



Homegardens of Kerala: Structural Configuration and Biodiversity

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Homegardens are traditional agro-ecosystems in the world with important role in socio-cultural and economic function of rural society. These are microenvironments with a larger farming system that contain high levels of species diversity and may contain crop species or varieties of species different from those found in surrounding agro-ecosystem. It is a major, unique and very much developed agricultural production system in Kerala- the 'Gods own country'-where it forms the basic farming system in all agro-ecological zones. This is a system with high diversity of useful plants and animals per unit area where its interaction through intervention by man results in a unique combination by high levels of productivity, stability and sustainability. Home gardens in Kerala are connected to 'Kaavu' (Sacred Groves). Some of the endangered species of wild plants, trees animals and plants can be seen in Home Gardens of Kerala. The main aim of preserving a Home Garden is to preserve ritualistic beliefs and cultural identity of joint families. Gradually, due to the origin of nuclear families and lifestyle related to the same, the Home Gardens underwent transformation to playgrounds. But still in Kerala, some families show ample importance to protect their Home Gardens. As pointed out, the preservation of home gardens in Kerala is strictly connected to family purposes. At the same time, home gardens are helpful to raise the water table of nearby ponds and wells. Unknowingly, some families in Kerala which preserve their home gardens preserve nature and ecological balance.

Study area

This study was undertaken in Kerala comprising all the 14 districts (Figure 1) covering a sample size of 504 home gardens using multi-stage stratified random sampling technique which examines the structural configuration of home gardens in terms of species diversity index. Structural configuration of home gardens presents broad idea on the diversity, species richness, evenness, dominance of species, changing structure and functions, cropping and farming system and type of home gardens.

Kerala is the southernmost state of India with a total area of 38,864 km². The state lies in the path of both the south-west and the north-east monsoons, thus getting exposed to two raining seasons. Technically, Kerala is comprised of three belts- the high interior range of archaic hills, which lie in the east, the low to medium elevation lateritic plateaus and the coastal plain. Kerala has diverse types of soils such as sandy, loamy, red, black, ferruginous and peat soil. The major crops in Kerala are pepper, cassava, paddy, cashew and coconut and the cash crops like coffee and tea, vanilla, spices, cashew nut and nutmeg and the plantation crops like rubber also dominate the agricultural produce of Kerala.

The farmers of the state usually undertake intensive farming involving a variety of crops on the limited area available in order to obtain food, fuel, fodder, timber and cash from homesteads. (Nair and Sreedharan, 1986).

Figure.1



Measure of species diversity

In this study, Shannon-Weiner index of diversity based on information theory (the information content is a measure of the amount of uncertainty) was used to calculate the diversity index of home gardens. This index helps in a better understanding of the structural configuration of home gardens.

Defined regions with in a home garden

The data enumeration with respect to the crop components in the home garden was done for three different regions in the home garden which was explained as 'courtyard', 'mid region', and 'outer region' of the home garden (Figure 2). Courtyard was operationally defined as the area that is perceived to be near to the house in the home garden. Mid region was operationally defined as the area that is perceived to be falling in between the courtyard and outer region in the home garden. Outer region was operationally defined as the area that was perceived to be farther in distance from the house in the home garden.

Figure 2. Defined regions

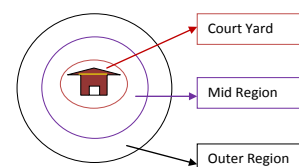


Table 1. Biodiversity index of home gardens in Kerala. N=504

Districts	HG No's	Area in cents	Diversity index			Mean DI Total/3	Rank
			CY	MR	OR		
Trivandrum	36	99.7	0.650649	0.956849	2.146724	1.25	12
Kollam	36	66.94118	1.29913	0.946742	1.784995	1.343333	5
Alapppy	36	100.8095	1.046394	1.005572	1.728433	1.26	11
Pathanamthitta	36	130.9211	0.871708	1.078831	2.122318	1.356667	3
Kottayam	36	165.3714	1.048	0.718193	2.284641	1.35	4
Idukki	36	134.2105	0.64183	0.980832	2.347338	1.323333	8
Ernakulam	36	207.1852	0.589634	2.096822	1.269218	1.32	9
Kozhikode	36	161.9143	0.023626	2.782581	1.193796	1.333333	6
Kannur	36	174.4706	0.094538	2.979374	1.007954	1.36	2
Kasaragod	36	305.0909	0.074903	3.190152	0.765908	1.343333	5
Malappuram	36	160.4167	0.603531	1.497634	1.89883	1.33	7
Thrissur	36	124.7091	0.994354	1.079119	1.926564	1.333333	6
Palakkad	36	180.6949	0.545765	0.865037	2.543097	1.316667	10
Wayanad	36	337.4	0.129805	3.124386	0.869262	1.373333	1
Mean Total	Total/14		0.615276	1.664438	1.706363		

Systems thinking

Homegarden biodiversity index calculated using Shannon Wiener diversity index is presented in table 1. From the table it was evident that the mean total biodiversity index was the highest (1.37) for Wayand district and the lowest being for Thiruvananthapuram district. The rank position of mean biodiversity index is shown in the last column of the table wherein maximum biodiversity was for homegardens in Wayanad followed by Kannur, Pathanamthitta, Kottayam, Kasaragod, Kozhikode and Thrissur, Malappuram, Idukki, Ernakulam, Palakkad, Alappuzha and finally Thiruvananthapuram. Maximum biodiversity showing regions such as Wayanad, Kannur and Pathanamthitta are highland areas. Thiruvananthapuram and Alappuzha showing the least biodiversity indices are coastal areas. It is purely of geographical reason (Agro climatic zones).

From the mean total of biodiversity index calculated for courtyard, Mid region and Outer region for all the 14 districts, it was found that maximum biodiversity index was observed for Outer regions, followed by mid region and courtyard. Careful and detail perusal of table 1 points out to some important observation. Even though the Outer region has got the maximum biodiversity considering all the 14 districts of study, the maximum biodiversity was noted in the mid region in case of homegardens in Kasaragod closely followed by homegardens in Wayanad. To make it more clear, the homegardens of Kasaragod and Wayanad districts are the only two districts among the 14 districts of study that possess a biodiversity index more than three and that too in the mid regions of the homegardens. It again points to an interesting fact that even though the biodiversity index is maximum for outer region considering the mean value of all homegardens, the maximum biodiversity is noticed in the mid regions of homegardens in the following districts in the order of high biodiversity index viz., Kasaragod, Wayanad, Kannur and Kozhikode.

We cannot interpret this variation unless the idea of different crops present in these regions is assessed. This may be due to the presence of diversing perennial plants. All the other districts may possess seasonal crop plants. Diversity of mid region of four districts (Kasaragod, Wayanad, Kannur and Kozhikode) is high due to the cultivation of more intervening cash crops. Mid region was more convenient because gardener can manage his more important species well.

High biodiversity indices of outer region of most of the other districts are due to the planting of various non commodity trees or natural regeneration of fallen seeds or dumping of organic house hold wastes to the outer and mid region, it increases fertility of soil and also the germination of thrown vegetable seeds.

The minimum courtyard biodiversity compared to other regions is probably due to introduced monoculture such as

making lawns or reduced organic content of the soil or plastering the courtyard.

Though Wayanad is having large holding size and biodiversity index, it was observed that Kollam having the least holding size (66.94) ranks 5 in total biodiversity index and Thiruvananthapuram which has the least biodiversity index has a holding size of 99.7. That indicates the biodiversity increment was influenced by the holding size. A worthy question put forth by Grines (1997) in his learned review is that 'though subordinate members of the plant community exercises controls on the identity' functional diversity and relative abundance of dominance, the answer of these question in our study is not only yes but the extend to which it takes place depends upon the size of holdings. Certainly the dominance determines the ecosystem properties to a large extend but homegardens of Kerala cannot be considered as a stable hierarchy. Over a long term the subordinates and even transient members can act as filters selecting between different potential structural dominance.

Closing thoughts

Homegardens in Kerala represents a subsistence land-use system typical of tropical Indian South, where interaction and intimate association of different production components (crop-tree-animal mix combine) insitu are intensively facilitated and managed by family labour so as not only to meet the food production but also to generate additional income through sale of farm surplus. This interaction and intimate association makes it ever evolving and adds significance to the structure of homegardens. The homegarden system has its unique structural configuration and cropping patterns. It is the predominant type of agricultural production system in the state of Kerala. The structural configuration of home gardens of Kerala considerably varied. In this study the means of the diversity index using Shannon-Wiener showed that Wayanad topped in the diversity index. Biodiversity varied in homegardens within regions, within and between districts and also influenced by holding size. Increase in population, emerging nucleotide family structure and high rate of fragmented holdings year round leading to decreased land for agriculture raises the conservation status of these land-use systems and makes it necessary for a 'homegarden policy' in regions where they are found (Thomas, A. et.al. 2011). Homegarden is important as reservoirs of agricultural biodiversity and knowledge and it help in formulating strategies to ensure effective and meaningful programmes for the holistic development.

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