



Research paper

# Traditional Knowledge and Sustainable Use of Wild Edible and Medicinal Plants in Tirunelveli District, Tamil Nadu, India

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## ABSTRACT

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This study investigates the traditional knowledge surrounding the use of wild edible and medicinal plants among traditional healers in Tirunelveli District, Tamil Nadu, India. These healers play a crucial role in safeguarding and transmitting indigenous wisdom about local flora with therapeutic and nutritional applications. By employing methods such as structured interviews, participant observation, and field visits, the research catalogs the diversity of plant species, their preparation techniques, and utilization patterns. The findings underscore the richness of traditional knowledge and the indispensable role wild plants play in local healthcare and nutrition systems. This study also emphasizes the urgent need to preserve this heritage in the face of modern challenges, offering valuable insights for future research and promoting the sustainable use of plant resources.



## 1. Introduction

The traditional knowledge of wild edible and medicinal plants has long served as a cornerstone of healthcare and nutrition in rural communities worldwide (Hassan et al., 2024). In India, with its rich biodiversity and diverse ecosystems, indigenous knowledge of medicinal plants is deeply embedded in the practices of traditional healers (Haque et al., 2018; Pan et al., 2014). These healers, often regarded as custodians of this invaluable wisdom, utilize a wide range of wild plants to address various ailments and supplement local diets (Rahman et al., 2022; Chinsamy & Koitsiwe, 2016). In particular, Tirunelveli District in Tamil Nadu boasts a remarkable variety of wild plants that have been traditionally used for both healthcare and nutritional purposes.

In remote regions where access to modern healthcare is limited, traditional healers play a pivotal role in preserving and transmitting knowledge about medicinal plants (Anju & Kumar, 2024). They rely on locally available wild plants to prepare remedies for common ailments such as fever, digestive disorders, skin infections, and respiratory conditions (Murthy & Vidyasagar, 2013; Rehman et al., 2023). Beyond their medicinal value, many of these plants also serve as essential sources of nutrition, contributing to the dietary diversity of rural communities. Traditional healers possess intricate knowledge of plant identification, collection, preparation, and administration, forming the foundation of local healthcare systems (Mukherjee et al., 2021; Reddy, 2023).

Research has highlighted the cultural and practical significance of wild edible and medicinal plants in traditional medicine (Balick & Cox, 1996; Pushpangadan et al., 2000). However, this knowledge is increasingly at risk due to factors such as urbanization, globalization, reliance on modern medicine, and environmental degradation (Gupta et al., 2013). With many traditional healers aging and younger generations leaning towards contemporary healthcare practices (Gorman, 2017), the loss of this invaluable knowledge is becoming a growing concern unless documented and preserved (Nakashima & Krupnik, 2018; Kumar & Lakshminarayana, 2024). Situated in southern Tamil Nadu, Tirunelveli District is celebrated for its diverse flora, including numerous species with medicinal and nutritional properties (Ragupathy, 1999; Radha et al., 2021). Its unique geographical and climatic conditions create an ideal environment for studying traditional plant knowledge systems (Sharma et al., 2023; Wang & Chiou, 2019). Nevertheless, there remains a pressing need for comprehensive documentation of plant species, their preparation techniques, and their therapeutic applications.

This study aims to investigate the traditional knowledge of wild edible and medicinal plants among healers in Tirunelveli District, Tamil Nadu. It seeks to document the plant species used, preparation methods, and associated healing practices (Duche-Pérez et al., 2024; Mutheeswaran et al., 2011). By doing so, the research will shed light on how these plants are integrated into local healthcare systems while highlighting the urgent need to preserve this knowledge amid environmental and societal changes (Gómez-Baggethun et al., 2013; Bardsley, 2015). The findings will also provide insights into the sustainable use of wild plant resources, contributing to biodiversity conservation and cultural heritage preservation (Bridgewater & Rotherham, 2019; Corrigan et al., 2016).

Through structured interviews, field observations, and an analysis of local medicinal plant practices (Avigdor et al., 2014; Weckerle et al., 2018), this study aims to offer a comprehensive understanding of the knowledge traditional healers possess regarding plant-based remedies and food sources in Tirunelveli District (Priyadharshana et al., 2022; Esakkimuthu et al., 2018; Ayyanar & Ignacimuthu, 2011). Documenting and preserving this knowledge is crucial for promoting sustainable practices in healthcare and nutrition (Prosen et al., 2023), benefiting not only local communities but also global conservation and resource management efforts (Rampheri & Dube, 2021; Armitage et al., 2020).

## 2. Methodology

This study adopted a comprehensive ethnobotanical approach to document the knowledge and practices of traditional healers regarding wild edible and medicinal plants in Tirunelveli District (Phillips, 1996; Giday et al., 2009). The research aimed to capture both the therapeutic and nutritional uses of these plants by engaging directly with local healers who possess extensive knowledge of indigenous flora. A combination of qualitative and field-based methods was employed, including semi-structured interviews, participant observation, and focused group discussions (Romero et al., 2019; Lillis, 1999).

In-depth interviews were conducted with traditional healers, herbalists, and knowledgeable community members to gather insights into the identification, preparation, and application of wild plants. Data collection focused on specific plant species used for ailments, the plant parts utilized, and preparation methods (Ksouri et al., 2012). Additionally, the study explored the cultural significance of these plants and their role in the local food system.

Ethical considerations were rigorously followed, with informed consent obtained from all participants. Field visits were conducted to observe plant collection practices and document the natural

habitats of the species. This ethnobotanical approach provided a holistic understanding of how local communities in Tirunelveli depend on wild plants for health and nutrition, emphasizing the importance of preserving this traditional knowledge for future generations.

### 3. Study Area

The research was conducted over 13 months, from June 2022 to July 2023, in rural areas of Tirunelveli District. This region is characterized by its diverse ecosystems, including dry forests, wetlands, and agricultural landscapes, which support a wide range of wild plant species with medicinal and edible value.

#### 3.1 Study Population

Traditional healers with a minimum of 10 years of experience were selected using local networks and recommendations from community members. These individuals were identified based on their reputation and expertise in utilizing wild plants for healthcare and nutritional purposes. A total of 25 healers participated in the study, representing different villages across the district.

#### 3.2 Data Collection Techniques

##### 3.2.1 Structured Interviews

Healers were engaged in detailed interviews to gather information about plant species, their local names, preparation methods, therapeutic uses, and any cultural or spiritual practices associated with their use.

##### 3.2.2 Participant Observation

Field visits were conducted to observe the collection, preparation, and application of plants in their natural context. These observations provided real-time insights into the traditional practices and methods employed by the healers.

##### 3.2.3 Focus Group Discussions

Group discussions were organized to facilitate knowledge exchange among healers. These sessions revealed shared practices, regional variations, and unique insights into plant use within the community.

##### 3.2.4 Plant Identification and Documentation

Plant specimens were collected during field visits and identified in collaboration with local botanists. Herbarium samples were prepared, cataloged, and stored for future reference to validate species identification and ensure accuracy in documentation.

### 3.3 Data Analysis

Thematic analysis was employed to identify patterns and themes in plant usage, preparation methods, and associated practices. Descriptive statistics were used to summarize the frequency of plant mentions and their applications. Cross-referencing with existing scientific databases validated the medicinal and nutritional properties of the documented plants.

### 3.4 Ethical Considerations

Ethical guidelines were strictly adhered to throughout the study. Informed consent was obtained from all participants, ensuring their voluntary involvement and understanding of the study's purpose. Confidentiality was maintained, and the shared knowledge was documented responsibly, respecting the intellectual property rights of the healers.

## 4. Results

### 4.1 Diversity of Plant Species

The study identified a total of 137 plant species, categorized into medicinal plants (40 species) and wild edible plants (97 species) (Fig 1). Notable medicinal plants included *Andrographis paniculata*, widely used for treating fever and infections, and *Azadirachta indica* (neem), renowned for its detoxifying and wound-healing properties. Common wild edible plants included *Moringa oleifera*, valued for its high nutritional content, and *Portulaca oleracea*, a rich source of omega-3 fatty acids and essential vitamins.

### 4.2 Preparation Methods

Traditional healers utilized various preparation methods tailored to specific ailments. Decoctions made from neem leaves were frequently used to treat skin infections, while powdered roots of *Solanum virginianum* were prepared as a remedy for respiratory issues and immune enhancement. Other methods included preparing pastes, infusions, and oils, often accompanied by rituals or prayers to enhance their efficacy (Fig 2).

### 4.3 Cultural Significance

Many plants held significant cultural and spiritual value within the community. For instance, *Ocimum sanctum* (Tulsi) was revered as sacred and commonly used in household remedies and religious ceremonies. The integration of spiritual practices with plant usage reflected a holistic approach to healthcare and well-being (Fig 3).

### 4.4 Sustainability Practices

Traditional healers emphasized sustainable harvesting techniques to ensure the regeneration of plant species. Practices such as collecting only mature plants, seed replanting, and seasonal harvesting were commonly observed. However, challenges like habitat destruction, overharvesting, and climate change were identified as major threats to the availability and sustainability of these plant resources.

### 4.5 Challenges

The study revealed several challenges impacting the preservation and continuity of traditional knowledge:

**Urbanization:** Rapid urban expansion has led to habitat loss and a decline in the availability of wild plant species.

**Intergenerational Knowledge Gap:** Younger generations exhibit limited interest in traditional practices, leading to a gradual erosion of indigenous knowledge.

**Climate Change:** Changes in rainfall patterns and temperature fluctuations have been found to affect

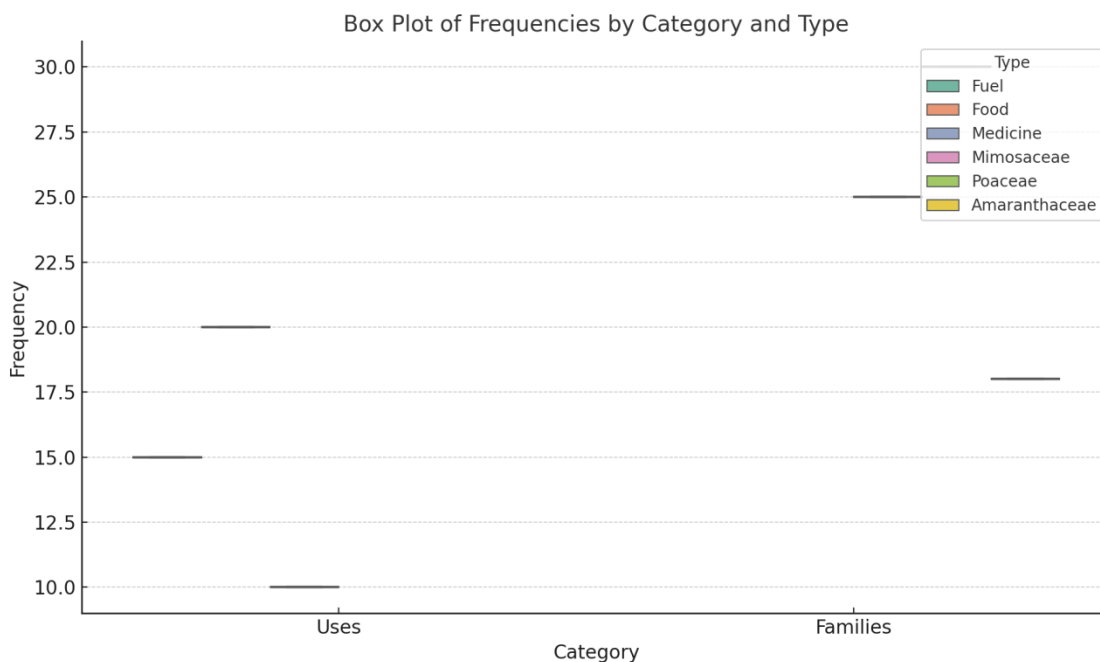


Fig. 1 Box plot showing frequency Distribution Across Categories (Uses and Families)

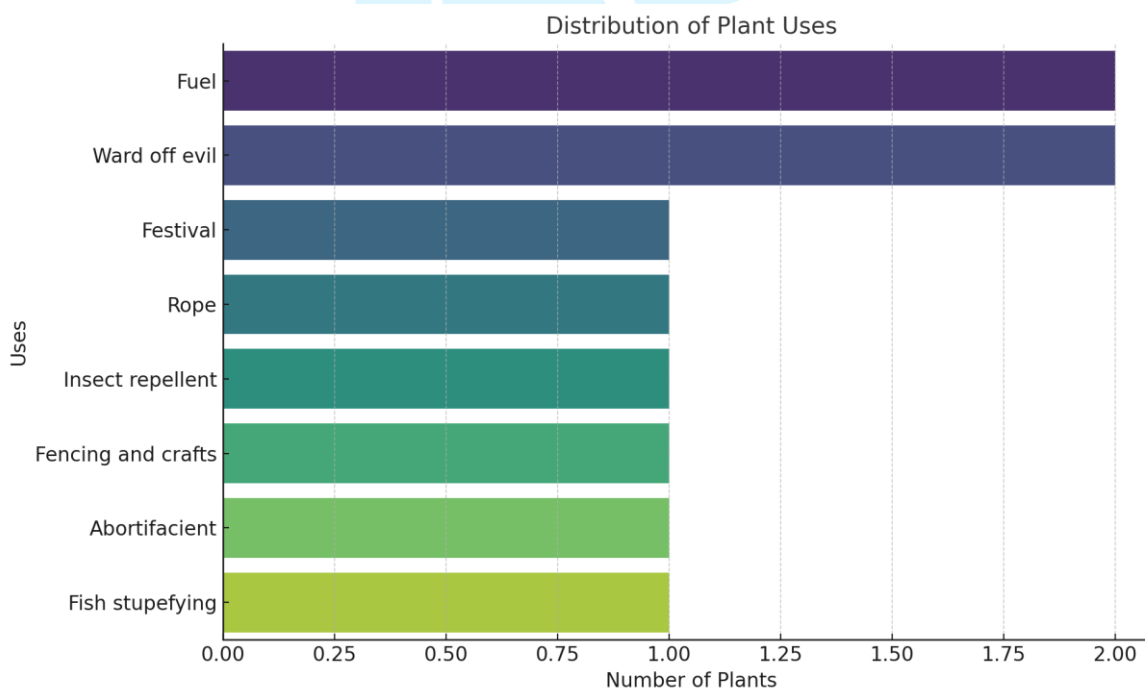
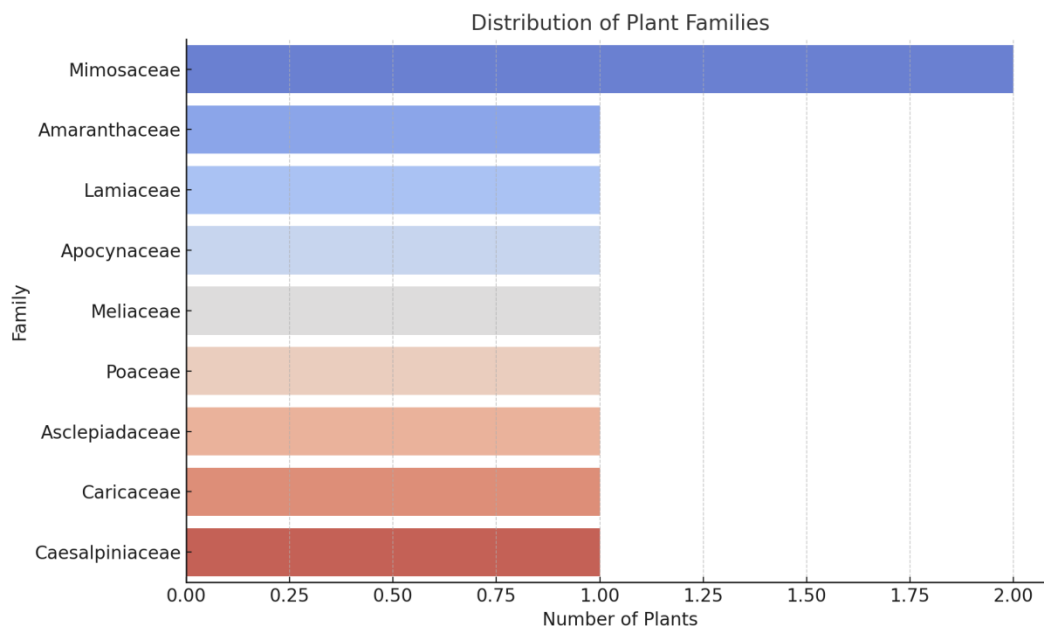


Fig. 2 Distribution of Plant Uses Based on the Number of Plant Species



**Fig. 3** Distribution of number of families and number of plants used

## 5. Discussion

This study provides valuable insights into the traditional knowledge and utilization of wild edible and medicinal plants by healers in Tirunelveli District, Tamil Nadu, India (Kuusisto & Meyer, 2003; Halinen et al., 2014). The findings highlight the depth of indigenous wisdom, particularly in the diverse applications of wild plants for both medicinal and nutritional purposes (Vanila et al., 2008; Silambarasan et al., 2023). Traditional healers employ a wide range of plant species to treat ailments such as digestive disorders, skin diseases, and respiratory issues. Additionally, many of these plants contribute significantly to local diets, especially in rural areas with limited access to commercial food products. The multifunctional nature of these plants, serving both as remedies and nutritional resources, plays a vital role in sustaining the health and well-being of local communities (Sharma & Wagh, 2024; Kumar & Goel, 2019; Salim et al., 2023).

However, the study also identifies significant challenges in preserving this invaluable knowledge. Modern healthcare systems, changing lifestyles, and environmental degradation are gradually eroding traditional practices. Furthermore, biodiversity loss, including the decline of specific medicinal plant species, threatens the sustainability of traditional healing systems. These findings align with previous research emphasizing the need to safeguard indigenous knowledge for both cultural and ecological resilience (Stevenson, 1996).

The study underscores two primary implications. First, it calls for urgent conservation measures targeting both plant species and traditional knowledge systems. Second, it advocates for further research to explore the pharmacological properties of these plants and their potential integration into modern

healthcare and nutrition (Reimer et al., 2012; Derso et al., 2024). Future studies should focus on scientifically validating these traditional remedies and identifying pathways for their incorporation into contemporary medical practices.

### 5.1 Importance of Wild Edible and Medicinal Plants

The findings reaffirm the critical role of wild edible and medicinal plants in rural healthcare and nutrition systems in Tirunelveli District. As noted by Balick and Cox (1996), plants have long been central to traditional medicine for addressing a wide array of health concerns. Key species such as *Andrographis paniculata* (Kalmegh), *Azadirachta indica* (Neem), and *Solanum virginianum* (Kandangkathari) are widely recognized for their effectiveness in treating ailments like fever, skin infections, and digestive disorders (Pushpangadan et al., 2000; Subramanian et al., 2012; Eid et al., 2017; Singh & Singh, 2010). Wild edible plants such as *Moringa oleifera* (Drumstick) (Matic et al., 2018) and *Cucumis melo* (Wild Melon) (Memon et al., 2018) are also essential sources of micronutrients, addressing dietary deficiencies in rural populations. These plants, therefore, play a dual role in promoting healthcare and food security, underscoring the urgent need to conserve plant biodiversity (Ragupathy, 1999).

### 5.2 Preparation Methods and Usage

Traditional healers in Tirunelveli District employ diverse preparation methods, including decoctions, powders, pastes, and teas, reflecting their deep understanding of plant properties. These techniques mirror traditional healing practices documented across India (Jain, 1995; Weckerle et al., 2010). For instance, decoctions made from neem and tulsi leaves

are commonly used to treat infections, aligning with their well-documented efficacy in Indian ethnobotanical studies (Pushpangadan et al., 2000). Furthermore, the use of plant combinations, such as neem with turmeric for treating skin conditions, highlights the healers' sophisticated knowledge of plant interactions. Although these practices often lack formal scientific validation, their consistent effectiveness underscores the need to integrate them into broader healthcare systems.

### 5.3 Cultural and Spiritual Dimensions

The cultural and spiritual significance of wild plants is another key aspect highlighted by the study. Sacred plants like *Ocimum tenuiflorum* (Tulsi) and *Azadirachta indica* (Neem) are not only used for medicinal purposes but also hold religious and spiritual importance in rural Tamil Nadu. These plants are central to rituals and daily practices, reflecting a holistic approach to healing where cultural identity and medicinal practices are deeply intertwined (Ragupathy, 1999). Traditional healers often incorporate spiritual rituals into their treatments, providing a culturally relevant and comprehensive healing approach. These observations align with Gupta et al.'s (2013) findings that traditional knowledge systems are inherently tied to social and cultural contexts.

### 5.4 Challenges to Knowledge Preservation and Plant Conservation

The study identifies multiple challenges threatening the preservation of traditional knowledge and plant resources. Urbanization, deforestation, and changing land-use patterns have resulted in significant habitat loss for key medicinal plants such as *Andrographis paniculata* and *Gymnema sylvestre* (Raj et al., 2019). These findings echo Balick and Cox's (1996) concerns about the negative impact of deforestation on medicinal plant diversity. Additionally, younger generations show declining interest in traditional medicine, favoring modern healthcare systems instead. Overexploitation of high-demand medicinal plants further compounds these challenges, underscoring the need for sustainable harvesting practices and broader conservation initiatives.

### 5.5 Implications for Conservation and Future Research

The findings highlight the urgent need for conservation strategies focusing on habitat preservation, sustainable harvesting, and cultivation of high-demand medicinal plants. Community-based programs involving traditional healers can play a crucial role in managing plant resources and preserving indigenous knowledge. Furthermore,

scientific validation of traditional remedies through pharmacological studies can enhance their credibility and support their integration into modern healthcare systems. Such efforts will not only preserve traditional knowledge but also create sustainable medicinal products, benefiting both local communities and global markets.

Future research should prioritize documenting and digitizing traditional knowledge to ensure its long-term preservation. Collaborative efforts between ethnobotanists, traditional healers, and local communities are essential for building comprehensive databases that encompass plant species, medicinal uses, cultural practices, and conservation strategies. Bridging traditional knowledge and scientific research will pave the way for a more holistic approach to healthcare and biodiversity conservation.

## 6. Conclusion

This study highlights the significant role of wild edible and medicinal plants in healthcare and nutrition systems in Tirunelveli District. Traditional healers exhibit extensive expertise in utilizing plants to treat ailments and address nutritional needs. The study documented 137 plant species with applications ranging from treating fevers and skin infections to alleviating stress-related disorders. Additionally, wild edible plants like *Moringa oleifera* and *Cucumis melo* contribute to food security in rural areas. Despite their importance, challenges such as deforestation, urbanization, overexploitation, and shifting healthcare preferences threaten the sustainability of both these plants and the knowledge associated with them. Effective conservation strategies, including habitat preservation, sustainable harvesting, and the cultivation of medicinal plants, are crucial.

Moving forward, collaborative documentation, scientific validation, and integration of traditional knowledge into healthcare systems are essential for sustainable outcomes. This study underscores the importance of balancing development with cultural and ecological preservation to ensure a resilient future for traditional knowledge systems and biodiversity conservation.

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### Declaration of Conflict

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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