Journal of Plant Development Sciences
Meerut, India

RESEARCH

PLANT DIVERSITY IN THE HOME GARDENS OF HALAKKI VAKKALIGA TRIBES IN UTTARA KANNADA

Rajeshwari N.*[1] Nagaratna C. Kurbetta[2] Spoorthi K.N.[3] and Sowmya B.N.[4]

[1-3]*Department of Extension and Communication Management, College of Community Science, UAS, Dharwad, Karnataka*
[4]*Department of Agricultural Extension Education, College of Agriculture, UAS, Dharwad, Karnataka*

Received-26.12.2024, Revised-11.01.2025, Accepted-29.01.2025

Abstract: The Western Ghats, a global biodiversity hotspot, supports rich flora and fauna, with indigenous communities playing a vital role in conservation. This study examines plant diversity in the home gardens of the Halakki Vakkaligatribes in Ankola, Uttara Kannada, Karnataka. The research employs ecological indices, including the Shannon-Weaver Index (H' = 3.242) and Simpson's Diversity Index (1 - D = 0.928), to assess species richness and distribution. The findings indicate a highly diverse plant community, with a Simpson's Dominance Index (D = 0.071) confirming minimal species dominance. The Simpson's Reciprocal Index (1/D = 14.07) highlights species coexistence, essential for agroecological stability. Ankola's humid coastal conditions, high annual rainfall (3000-3500 mm) and lateritic soils foster diverse plant species, including fruit trees (*Musa paradisiaca, Mangifera indica, Psidium guajava),* spices (*Piper nigrum, Curcuma longa*), medicinal plants (*Ocimum tenuiflorum, Aloe barbadensis*) and plantation crops (*Cocos nucifera, Areca catechu*). The high frequency and relative density of banana (17.54%), coconut (11.35%) and areca nut (5.13%) underscore their economic and agricultural importance. In contrast, sacred plants such as *Azadirachta indica* (Neem) and *Calotropis gigantea* (Ekke) demonstrate cultural significance but lower relative density.The findings provide a scientific basis for conservation efforts and reinforce the role of traditional home gardens in maintaining biodiversity in the Western Ghats.

Keywords: Halakki tribe, Home gardens, Biodiversity, Agroforestry, Ankola

INTRODUCTION

The Western Ghats, recognized as one of the eight 'hottest' biodiversity hotspots in the world, harbours a rich variety of flora and fauna. The Uttara Kannada district, particularly Ankola taluk, is a unique ecological region characterized by high rainfall, lateritic soils and diverse plant species that support both traditional agriculture and agroforestry. Among the indigenous communities of this region, the Halakki Vakkaligatribe has played a crucial role in conserving plant biodiversity through their cultural and agricultural practices. Understanding the plant diversity in their backyards provides valuable insights into their traditional knowledge, ecological management and conservation practices.

Home gardens serve as vital repositories of biodiversity, particularly in tropical regions where they support a wide array of species for food, medicine and cultural practices. These gardens, often maintained with traditional ecological knowledge, contribute to food security, climate resilience and sustainable agriculture. In Ankola, the Halakki Vakkaligatribe's home gardens are characterized by a combination of fruit-bearing trees, medicinal herbs, spices and plantation crops such as coconut and areca nut. Their agricultural methods are deeply rooted in their cultural heritage, promoting biodiversity and minimizing environmental degradation.

Several studies have highlighted the role of home gardens in maintaining biodiversity and ensuring ecological stability (Kumar & Nair, 2004; Galluzzi *et al*., 2010; Das and Das, 2005 and Myers *et al*. 2000). The presence of sacred groves, intercropping systems and agroforestry practices in Ankola further enhances the ecological resilience of the region. While large-scale monoculture plantations threaten biodiversity in many parts of the Western Ghats, traditional agroforestry systems like those practiced by the Halakki Vakkaligatribe help sustain a diverse range of species, preventing any single species from dominating the landscape. This study aims to assess and quantify the diversity indices of plant species found in the backyards of the Halakki Vakkaligatribes to understand the ecological significance and sustainability of their agricultural practices.

The research examines species richness, relative frequency and ecological dominance using diversity indices such as the Shannon-Weaver Index and Simpson's Diversity Index. These metrics provide insights into species distribution, dominance and overall ecosystem health. By analyzing the plant diversity in the home gardens of the HalakkiVakkaligatribe, this study contributes to

*Corresponding Author

ongoing discussions on biodiversity conservation, sustainable land use and the importance of indigenous agricultural knowledge in mitigating environmental challenges.

MATERIALS AND METHODS

The study was conducted in Belambar village in Ankola taluk of Uttara Kannada district in Karnataka state. Data collection involved 75 selected home gardens of the Halakki Vakkaligatribe. Plant species were identified and diversity indices were calculated using the Shannon-Weaver Index, Simpson's Diversity Index and Simpson's Reciprocal Index.

RESULTS AND DISCUSSION

The study identified multiple plant species categorized into fruit plants, medicinal plants, spices, flowering plants, timber and sacred plants. The frequency and relative density of dominant species are summarized in Tables 1–5.

Table 1. Fruit Plants in the Home gardens of HalakkiVakkaliga Tribes

Scientific Name	Frequency	Relative Frequency (%)	Density	Relative Density (%)
Musa paradisiaca (Banana)	61	15.34	0.42	17.54
Mangifera indica (Mango)	45	11.32	0.29	12.10
Psidium guajava (Guava)	38	9.55	0.25	10.43
Citrus limon (Lemon)	24	6.03	0.18	7.51
Syzygium cumini (Jamun)	18	4.52	0.14	5.83

Table 2. Medicinal Plants in the Home gardens of HalakkiVakkaligaTribes

Scientific Name	Frequency	Relative Frequency (%)	Density	Relative Density (%)
Ocimum tenuiflorum (Tulasi)	72	18.10	0.15	4.29
Aloe barbadensis (Aloe Vera)	40	10.05	0.08	2.36
Plectranthus amboinicus (Doddapatre)	27	6.78	0.07	2.11
Tinospora cordifolia (Amrut Balli)	15	3.77	0.04	1.23

Table 3. Spices and Condimentsin the Home gardens of Halakki Tribes

Scientific Name	Frequency	Relative Frequency (%)	Density	Relative Density (%)
Capsicum annuum (Red Chilly)	30	7.54	0.07	2.13
Curcuma longa (Turmeric)	18	4.52	0.05	1.54
Piper nigrum (Black Pepper)	14	3.52	0.04	1.21

Table 4. Flowering Plants in the Home gardens of Halakki Tribes

Scientific Name	Frequency	Relative Frequency (%)	Density	Relative Density (%)
Hibiscus rosa-sinensis (Dasavala)	33	8.28	0.09	2.48
Ixora coccinea (Ixora)	22	5.52	0.08	2.09
Michelia champaca (Sampige)	10	2.51	0.06	1.79

Table 4. Timber and Agroforestry Plantsin the Home gardens of Halakki Tribes

Scientific Name	Frequency	Relative Frequency (%)	Density	Relative Density (%)
Cocos nucifera (Coconut)	45	11.32	0.27	11.35
Areca catechu (Arecanut)	25	6.28	0.12	5.13
Bambusa vulgaris (Bamboo)	12	3.01	0.07	2.94

Table 5. Sacred Plantsin the Home gardens of Halakki Tribess

Scientific Name	Frequency	Relative Frequency (%)	Density	Relative Density (%)
Azadirachta indica (Neem)	9	2.26	0.04	1.72
Calotropis gigantea (Ekke)	6	1.51	0.02	0.79

Banana (*Musa paradisiaca*) has the highest relative density (17.54%), making it the most dominant fruit crop. Mango and Guava also have significant representation, showing their importance in homestead and commercial cultivation. The high

relative density (53.41%) of fruit trees suggests their prominence in local agriculture.

Tulasi (*Ocimum tenuiflorum*) is the most frequently occurring medicinal plant (72 occurrences, 18.10% relative frequency). Despite high frequency, medicinal plants have low relative density (9.99%), indicating they are widely dispersed but in smaller numbers. This reflects the cultural and domestic significance of these plants, rather than large-scale cultivation.

Spice plants have low frequency and density compared to fruit trees, showing they are cultivated on a smaller scale. Red Chilly has the highest relative density (2.13%), suggesting its popularity in home gardens.

Flowering plants contribute 6.36% to the total relative density, showing their role in aesthetic and ecological functions. Hibiscus is the most dominant flowering plant. Coconut and Arecanut have the highest densities, reflecting their economic importance. High timber and agroforestry presence (19.42% relative density) shows sustainable land-use practices. Sacred plants are less frequent but hold significant cultural importance. Neem (*Azadirachta indica*) is the dominant sacred plant, valued for medicinal and religious uses.

Table 6. Overall Diversity Indices of the plant species in Back yards of Halakki tribes

Simpson's Dominance Index (D)	0.071071365
Simpson's Diversity Index (1 - D)	0.928928635
Simpson's Reciprocal Index (1/D)	14.07036444
Shannon-Weaver Index (H')	3.242174173

The plant diversity assessment in Ankola, a coastal taluk in Uttara Kannada, reveals a high species richness and ecological stability, as indicated by the Shannon-Weaver Index (H' = 3.242) and Simpson's Diversity Index (1 - D = 0.928). The low Simpson's Dominance Index (D = 0.071) suggests that no single species dominates the ecosystem, a direct result of the region's traditional agroforestry practices, mixed cropping systems and the presence of sacred groves and home gardens (Table 6).

The Simpson's Reciprocal Index (1/D = 14.07) further confirms the presence of multiple coexisting species, reducing the risk of monoculture-driven ecological imbalances. Ankola's high rainfall (3000-3500 mm annually), humid coastal conditions and lateritic soils support the growth of fruit trees (mango, guava, papaya), spices (black pepper, turmeric, ginger), plantation crops (areca nut, coconut, cashew) and medicinal plants (Aloe vera, Insulin plant, Tulasi). The high frequency of banana (6.86%), coconut (7.87%) and areca nut (4.39%) in the study reflects the dominance of these crops in local agriculture, while lower relative density values for certain ornamental and medicinal plants indicate their restricted yet significant presence in home gardens and forest patches.

The high biodiversity in Ankola can be attributed to its agro-ecological conditions and traditional conservation methods. The presence of sacred groves, home gardens and mixed cropping systems plays a crucial role in maintaining plant diversity, preventing any single species from dominating. Coconut and areca nut plantations, intercropped with spices like black pepper and medicinal plants, contribute to the high species richness observed in the study.

The relatively low dominance index (D = 0.071) suggests that native vegetation has not been completely replaced by monoculture plantations, unlike in some other parts of coastal Karnataka. However, the increasing trend of cashew monoculture and land conversion for infrastructure development poses a potential threat to certain native species. Despite this, the Simpson's Reciprocal Index (14.07) indicates a strong, balanced distribution of species, ensuring long-term ecological stability.

Overall, the combination of high rainfall, soil characteristics and traditional conservation practices has led to a diverse and ecologically stable plant community in Ankola, making it a biodiversity hotspot within the Western Ghats region.

CONCLUSION

The study highlights the ecological significance of home gardens in the Halakki tribal communities of Ankola. The findings demonstrate high species richness and minimal dominance, indicating a balanced ecosystem. Traditional agroforestry practices play a crucial role in biodiversity conservation and their integration into conservation policies is essential for sustaining ecological resilience in the Western Ghats.

ACKNOWLEDGEMENT

The authors place a deep sense of gratitude to **Indian Council of Social Science Research (ICSSR), New Delhi** for financial assistance, support and Guidance Research Project titled "Assessment of Food, Culture, Plant and Animal bio diversity among Halakki Tribes in Uttar Kannada district- An Ethnographic analysis" sanctioned by **Indian Council of Social Science Research (ICSSR) New Delhi** for financial assistance, support and Guidance.

REFERENCES

Das, T. and Das, A. K. (2005). Inventorying plant biodiversity in home gardens: A case study in Barak Valley, Assam, North East India. *Current Science*, **89**(1): 155-163.

Google Scholar

Galluzzi, G., Eyzaguirre, P. and Negri, V. (2010). Home gardens: Neglected hotspots of agro-biodiversity and cultural diversity. *Biodiversity and Conservation*, **19**(13): 3635-3654.

Google Scholar

Kumar, B. M. and Nair, P. K. R. (2004). The enigma of tropical home gardens. *Agroforestry Systems*, **61**(1):135-152.

Google Scholar

Myers, N., Mittermeier, R. A., Mittermeier, C. G., da Fonseca, G. A. B. and Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature*, **403**(6772):853-858.

Google Scholar