

Floristic Diversity and Cultural Significance of Traditionally Important Plants of Ayodhya District, Uttar Pradesh, India

Dinesh Kumar Bharti¹, Santosh Kumar²

^{1,2}*Department of Botany, K.S. Saket PG College, Ayodhya, Uttar Pradesh, India*

Abstract—Plants associated with religious traditions, cultural practices and indigenous knowledge constitute an important component of biocultural diversity in India. Ayodhya district of Uttar Pradesh represents a culturally significant landscape in which vegetation is closely associated with temples, sacred places, riverbanks, ponds, kunds, gardens, residential areas and rural landscapes. The present study documents the floristic diversity and traditional significance of plants associated with culturally important locations of Ayodhya district. Field-based documentation was undertaken across different habitat categories, including sacred, urban, rural and aquatic/wetland environments. A total of 75 traditionally significant plant species belonging to 44 families were documented. The recorded flora comprised trees, shrubs, herbs, climbers, vines, woody herbs, grasses and aquatic plants, demonstrating considerable ecological and functional diversity. Fabaceae, Poaceae and Moraceae represented prominent families in the documented flora, while several other families contributed multiple culturally important taxa. Representative species included *Ocimum tenuiflorum*, *Ficus religiosa*, *Ficus benghalensis*, *Aegle marmelos*, *Azadirachta indica*, *Saraca asoca*, *Nelumbo nucifera*, *Nymphaea nouchali*, *Cynodon dactylon*, *Butea monosperma*, *Phyllanthus emblica*, *Piper longum* and *Madhuca longifolia*. The documented plants have significance in religious offerings, ritual practices, traditional medicine, food, household uses and cultural symbolism. The findings indicate that culturally important vegetation in Ayodhya represents more than a collection of useful plants; it constitutes a living component of local biocultural heritage. Conservation of such flora therefore requires integration of botanical documentation, traditional ecological knowledge, habitat protection, sustainable management and community participation. The study provides a baseline for future quantitative ethnobotanical investigations and conservation planning in Ayodhya district.

Index Terms—Ayodhya, sacred plants, ethnobotany, traditional ecological knowledge, biocultural diversity, religious plants, floristic diversity, plant conservation

I. INTRODUCTION

Plants have historically occupied an important position in the cultural, religious and ecological traditions of the Indian subcontinent. Their association with rituals, festivals, worship, traditional medicine, food systems and cultural symbolism has resulted in the development of extensive bodies of traditional ecological knowledge. Ethnobotany provides an interdisciplinary framework for understanding these relationships between people and plants and also provides opportunities for linking cultural knowledge with biodiversity conservation (Cotton, 1996; Martin, 1995; Berkes, 2012). Sacred and traditionally significant plants are particularly important because their conservation may be supported by cultural values, customary practices and religious beliefs. Sacred groves and sacred natural sites have been recognized as important repositories of biodiversity and traditional knowledge (Gadgil & Vartak, 1976; Bhagwat & Rutte, 2006; Khan et al., 2008). Such landscapes may function as biocultural refugia where ecological diversity and cultural practices persist together (Barthel et al., 2013; Ekblom et al., 2019). Religious significance may also contribute to the continued cultivation and protection of particular plant species. Studies from different parts of India have documented the use of plants in Hindu rituals, traditional healthcare and cultural practices (Agarwal, 2014; Chandra, 2023; Arya & Kumar, 2022). Ethnobotanical investigations have further demonstrated that culturally important species can possess multiple uses, including medicinal, dietary,

ritual and household applications. The relationship between sacred plants and traditional knowledge is particularly relevant in areas undergoing rapid urbanization. Urban expansion can alter habitats and affect plant diversity, while culturally valued plants may continue to survive within temple compounds, home gardens, roadsides, institutional campuses and other managed landscapes. Urbanization is widely recognized as an important driver of changes in species richness and ecological structure (McKinney, 2002, 2008; Grimm et al., 2008). Ayodhya is an important cultural landscape of Uttar Pradesh in which religious traditions are closely connected with natural features such as the Sarayu River, temples, kunds, ponds, gardens and sacred locations. The district therefore provides an appropriate setting for studying the interaction between floristic diversity, cultural practices and traditional ecological knowledge.

Although numerous ethnobotanical studies have been undertaken in different parts of Uttar Pradesh and India, comparatively limited systematic documentation has focused specifically on the traditionally significant flora of Ayodhya. The present investigation was therefore undertaken to document the plant diversity associated with culturally important landscapes of Ayodhya and to examine its broader cultural, ecological and conservation significance.

II. OBJECTIVES OF THE STUDY

The study was undertaken with the following objectives:

1. To document traditionally and culturally significant plant species occurring in selected habitats of Ayodhya district.
2. To analyse the taxonomic and life-form diversity of the documented flora.
3. To record the association of plants with religious, traditional, medicinal and other cultural practices.
4. To examine the ecological and biocultural significance of traditionally important plants.
5. To identify conservation considerations for maintaining culturally significant plant diversity in the district.

III. STUDY AREA

Ayodhya district is situated in the central-eastern part of Uttar Pradesh and forms part of the Middle

Gangetic Plain. The landscape is characterized by alluvial terrain, agricultural land, settlements, wetlands, ponds, river-associated habitats and culturally important sites. The Sarayu River and associated aquatic and riparian environments contribute substantially to the ecological character of the district. The climate is broadly subtropical and monsoonal, with marked seasonal variation. Summer conditions are generally warm, the monsoon contributes the major proportion of annual rainfall, and winter is comparatively cool. The regional environment supports a diverse assemblage of cultivated, naturalized, ruderal, aquatic and traditionally maintained vegetation.

From a cultural perspective, Ayodhya contains numerous temples, religious establishments, kunds, ponds, riverfront sites, gardens and other locations where particular plant species are retained because of their cultural or religious importance. Such sites create a mosaic of habitats ranging from highly managed vegetation to semi-natural and aquatic environments. The coexistence of cultural sites and diverse ecological habitats makes Ayodhya a suitable landscape for studying plant–people relationships and biocultural diversity.

IV. MATERIALS AND METHODS

4.1 Field Survey and Sampling

Field observations were conducted in representative culturally important and ecologically distinct locations of Ayodhya district. Sampling was designed to encompass different habitat categories rather than restricting observations to a single vegetation type.

The major habitat categories considered were:

- Sacred and religious sites
- Urban and semi-urban habitats
- Rural landscapes
- Riverbanks and riparian habitats
- Ponds, kunds and wetlands
- Institutional and garden environments

Seasonal observations were undertaken to account for differences in plant occurrence, phenology and visibility.

4.2 Plant Documentation

Plants encountered during field observations were documented through direct observation and field photography. Relevant morphological characters were

recorded for identification. Where necessary, specimens were collected following standard herbarium procedures.

Field and herbarium techniques were based on established methodological approaches described by Jain and Rao (1977), Bridson and Forman (1998), and Martin (1995).

4.3 Plant Identification

Plant identification was undertaken using standard floristic literature and taxonomic resources, including regional floras and major Indian floristic references. Taxonomic nomenclature was cross-checked with contemporary botanical resources, including Plants of the World Online and World Flora Online where appropriate.

Major references used for botanical identification included Duthie (1903–1929), Hooker (1872–1897), Sharma et al. (1993), Sharma and Singh (2001), Mabberley (2017), Simpson (2019), POWO (2026) and WFO (2026).

4.4 Documentation of Traditional Significance

Information concerning traditional and cultural significance was compiled from field observations, local knowledge and published ethnobotanical literature.

Plants were categorized according to their reported association with:

- Religious and ritual practices
- Traditional medicine
- Food and edible uses
- Cultural symbolism
- Household uses
- Ecological and conservation functions

The study treats traditional knowledge as an important component of biocultural heritage and recognizes that cultural uses may vary among communities and locations.

4.5 Data Organization

The documented species were organized according to:

1. Family
2. Scientific name
3. Habit/life form
4. Habitat
5. Traditional or cultural significance
6. Medicinal or other documented uses

The final dataset comprised 75 plant species distributed among 44 families. The dataset included trees, shrubs, herbs, climbers, vines, woody herbs, grasses and aquatic plants.

V. RESULTS

5.1 Floristic Composition

The survey documented 75 traditionally significant plant species belonging to 44 families. The recorded flora demonstrated substantial taxonomic and ecological diversity and represented both naturally occurring and human-associated vegetation.

The flora included several major life forms, including:

- Trees
- Shrubs
- Herbs
- Climbers
- Vines
- Woody herbs
- Grasses
- Aquatic plants

The occurrence of these different life forms across sacred, urban, rural and aquatic environments indicates that cultural significance is not restricted to a particular growth form or habitat.

5.2 Family Representation

Among the documented families, Fabaceae, Poaceae and Moraceae were particularly prominent. The dataset contained approximately eight genera of Fabaceae, seven genera of Poaceae and six genera of Moraceae. Apocynaceae, Malvaceae, Arecaceae and Oleaceae were also represented by multiple genera.

The prominence of Fabaceae is consistent with the ecological and economic importance of this family in tropical and subtropical landscapes, whereas Poaceae represents an important component of grassland, agricultural and ruderal habitats. Moraceae includes several culturally significant trees, particularly species of Ficus.

Table 1. Summary of the documented traditionally significant flora

Parameter	Observation
Total plant species	75
Total families	44

Major life forms	Trees, shrubs, herbs, climbers, vines, woody herbs, grasses, aquatic plants
Major represented families	Fabaceae, Poaceae, Moraceae
Other multi-genera families	Apocynaceae, Malvaceae, Arecaceae, Oleaceae
Principal habitat categories	Sacred, urban, rural, aquatic/wetland

5.3 Representative Traditionally Significant Plants

Several plants documented in the dataset have strong cultural associations in Indian traditions.

Table 2. Representative culturally significant plant species recorded in the Ayodhya dataset

Species	Major cultural/traditional association
<i>Ocimum tenuiflorum</i>	Religious worship; traditional medicine
<i>Ficus religiosa</i>	Sacred tree; religious and cultural significance
<i>Ficus benghalensis</i>	Sacred tree; cultural and ritual significance
<i>Aegle marmelos</i>	Religious offerings; traditional medicine
<i>Azadirachta indica</i>	Traditional medicine; cultural and household significance
<i>Saraca asoca</i>	Religious and cultural significance; traditional medicine
<i>Nelumbo nucifera</i>	Religious symbolism; worship and cultural use
<i>Nymphaea nouchali</i>	Aquatic cultural significance
<i>Cynodon dactylon</i>	Ritual/religious use
<i>Butea monosperma</i>	Traditional and cultural significance
<i>Phyllanthus emblica</i>	Traditional medicine and food
<i>Piper longum</i>	Traditional medicine and culinary significance
<i>Madhuca longifolia</i>	Food, traditional and livelihood significance
<i>Curcuma longa</i>	Ritual, food and traditional medicinal use
<i>Datura metel</i>	Religious/ritual association
<i>Santalum album</i>	Religious use and cultural symbolism
<i>Desmostachya bipinnata</i>	Ritual/religious significance
<i>Imperata cylindrica</i>	Traditional use

<i>Neolamarckia cadamba</i>	Cultural and religious association
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Note: The table represents documented examples from the study dataset and is not intended to imply that each species has identical uses throughout the district.

5.4 Habitat Diversity

Traditionally significant plants occurred across markedly different habitats. Sacred and religious locations supported culturally valued trees, herbs and ornamentals, while urban and residential environments contained cultivated and naturalized species. Rural environments contributed additional medicinal, food, fodder and culturally useful plants. Aquatic habitats supported lotus, water lilies and other wetland-associated taxa.

The occurrence of culturally important plants in aquatic and riparian habitats is particularly noteworthy because wetlands provide ecological services in addition to supporting culturally valued species. Wetlands are recognized as important components of tropical and subtropical landscapes and require integrated ecological management (Gopal, 2013; Mitsch & Gosselink, 2015).

5.5 Cultural and Medicinal Significance

The documented flora displayed overlapping categories of use. A plant regarded as sacred may simultaneously possess medicinal, nutritional, ecological or household importance. This multifunctionality is characteristic of ethnobotanical plant resources.

For example, *Ocimum tenuiflorum* has both strong religious associations and documented therapeutic significance. Pattanayak et al. (2010) reviewed its pharmacological and therapeutic importance. Similarly, *Aegle marmelos*, *Azadirachta indica*, *Phyllanthus emblica* and *Piper longum* represent plants whose cultural importance occurs alongside traditional medicinal use.

Such overlap demonstrates that cultural classification and utilitarian classification should not be treated as mutually exclusive categories.

VI. DISCUSSION

6.1 Ayodhya as a Biocultural Landscape

The documentation of 75 species belonging to 44 families demonstrates that culturally important

vegetation in Ayodhya is floristically diverse. The distribution of plants across sacred, urban, rural and aquatic environments indicates that the cultural flora of the district is embedded within the wider landscape rather than being confined to isolated religious sites. This finding is consistent with the broader concept of biocultural diversity, in which biological and cultural diversity interact and reinforce one another. Traditional ecological knowledge can contribute to the recognition, maintenance and sustainable use of biological resources (Gadgil et al., 1993; Berkes, 2012; Singh et al., 2021).

6.2 Sacred Plants and Conservation

The cultural protection of particular plants may contribute indirectly to their persistence. Sacred trees and plants maintained within temples, religious compounds and culturally important locations can function as small refuges within increasingly modified landscapes.

Previous studies have emphasized the conservation value of sacred groves and sacred natural sites (Bhagwat & Rutte, 2006; Blicharska et al., 2013; Kandari et al., 2014). However, the conservation significance of culturally protected individual trees, temple vegetation, sacred ponds and river-associated plants also deserves attention.

In Ayodhya, such culturally managed habitats can potentially contribute to local conservation by maintaining mature trees, perennial plants and aquatic vegetation.

6.3 Traditional Ecological Knowledge

Traditional ecological knowledge represents accumulated observations and practices developed through long-term interactions between communities and their environments. Documentation of plant-related knowledge is particularly important where modernization and changes in land use may reduce opportunities for intergenerational transmission.

Studies from different regions of India have demonstrated considerable ethnobotanical knowledge relating to medicinal and ritual plants (Kala, 2005; Kumar et al., 2021; Kumar & Singh, 2022a, 2022b). Similar documentation in Ayodhya can provide a baseline for understanding how cultural practices influence plant selection and maintenance.

Traditional knowledge should, however, be documented with appropriate recognition of

knowledge holders and should not be treated simply as an unrestricted resource for extraction or commercialization.

6.4 Medicinal and Multifunctional Plants

A substantial component of the culturally important flora consists of species with medicinal or multipurpose uses. The overlap between sacred and medicinal plants has been widely reported in ethnobotanical literature.

The multifunctionality of plants is important from a conservation perspective because species used for multiple purposes may experience greater harvesting pressure. Sustainable collection, cultivation and propagation may therefore be required for species that are simultaneously culturally valued and therapeutically utilized.

Hamilton (2004) emphasized the close relationship between medicinal plant conservation and rural livelihoods, while recent ethnobotanical studies continue to highlight the importance of documenting traditional medicinal knowledge alongside conservation measures.

6.5 Aquatic and Wetland Flora

The presence of culturally significant aquatic plants such as *Nelumbo nucifera* and *Nymphaea nouchali* highlights the importance of ponds, kunds and other wetlands within the cultural landscape.

Wetlands perform ecological functions including water regulation, habitat provision and support for biodiversity. Their cultural importance can potentially strengthen conservation motivation. Conversely, degradation of culturally important ponds and wetlands can result in simultaneous loss of ecological and cultural values.

Consequently, conservation planning for Ayodhya should consider sacred and culturally significant wetlands as integrated socio-ecological systems.

6.6 Urbanization and Changing Plant Diversity

Urbanization can alter plant communities through habitat fragmentation, construction, pollution, introduction of ornamental species and changes in land management. Nevertheless, urban cultural landscapes may retain valuable vegetation in temples, gardens, institutional campuses, roadside spaces and household compounds. McKinney (2002, 2008) and Grimm et al. (2008) emphasized the ecological consequences of

urbanization for biodiversity. In Ayodhya, culturally significant vegetation may therefore have an additional role as part of an urban ecological network.

VII. CONSERVATION IMPLICATIONS

The present study indicates several potential conservation priorities.

7.1 Conservation of Sacred Trees

Old individuals of culturally important trees such as *Ficus religiosa*, *Ficus benghalensis*, *Aegle marmelos* and other traditionally protected species should be documented and conserved as living biocultural heritage.

7.2 Protection of Sacred Wetlands

Culturally important ponds, kunds and wetland habitats should be considered not merely as water bodies but as ecological and cultural assets.

7.3 Documentation of Traditional Knowledge

Systematic documentation of local names, plant uses, rituals, harvesting practices and knowledge-transmission pathways can help preserve traditional ecological knowledge.

7.4 Sustainable Harvesting

Plants used for medicinal, ritual or commercial purposes should be harvested sustainably. Where demand is high, community-based cultivation and propagation should be encouraged.

7.5 Ex-situ Conservation

A living collection of culturally significant plants could be maintained in botanical gardens and institutional campuses. Such collections can support education, conservation and propagation.

7.6 Community Participation

Local residents, religious institutions, traditional practitioners, students and educational institutions can contribute to the conservation of culturally important flora.

VIII. LIMITATIONS OF THE STUDY

The present investigation provides a floristic and qualitative account of traditionally significant plants but should be considered a baseline study. The current

dataset does not provide sufficient information to calculate robust quantitative ethnobotanical indices such as Use Value, Fidelity Level, Informant Consensus Factor or Cultural Importance Index for every species. Likewise, species-specific abundance, population density, frequency, Importance Value Index and detailed GPS-based distribution should be analysed separately when complete field records are available.

Future research should therefore combine floristic documentation with quantitative ethnobotanical methods and population-level ecological assessment.

IX. FUTURE RESEARCH DIRECTIONS

Future investigations in Ayodhya may focus on:

1. Quantitative assessment of cultural importance of individual plant species.
2. Comparative analysis of sacred, urban, rural and wetland habitats.
3. Documentation of age and conservation status of sacred trees.
4. Assessment of traditional knowledge transmission between generations.
5. Population assessment of frequently harvested medicinal and ritual plants.
6. Development of a digital database of Ayodhya's culturally significant flora.
7. DNA barcoding and molecular authentication of selected medicinal plants.
8. Establishment of a living conservation collection of sacred and traditional plants.
9. Long-term monitoring of culturally significant wetlands and riverbank vegetation.
10. Integration of ethnobotanical knowledge into local biodiversity conservation planning.

X. CONCLUSION

The present study documented 75 traditionally significant plant species belonging to 44 families in the culturally and ecologically diverse landscape of Ayodhya district. The documented flora encompasses a broad range of life forms and habitats and demonstrates that plant diversity in Ayodhya is closely interwoven with religious traditions, traditional knowledge, medicine, food systems and cultural practices.

The importance of the documented flora extends beyond individual plant uses. Sacred trees, ritual herbs, medicinal plants, aquatic species and culturally managed habitats collectively form an important component of the district's biocultural heritage. The conservation of this heritage therefore requires an integrated approach combining floristic research, habitat protection, sustainable utilization, documentation of traditional ecological knowledge and community participation.

Ayodhya's traditionally significant flora should consequently be regarded as a living biocultural resource rather than simply a list of ethnobotanical species. Systematic documentation and long-term monitoring can provide a scientific foundation for conserving culturally valued plants while maintaining the ecological functions and traditional knowledge associated with them.

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