; however, in recent decades, ritualistic use and commercialization have sometimes led to unsustainable exploitation. Thus, re-establishing traditional conservation ethics can be an effective tool for modern preservation.

Conservation concerns and propagation potential

The synthesis of conservation data reveals that *S. asoca* faces vulnerability due to habitat degradation and overharvesting. Populations are declining in many forest regions, and the species is now listed as vulnerable in several regional assessments (Saini et al., 2018). Studies show that the bark is the most exploited part, leading to irreversible damage and poor regeneration. To counter this, researchers recommend tissue culture and micropropagation techniques, which have shown success in producing disease-free and genetically stable plantlets. Vegetative propagation using stem cuttings and root suckers has also demonstrated promise for large-scale cultivation (Rout et al., 2018). Establishing botanical gardens, seed banks, and community-based conservation programs is crucial for the long-term sustainability of the species. The integration of traditional conservation practices, such as maintaining sacred groves and temple gardens, with modern biotechnological approaches could ensure both ecological and cultural continuity.

Integrated ecological and medicinal significance

The collective findings highlight that *S. asoca* embodies a rare convergence of ecological stability, medicinal efficacy, and cultural symbolism. As an ecological entity, it supports biodiversity and environmental health; as a medicinal plant, it serves as a natural source of therapeutic compounds; and as a cultural icon, it fosters spiritual and ethical values linked to nature conservation (Yadav et al., 2019). The triangular relationship between ecology, medicine, and mythology forms the basis for its sustained relevance across centuries. This integrative perspective not only enriches ethnobotanical understanding but also provides a framework for sustainable management, value addition, and conservation-based livelihood development in local communities.

Future aspects

The review clearly establishes that *S. asoca* is a species of remarkable multidimensional significance, functioning simultaneously as an ecological stabilizer, a pharmacologically valuable plant, and a cultural icon (Salvi et al., 2022). Its presence in tropical forest ecosystems supports biodiversity, soil fertility,

and hydrological stability, while its phytochemical constituents, particularly flavonoids, tannins, and glycosides, exhibit diverse bioactivities with proven therapeutic benefits.

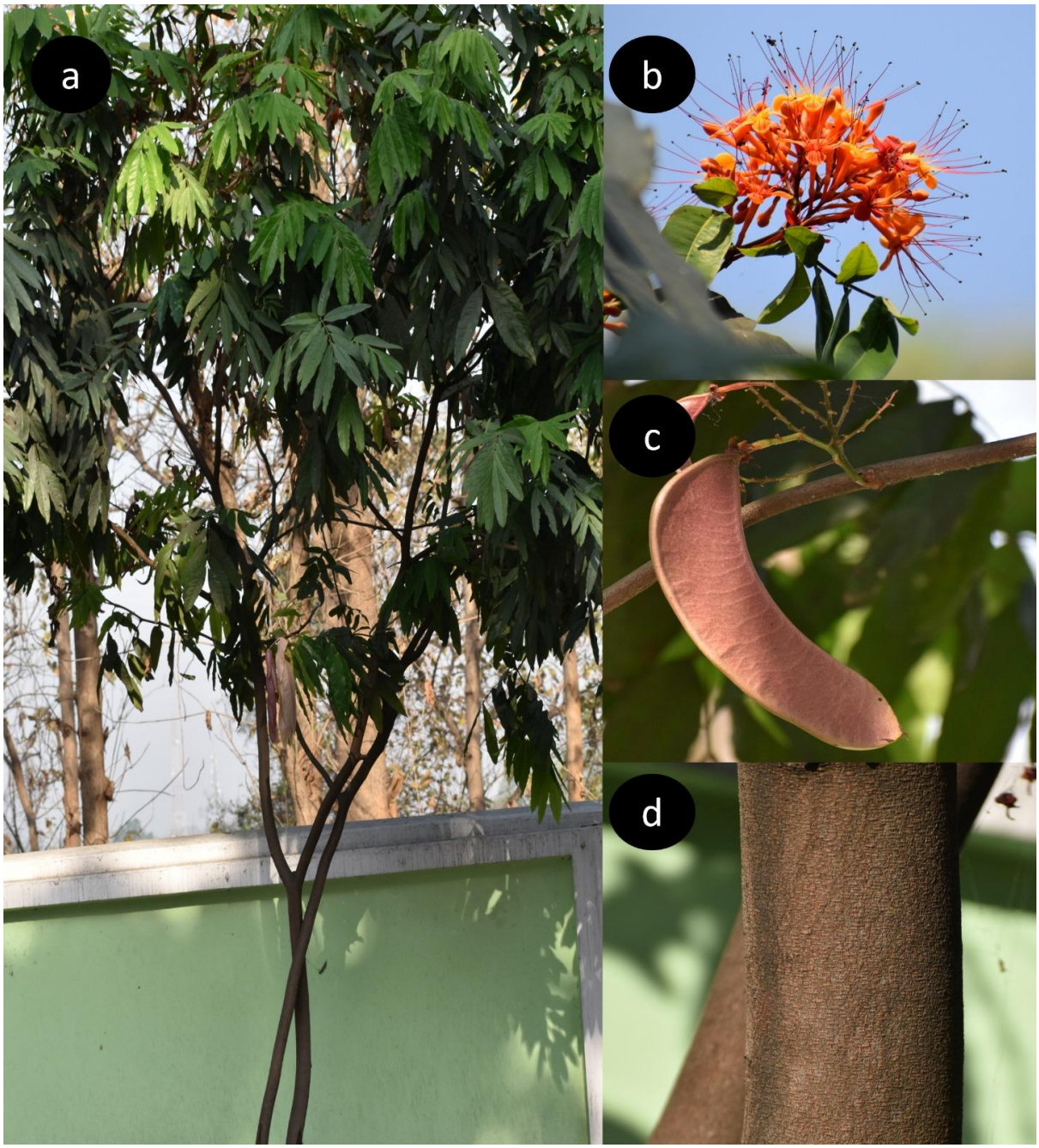

Plate 1: Plant parts of *Saraca asoca*

Despite these virtues, the species has been subjected to unsustainable exploitation driven by the herbal medicine industry, particularly due to the high demand for its bark in formulations like *Ashokarishta*. The current scenario highlights a pressing need to balance traditional medicinal utilization with modern conservation ethics to ensure the long-term viability of natural populations. From a pharmacological perspective, *S. asoca* presents tremendous potential for the discovery of novel bioactive compounds and the development of standardized herbal formulations. However, inconsistencies in extraction methods, dosage standardization, and compound isolation remain significant limitations in current

research (Singh et al., 2015). Future studies should focus on integrated phytochemical profiling, bioassay-guided fractionation, and molecular characterization to better understand the biochemical pathways and therapeutic mechanisms. Furthermore, combining traditional Ayurvedic wisdom with modern biotechnological tools such as metabolomics, genetic barcoding, and plant tissue culture can enhance both quality control and conservation outcomes. The development of sustainable cultivation models and agroforestry systems could also reduce dependency on wild populations while supporting rural livelihoods. In the broader context, *S. asoca* serves as a model species for the integration of cultural heritage with biodiversity conservation. Reviving traditional practices such as maintaining sacred groves, community-based planting drives, and temple garden restoration can reinforce ecological ethics at the grassroots level (Sumangala et al., 2017). Policies encouraging ex-situ conservation, public awareness, and inclusion in biodiversity management programs will play a pivotal role in preserving its genetic diversity. The future of *S. asoca* lies in adopting a holistic, interdisciplinary approach, linking ecology, pharmacology, and cultural sustainability. By bridging ancient reverence with scientific innovation, *S. asoca* can continue to inspire both conservation science and human well-being in the face of modern ecological challenges.

Conclusion

Saraca asoca stands as a symbol of harmony between nature, medicine, and culture, representing one of the most valued trees of the Indian subcontinent. The species exhibits significant ecological functions, supports diverse medicinal applications, and holds profound mythological and cultural reverence. However, increasing anthropogenic pressures and unsustainable harvesting threaten its natural populations. This review emphasizes the urgent need for integrated conservation strategies combining ecological restoration, scientific propagation, and traditional knowledge. Strengthening pharmacological research and promoting sustainable cultivation practices will not only safeguard its genetic resources but also enhance its role in healthcare and environmental stability. Conserving *S. asoca* is thus both a biological necessity and a cultural responsibility, ensuring that this sacred and scientifically important species continues to enrich ecosystems and human life for generations to come.

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