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Bridging the gap between inventory and reality: Assessing PBR accuracy in the Homegarden ecosystems of Kannur district, Kerala

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Abstract

Homegardens in Kerala represents a traditional agroforestry system that supports household nutrition, income generation, and biodiversity conservation. The present study examined the structure, composition, and diversity of homegardens in Kadirur Panchayat of Kannur district, Kerala, and identified gaps in the documentation of the People's Biodiversity Register (PBR). Primary data were collected from 80 randomly selected households in Ward 15 through field surveys and structured interviews, and were compared with secondary information obtained from the official PBR. The study revealed several limitations in PBR documentation, including incomplete household-level data, misclassification of crops, and inadequate representation of local crop varieties. A total of 65 food crop species were recorded, of which fruits constituted the largest group with 27 species, followed by vegetables and spices. Vegetables exhibited the highest Shannon–Wiener diversity index ($H' = 2.10$), while perennial crops such as coconut, banana, and arecanut dominated household preferences. Livestock diversity was comparatively low, with poultry rearing observed in only 7.5 per cent of households, largely influenced by government support schemes and constraints related to space and labour. The findings highlight the dynamic nature of homegarden agrobiodiversity and emphasise the need for regular updating of PBR records, improved varietal-level documentation, and integrated conservation strategies to strengthen biodiversity conservation and household food security.

Keywords: Agrobiodiversity, people's biodiversity register, species richness, food security

Introduction

Biodiversity encompasses the variety of life at the genetic, species, and ecosystem levels. Biodiversity for food and agriculture (BFA), also referred to as agrobiodiversity, represents the component of biodiversity that directly or indirectly contributes to agriculture and food production (FAO, 2019) [3]. It includes the diversity and variability of plants, animals, and micro-organisms that sustain the structure, functions, and ecological processes of agroecosystems, thereby supporting food production and ensuring food security (Pimbert, 1999) [17]. The conservation and enhancement of agrobiodiversity are increasingly recognised as important agroecological strategies for strengthening food security, improving dietary diversity, and stabilising local food systems. Greater household-level biodiversity can enhance local food self-sufficiency and reduce vulnerability to global economic and environmental shocks (Kc *et al.*, 2016) [6]. Agrobiodiversity also plays a crucial role in maintaining the long-term productivity and resilience of agroecosystems. However, the “State of the World's Biodiversity for Food and Agriculture” report highlighted that several components of agrobiodiversity at the genetic, species, and ecosystem levels are currently declining worldwide (FAO, 2019) [3]. The proportion of livestock breeds at risk of extinction is increasing, while plant diversity in farmers' fields continues to decline. A significant share of the remaining in situ agrobiodiversity is currently

conserved in the semi-subsistence farms and homegardens in tropical regions and smallholder farming systems (Birol *et al.*, 2006) [1].

Homegardens are intimate, multi-storey combinations of trees, crops, and sometimes livestock maintained around homesteads (Kumar and Nair, 2006) [10]. These agroforestry systems are recognised for their ecological, economic, and social significance and have evolved through generations of farmer innovation and experimentation (Wiersum, 2006) [20]. The origins of homegardening are believed to trace back to the humid tropical regions of Southeast Asia between 13,000 and 9,000 B.C. (Wiersum, 2006) [20]. Over time, these systems evolved through gradual crop intensification in response to increasing population pressure and declining availability of arable land (Kumar and Nair, 2004) [9]. Species diversity is one of the most widely emphasised characteristics of homegardens, and despite regional variations, many species compositions show remarkable similarities across geographical locations. Unlike natural ecosystems, the diversity observed in homegardens is largely human-managed, as farmers deliberately select and maintain species that fulfil household subsistence and livelihood requirements (Kumar and Nair, 2006) [10].

In India, homegardens are predominantly concentrated in humid tropical regions such as Kerala, coastal Odisha, West Bengal, and the northeastern states (Niyas *et al.*, 2016) [14]. Kerala, often referred to as the “Mecca of homegardens,”

maintains these systems as integral components of household food security and biodiversity conservation (Kumar *et al.*, 1994; Kumar and Nair, 2006) [8, 10]. Kerala homegardens support a rich diversity of crops and tree species that contribute to household nutrition, income generation, and environmentally sustainable production systems. However, accurate information on the extent and composition of homegardens remains limited due to the indistinct boundaries separating them from other cultivated lands (Kumar and Nair, 2006) [10]. Nevertheless, the People's Biodiversity Register (PBR), prepared under Section 22 of the Biological Diversity Rules (2004), serves as an important mechanism for documenting biodiversity at the panchayat level, including homegarden diversity. Kerala was among the first states to publish Volume I of the PBR during 2013–2014, and efforts are currently underway to prepare Volume II, which aims to improve and expand biodiversity documentation through updated classifications and ecological assessments. In this context, the present study was undertaken to assess the agrobiodiversity of homegardens in Kadirur Panchayat of Kannur district, Kerala, and to evaluate gaps in the existing People's Biodiversity Register documentation.

Materials and Methods

Study site and data collection

A field survey was conducted during January–February 2025 in the homegardens of Kadirur Panchayat, located in Kannur district, Kerala. The study area lies within the midland physiographic division of Kerala, characterised by undulating terrain, lateritic gravelly clay loam soils, a humid tropical climate, average annual rainfall of about 3,500 mm, and temperatures ranging from 22 to 35°C. Kadirur Panchayat was purposively selected as it is among the few panchayats in Kerala that have published Volume II of the People's Biodiversity Register (PBR). Ward 15 was selected due to the presence of key institutions such as the Krishi Bhavan and Panchayat office, which facilitated field verification and biodiversity documentation. From the ward, 80 households were randomly selected for assessing homegarden agrobiodiversity. Primary data were collected through structured interviews, complemented by direct field observations and documentation of plant and animal species present in each homegarden. Secondary data were obtained from the official People's Biodiversity Register (PBR) of Kadirur Panchayat and were used to compare documented biodiversity with field observations.

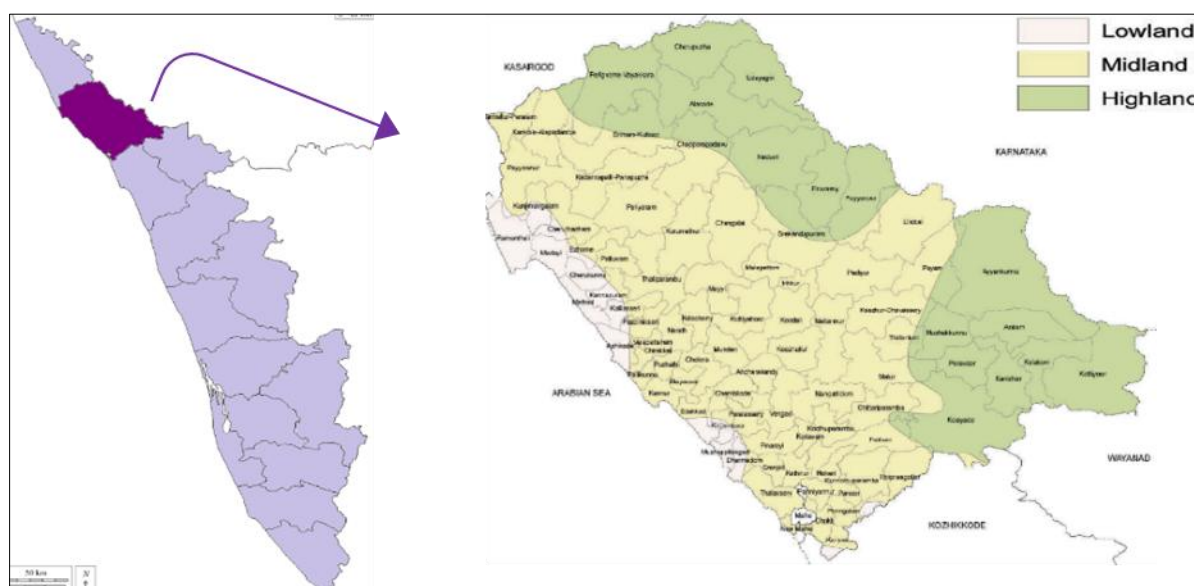


Fig 1: Map showing the study site

Diversity Assessment

Homegarden diversity was assessed using the Shannon–Wiener diversity index (H'), Simpson's dominance index (D), and Pielou's evenness index (J'). The Shannon–Wiener index is one of the most widely used measures of species diversity in plant communities and was used to estimate the diversity of food crops recorded in the surveyed homegardens. The Shannon–Wiener diversity index was calculated using Equation 1:

$$H' = -\sum_{i=1}^S P_i \ln P_i \quad (1)$$

where, P_i is the proportion of the total sample belonging to the i th species ($P_i = n_i/N$), n_i is the number of individuals of the i th species, N is the total number of individuals of all species, and S is the total number of species.

Simpson's (1949) [18] index of Dominance was determined by

Equation 2.

$$\text{Dominance (D)} = \sum (P_i)^2 \quad (2)$$

Pielou (1969) [16] species evenness index (E) by Equation 3.

$$\text{Species Evenness Index (E)} = H' / \ln S \quad (3)$$

Where H' is the Shannon–Weaver diversity index and S is the total number of species.

People's Biodiversity Register: Evolving Documentation Framework

The People's Biodiversity Register (PBR) was introduced under the provisions of the Biological Diversity Act, 2002, as a community-based mechanism for documenting local biodiversity, associated traditional knowledge, and biological

resources (NBA, 2013; KSBB, 2023) ^[7, 13]. In Kerala, the first phase of PBR preparation culminated in the publication of Volume I during 2013–2014. Nearly a decade later, revised guidelines issued by the National Biodiversity Authority and the Kerala State Biodiversity Board guided the preparation of Volume II during 2022–2023, with the aim of updating biodiversity records and strengthening documentation of the ecological and socio-economic dimensions of biodiversity (NBA, 2013; KSBB, 2023) ^[7, 13].

A comparison of PBR Volumes I and II revealed several structural and conceptual changes in biodiversity documentation (Table 1). While both volumes retain agrobiodiversity as a distinct component, Volume II introduces a revised classification framework. The category “Domesticated Biodiversity” in Volume I has been

incorporated within the broader agrobiodiversity component, while “Wild Biodiversity” has been restructured as “Habitat Biodiversity” to emphasise ecosystem-level documentation. In addition, Volume II includes expanded provisions for recording ecosystem services, conservation initiatives, and ecological interactions, thereby broadening the scope of biodiversity assessment beyond species inventories (NBA, 2013; KSBB, 2023) ^[7, 13].

Although these revisions enhance the comprehensiveness of biodiversity documentation, their effectiveness depends on the accuracy and completeness of biodiversity records generated at the local level. Therefore, an assessment of the biodiversity information documented in the PBR against field observations is essential to evaluate the extent to which local agrobiodiversity is adequately represented.

Table 1: The classification of crop and animal biodiversity adopted in Volumes I and II

PBR Volume I	PBR Volume II
Agrobiodiversity Crop plants Fruit plants Fodder crops/species Weeds Pests of crops	Agrobiodiversity Crop plants Fruit plants Fodder crops/species Weeds Pests of crops
Domesticated biodiversity Fruit trees Ornamental Plants/ Trees/Climbers, etc. Timber Plants / Trees Domesticated Animals Culture Fisheries	Non-agricultural biodiversity Trees, Shrubs, Herbs, Medicinal plants, Tubers, Grasses, Climbers etc. Invasive/Exotic plants (Terrestrial and aquatic) Freshwater and saline biodiversity (Animals) Wild fish biodiversity (Inland/Saline water/marine fish biodiversity) Wild Animals (Mammals, Birds, Reptiles, Amphibians, Insects) Invasive/Exotic animals (Terrestrial and aquatic) Coastal and Marine Flora Coastal and Marine Fauna
Wild biodiversity Trees, Shrubs, Herbs, Tubers, Grasses, Climbers, etc. Wild Plant Species of Importance Aquatic Biodiversity Wild Aquatic Plant Species of Importance Wild Plants of Medicinal Importance Wild relatives of Crops Ornamental Plants Fumigate / Chewing Plants Timber Plants Coastal and Marine Flora Coastal and Marine Fauna Wild Animals (Mammals, Birds, Reptiles, Amphibians, Insects)	Habitat biodiversity Sacred grooves Forests Mangroves Lakes Farm lands etc. (both natural and manmade)
Urban Biodiversity Flora and Fauna	

Gaps in Agrobiodiversity Documentation: Evidence from Kadirur PBR and Field Survey

A comparison of biodiversity records documented in the People's Biodiversity Register (PBR) with observations from the field survey revealed several gaps in the representation of homegarden agrobiodiversity in Kadirur Panchayat. Although the PBR serves as an important mechanism for documenting local biodiversity, the findings indicate that existing records do not fully capture the diversity maintained at the household level.

A primary survey conducted among 80 households in Ward

15 of Kadirur Panchayat documented 65 food crop species cultivated in homegardens. The survey revealed considerable variation in species composition and crop preferences across households, highlighting the dynamic and heterogeneous nature of homegarden systems. Comparison with the PBR records revealed notable gaps in species documentation. Several food crop species recorded during the field survey were absent from the PBR records (Table 2), indicating that the existing biodiversity inventory does not fully reflect the actual composition of homegarden agrobiodiversity in the study area.

Table 2: Unrecorded crops in the PBR of Kadirur panchayat

SL NO	Crop (Common name)	Local/Malayalam name	Scientific name
1	Sorghum	Cheru cholam/ Sorghum	<i>Sorghum bicolor</i>
2	Cabbage	Cabbage	<i>Brassica oleracea</i> var. <i>capitata</i>
3	Purple yam	Kandikizhangu	<i>Dioscorea alata</i>
4	Kumquat	Madhura naranga	<i>Citrus japonica</i>
5	Soursop fruit	Mullan chakka	<i>Annona muricata</i>
6	Egg tree	Vilathi mavu	<i>Garcinia xanthochymus</i>
7	Jujubee	Elantan pazham	<i>Elantra ziziphus</i>

Source: Primary survey, PBR of Kadirur panchayat

In addition to species-level omissions, substantial gaps were observed in the documentation of crop varietal diversity. While the PBR recorded several crop species, varietal-level information was either incomplete or unavailable for a number of important fruit and plantation crops. The field survey documented greater varietal diversity than reported in

the PBR (Table 3), highlighting the limitations of existing biodiversity records in capturing intraspecific diversity maintained within homegardens. Since local varieties often possess unique traits related to adaptation, resilience, and household food security, their systematic documentation is essential for effective agrobiodiversity conservation.

Table 3: Unrecorded varieties in the PBR of Kadirur panchayat

Sl no	PBR		Primary survey	
	Crop	Variety	Crop	Variety
Plantation				
1	Coconut	Ramganga, Cherandathur thengu	Coconut	Kerala kalpasree, Local, Green dwarf, kuttiyadi
2	Arecanut	VTNH-1	Arecanut	Mangala
Fruit crop				
1	Banana	-	Banana	Adakkapoovan, Vennittampovan, Robust, Nendran, Kadali, Devakadali
2	Jackfruit	-	Jackfruit	Pazham, Varikka, Vietnamese, Sindoor
3	Mango	-	Mango	Kurukkan mavu(local), Kuttiyattor manga
4	Rambutan	Hybrid	Rambutan	Budded yellow, Budded red

Source: Primary survey, PBR of Kadirur panchayat

Several limitations were also observed in Volume II of the PBR. The integration of domesticated and wild biodiversity under the broad category of “Non-Agricultural Biodiversity” has reduced the level of detail previously provided through functional classifications based on product use and plant type. This restructuring has introduced ambiguities in classification and resulted in inconsistencies in the categorisation of certain crops. For instance, papaya and sweet potato, though commonly cultivated in homegardens, were classified under non-agricultural biodiversity categories. In addition, the merging and reorganisation of biodiversity categories have increased the potential for overlaps and duplication of records, thereby affecting the consistency and interpretability of biodiversity inventories. Additional structural limitations were evident in the revised documentation framework. The removal of the dedicated urban biodiversity category present in Volume I has narrowed the scope of documentation, while the introduction of “Habitat Biodiversity” has created overlaps with existing categories. Although the inclusion of freshwater and saline biodiversity represents an improvement, the absence of clear subcategories for different aquatic ecosystems reduces the level of detail available compared to Volume I.

Apart from these structural issues, several procedural challenges were identified. Incomplete data entry, often resulting from limitations in digitisation and record management, has contributed to the loss of biodiversity information. Furthermore, biodiversity inventories are frequently compiled using information obtained from a limited number of key informants, with minimal representation from ordinary households. Consequently,

important components of household-level agrobiodiversity, particularly those maintained in Kerala homegardens, remain inadequately documented. These findings, together with the species- and varietal-level discrepancies observed between the PBR and field survey, highlight the need for more inclusive household-level surveys, improved data management practices, and regular updating of PBR records to enhance their effectiveness as tools for biodiversity conservation and local planning.

Food crop diversity of Kadirur Panchayat

The surveyed homegardens exhibited considerable variation in size, crop richness, and species diversity, reflecting the heterogeneous nature of household agroforestry systems in Kadirur Panchayat (Table 4). Landholding size ranged from 5 to 60 cents, with a mean of 20.21 cents (0.082 ha), while the number of food crop species varied from 4 to 39, with an average of 13.66 species per homegarden. Although the average landholding (0.082 ha) was considerably smaller than those reported by Nair and Sreedharan (1986)^[12] (0.22 ha; 0.02–1.0 ha) and Peyre *et al.* (2006)^[15] (0.14–1.01 ha), this finding is consistent with the long-term decline in operational landholding size documented in the Kerala Agricultural Census (Department of Economics and Statistics, 2018). Progressive land fragmentation, inheritance practices, demographic pressure, and urbanisation have collectively contributed to the reduction in homegarden size across the state. Nevertheless, the relatively small landholdings supported a high level of food crop richness, demonstrating that even fragmented homegardens continue to play an important role in household food production and

the conservation of on-farm agrobiodiversity.

Table 4: Structural characteristics of homegardens in Kadirur

Parameter	Average	Maximum	Minimum
Size of the landholding (Cents)	20.21	60	5
No of food crops per household	13.66	39	4
Shannon Weiner diversity index (H')	2.06	3.16	0.88
Simpsons index (D)	0.19	0.56	0.06
Evenness (J')	0.82	0.95	0.39

The Shannon–Weiner Diversity Index (H') ranged from 0.88 to 3.16, with a mean value of 2.06, indicating moderate to high species diversity across the surveyed homegardens. This level of diversity exceeded that reported by Peyre *et al.* (2006) [15] and was comparable to the values observed by Chandrashekara and Baiju (2010) [2], remaining within the range commonly reported for species-rich tropical homegarden systems. The relatively high diversity observed in the present study may partly reflect the favourable institutional environment of the study area, where access to extension services, technical guidance, and quality planting materials through the Krishi Bhavan and Panchayat could encourage the cultivation of a wider range of species. Furthermore, the mean Simpson's Index (D) of 0.19 and Evenness Index (J') of 0.82 indicate low species dominance and a relatively even distribution of species, suggesting a well-balanced crop composition across the surveyed homegardens.

A total of 65 food crop species were recorded from the 80 surveyed homegardens and classified into five major crop categories (Table 5). Fruits constituted the largest group (27 species; 41%), followed by vegetables (15 species; 23.08%) and spices and condiments (14 species; 21.54%), while tuber crops (7 species; 10.77%) and plantation crops (3 species; 4.62%) were less represented. The predominance of fruit species is consistent with the characteristic structure of Kerala homegardens, where perennial fruit trees form the principal component of multilayered agroforestry systems (Nair, 1993) [11]. In contrast, Jacob (1997) [4] reported tuber crops as the dominant crop category, followed by fruits, oil-yielding palms, spices, vegetables, and timber species. The comparatively low representation of tuber crops in the present study may reflect recent changes in farmers'

cultivation preferences, as frequent crop damage caused by porcupines and wild boars has discouraged their cultivation. This shift highlights the influence of human–wildlife conflict on species composition and crop selection in contemporary homegarden systems.

Vegetables exhibited the highest Shannon–Weiner diversity (H' = 2.10) and evenness (J' = 0.78), indicating a relatively balanced distribution of species within this crop category. In contrast, fruits, despite comprising the largest number of species, showed comparatively lower diversity because only a limited number of fruit tree species were commonly maintained in individual homegardens. Plantation crops recorded the highest Simpson's dominance (D = 0.50), followed by fruits (D = 0.45), reflecting the widespread cultivation of a few economically important perennial species, particularly coconut, arecanut, mango, and jackfruit. Among individual crops, banana was the most frequently cultivated species, followed by coconut and arecanut (Figure 1). The widespread cultivation of banana may also indicate the gradual replacement of paddy cultivation with more intensive and economically viable homegarden-based production systems, reflecting changing land-use practices and household livelihood strategies.

Species composition in the homegardens of Kadirur panchayat

A total of 65 food crop species were recorded from the 80 surveyed households and classified into five categories. Fruits constituted the largest group with 27 species (41%), followed by vegetables (15 species, 23.08%) and spices and condiments (14 species, 21.54%). Seven tuber crops (10.77%) were documented, while plantation crops were represented by only three species (4.62%) (Table 5). The predominance of fruit species confirms the characteristic structure of Kerala homegardens, where fruit and other food-producing trees form the major component of the production system (Nair, 1993) [11]. In contrast, Jacob (1997) [4] reported tuber crops as the most dominant category, followed by fruits, oil-yielding palms, rubber, spices, vegetables, and timber and fodder trees. The relatively lower representation of tuber crops in the present study is likely attributable to farmers reducing their cultivation because of recurrent crop damage caused by porcupines and wild boars.

Table 5: Species composition in the homegardens of Kadirur panchaya

Crop	No of species	Shannon-Weiner diversity index (H')	Simpson's index (D)	Evenness (J')
Vegetables	15 (23.08)	2.10	0.15	0.78
Fruits	27 (41)	1.57	0.45	0.48
Plantation	3 (4.62)	0.70	0.5	0.64
Spices and condiments	14 (21.54)	1.77	0.21	0.67
Tuber crops	7 (10.77)	1.46	0.27	0.75

Vegetables exhibited the highest Shannon–Weiner diversity (H' = 2.10) and evenness (J' = 0.78), followed by spices and condiments, fruits, tubers, and plantation crops. Although fruits comprised the highest number of species, their comparatively lower diversity reflects the limited number of individual trees maintained per household. Simpson's dominance index (D) was highest for plantation crops (0.50), followed by fruits (0.45), indicating the predominance of a few economically important perennial species within these

categories. The high dominance among plantation crops was primarily due to the widespread cultivation of coconut and arecanut, while fruit crop dominance reflected the prevalence of mango, jackfruit, and banana in the surveyed homegardens.

Banana was the most widely cultivated crop, occurring in 79 households with a total of 1,644 plants, reflecting the increasing preference for banana cultivation following the decline of paddy farming. Coconut (74 households; 881

plants) and arecanut (72 households; 745 plants) were the next most common perennial crops (Figure 1). Among fruit crops, mango was the most frequently cultivated species after banana, occurring in 47 households with 115 trees. Chilli (30 households; 225 plants) and brinjal (28 households; 214 plants) were the dominant vegetable crops (Figure 1). These findings suggest that while perennial fruit and plantation crops form the structural and economic backbone of homegardens, vegetables and other short-duration crops contribute greater crop density per household because of their intensive cultivation and frequent harvesting. A comparable pattern was reported by Chandrashekara and Baiju (2010)^[2] in Malappuram district, Kerala, where coconut, arecanut,

mango, and jackfruit were among the most frequently occurring perennial species across 32 surveyed homegardens, highlighting their continued importance in sustaining the productivity and structural complexity of Kerala homegarden systems.

Despite the relatively small mean landholding of 20.21 cents, the surveyed homegardens supported 65 food crop species, averaging 13.66 species per household, with a mean Shannon diversity index of 2.06. The coexistence of multiple food crop categories and locally maintained varieties within these limited land areas demonstrates the capacity of homegardens to conserve substantial agrobiodiversity while contributing to household food production.

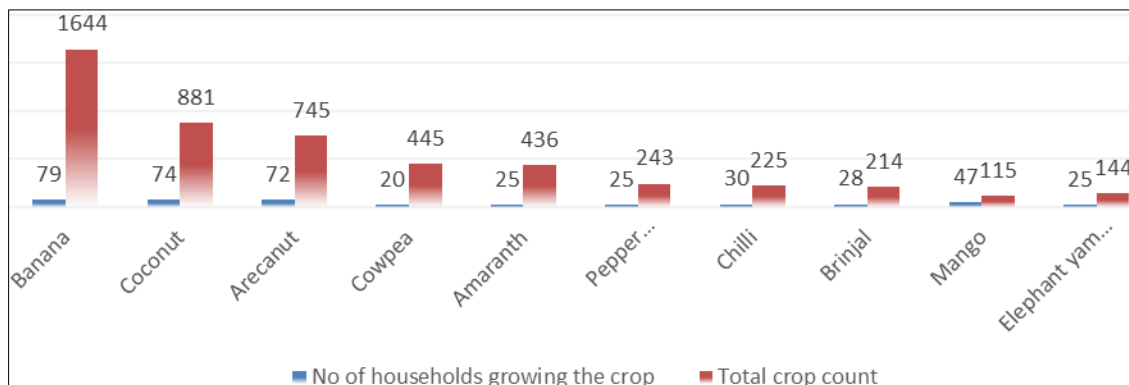


Fig 3: Food crop distribution among the surveyed households of Kadirur panchayat

Livestock diversity in the homegardens of Kadirur Panchayat

Table 6 presents the diversity of domesticated animals maintained in the homegardens of Kadirur Panchayat, including the livestock types, breeds, population, and household distribution. Of the 80 households surveyed, only six (7.5%) practiced livestock rearing, indicating that animal husbandry currently plays a limited role in the homegarden production system. Poultry was the most commonly reared livestock, with hens maintained in five households (6.25%). A total of 57 birds were recorded, comprising 27 local birds and 30 birds of the BV 380 breed. The relatively higher adoption of poultry farming may be attributed to the implementation of the Panchayat's *Adukkalathottathile Kozhivalarthal* scheme, together with the comparatively low investment, limited space requirement, and ease of management associated with backyard poultry production. Cattle rearing was confined to only two households (2.5%), with three animals belonging to Jersey (2) and Vechur (1) breeds. Similarly, goat farming was recorded in two households (2.5%), which together maintained nine Malabari goats.

The findings indicate that government interventions have played an important role in promoting backyard poultry farming, whereas the rearing of larger livestock remains limited. This may be attributed to factors such as limited land availability, higher feed and maintenance costs, increased labour requirements, and the declining interest in livestock-based farming among rural households. These observations contrast with the findings of Nair and Sreedharan (1986)^[12], who reported that cattle and poultry were integral components of most Kerala homesteads. The present results therefore suggest a gradual transformation of Kerala

homegarden systems over the past few decades, with a declining integration of livestock into traditional mixed farming practices. Reduced livestock ownership may also affect the ecological sustainability of homegardens by limiting on-farm nutrient recycling and increasing dependence on external nutrient inputs, thereby weakening the integrated nature of these agroforestry systems.

Conclusion

Homestead farming remains an important land-use system that promotes the sustainable utilisation of natural resources while supporting the ecological, economic, and nutritional needs of rural households. The present study documented the species composition of food crops and livestock maintained in the homegardens of Kadirur Panchayat, highlighting their continued significance in sustaining agrobiodiversity and household food security.

A total of 65 food crop species belonging to five crop categories were recorded, with fruits constituting the largest group, followed by vegetables, spices and condiments, tubers, and plantation crops. Although fruit species were the most diverse in terms of richness, vegetables exhibited the highest species diversity and evenness, indicating a more balanced distribution of vegetable crops across households. Coconut, banana, and arecanut were the dominant crops, reflecting their economic and subsistence importance in the study area. The reduced cultivation of tuber crops compared with earlier studies suggests changes in farmers' crop preferences, influenced in part by increasing wildlife damage. Livestock diversity was comparatively low, with only a small proportion of households practicing animal husbandry. Poultry was the predominant livestock component, supported by local government initiatives promoting backyard poultry

farming, whereas cattle and goat rearing were limited. These findings indicate a gradual decline in the integration of livestock within traditional Kerala homegarden systems, representing a shift from the mixed farming practices reported in earlier studies.

The study highlights that homegardens in Kadirur Panchayat continue to function as multifunctional agroforestry systems that contribute to biodiversity conservation, food security, and rural livelihoods. Strengthening plant diversity through improved access to quality planting materials, promoting small-scale livestock rearing using locally adapted breeds, and supporting farmers through extension services and incentive programmes can further enhance the sustainability of these systems. In addition, systematic household-level biodiversity documentation and regular updating of the People's Biodiversity Register would provide a stronger scientific basis for local conservation planning and sustainable resource management. Overall, conserving and strengthening Kerala's homegarden systems will remain essential for promoting resilient agriculture, enhancing agrobiodiversity, and supporting sustainable rural development.

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