

## THE FLORISTIC AND FUNCTIONAL DYNAMICS OF HOMEGARDENS OF MULAKUNNATHUKAVU GRAMA PANCHAYATH, THRISSUR DISTRICT, KERALA

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### ABSTRACT

A survey was conducted in 90 home gardens in 10 wards of Mulakunnathukavu Gramma Panchayath in Thrissur district, Kerala to study the structural and functional attributes of home gardens. The study also intended to know about the density and diversity of plant species also standing stock of timber trees in the home gardens. The home gardens were classified in to three categories based on the size of the land holding viz. small home gardens (below 30 cents), medium home gardens (30 - 50 cents), large home gardens (above 50 cents). The main type of land use pattern was coconut based home gardens. In small home gardens, under storey was rich with shade tolerant crops that were maintained to meet the food requirements of the households. While the medium home gardens consisted more fruit trees and large home gardens consisted more cash crop crops and timber trees. All the three categories of home gardens had different structural and functional character ventures. In integrated farming system, the trees crops and livestock are deliberately managed in the same land management unit which produced a continuous, reliable, and balanced supply of foods as well as cash for basic needs and recurrent farm expenditure. The present trend towards single crop based commercial ventures pose serious threats to the diversity and there by ecological stability of homegardens which were once the harbingers of biodiversity.

**Keywords:** Crops, cultivation, farming, homegardens, timber

### INTRODUCTION

Globally, home gardens have been documented as an important supplemental source contributing to food and nutritional security and livelihoods. Home gardens can be described as a mixed cropping system that encompasses vegetables, fruits, plantation crops, spices, herbs, ornamental and medicinal plants as well as livestock that can serve as a supplementary source of food and income. Food production on small plots adjacent to human settlements is the oldest and most enduring form of cultivation (Ninez, 1987).

This study was an attempt to characterize the structural and functional attributes of selected home gardens, by analysing the species composition from Mulakunnathukavu Gramma panchayath (10 wards), Puzhakal block, Thrissur district, Kerala. The study was also undertaken with the objective of accessing the nature of dynamics of home gardens characteristics and to know the changing trends in cultivation practices and present status of the panchayath and how much importance they given for its maintenance. It also indicates the relevance and maintenance of home gardens that is important for the present and future generations.

## MATERIALS AND METHODS

### *Study area*

The study was carried out in the Mulakunnathukavu gramapanchayath, Puzhakkal block, Thrissur district, Kerala. It is located 9 kilometres (5.6 mi) north of Thrissur city. Ten wards from this panchayath were selected for the study. About 90 homegardens in ten wards of Mulakunnathukavu gramapanchayath belonging to various socio-economic levels were selected for the present study. First-hand information of the panchayath was obtained from the panchayath officer and Agriculture officer. Prior to the survey the homegardens in the selected panchayath wards was divided into small, medium and large based on the extent of area which would be a reflection of socio-economic status of the farmers..

### *Methodology*

About 90 home gardens from 10 wards in the Mulakunnathukavu gramapanchayath belonging to various socioeconomic levels were selected for the present study.

### **Functional diversity**

Diversity index was calculated using Simpson equation. Simpson diversity index is the measure of diversity which takes into account the number of species present, as well as the relative abundance of each species. It is calculated using below equation;

$$\text{Simpson's diversity index (D)} = 1 - \left( \sum \left[ \frac{n}{N} \right]^2 \right)$$

Where n represents the total number of a particular species and N is the total number of all species.

### *Computation of the standing stock of timber of major tree species*

Standing stock of important tree species in the selected homegardens was calculated using basic equation;  $V = (G^2/4\delta) \times F \times H$ , where V is the individual tree volume; G is the girth at breast height; F is the form factor and H is the total height of the tree

## RESULTS

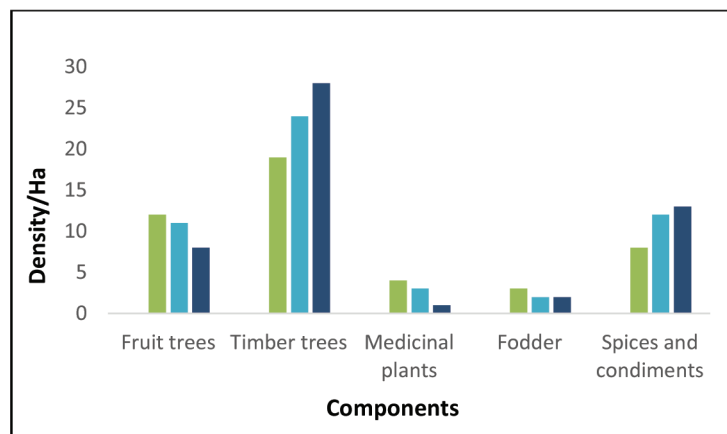
The result of the present study on the structural and functional analysis of homegardens of Mulakunnathukavu grama panchayath, Thrissur district Kerala are presented in the following sections.

### **NATURE OF COMPONENTS**

It was observed that a variety of timber trees, fruit trees, agricultural crops, plantation crops, medicinal plants, fodder plants, livestock are the main components of homegarden studied.

### **Species diversity**

It was found that the cash crops comprising mainly of coconut and arecanut occupy large share in home gardens. The density of fruit trees, medicinal plants, vegetables, livestock and other miscellaneous species were higher in small category of home gardens, whereas the density of timber trees was higher in large home gardens (Fig. 1).

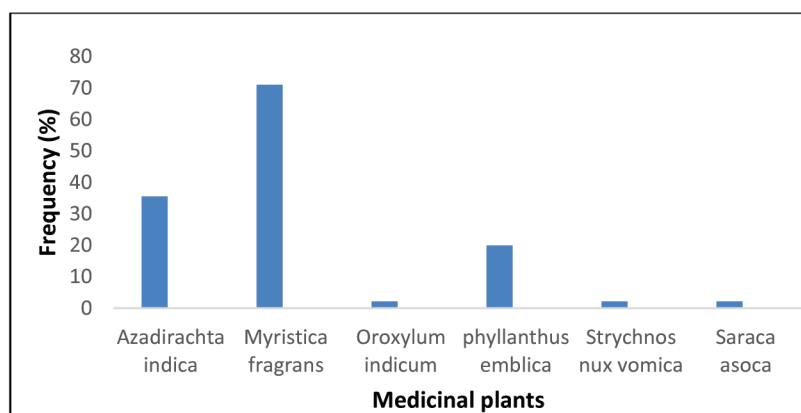


**Fig. 1: Graphical representation of species density of various components in the home gardens studied in Mulakunnathukavu Grama Panchayath.**

### Medicinal trees

The density of medicinal trees was higher in small home gardens compared to that of large and medium. The major medicinal trees of rural and urban home gardens were *Azadirachta indica*,

*Phyllanthus emblica*, *Saraca asoca* and *Strychnos vomica*. The major medicinal tree species was nutmeg, it is also included in the cash crop (Fig. 2).

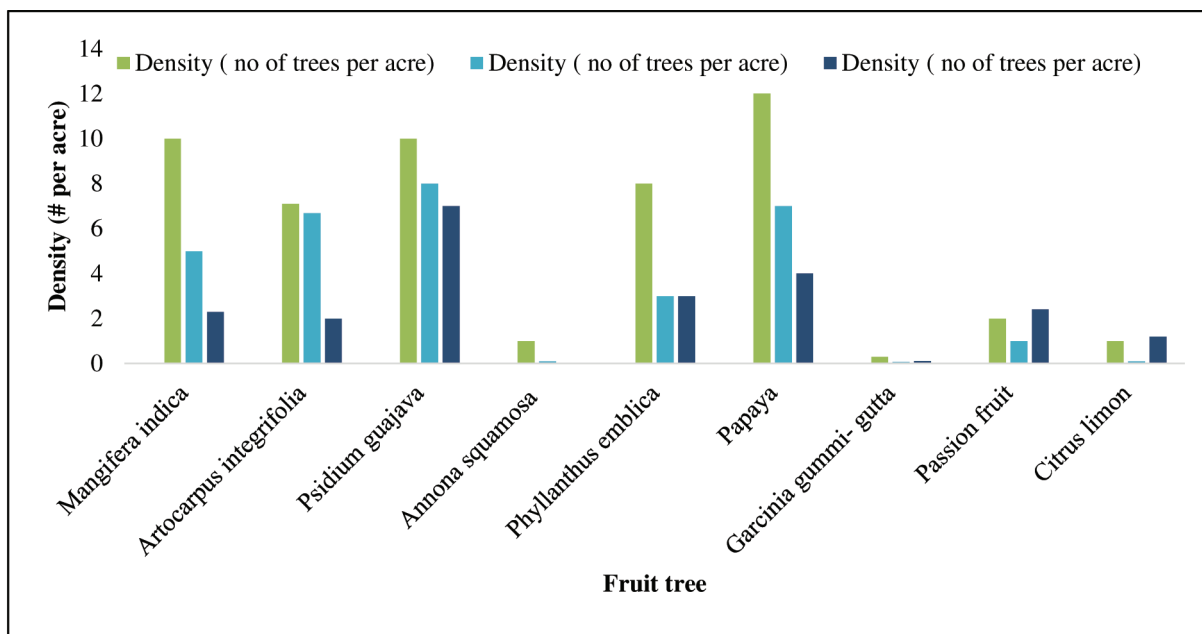


**Fig. 2: Graphical representation of frequency of medicinal trees in home gardens of Mulakunnathukavu Grama Panchayath**

### Fruit trees and crops

The most dominant fruit plant species were mango, jack, champa, guava, Annona, nelli, citrus etc. The

influence of new farming style and the import of exotic fruit trees like rambutan, Garcinia, passion fruit were observed (Fig 3).

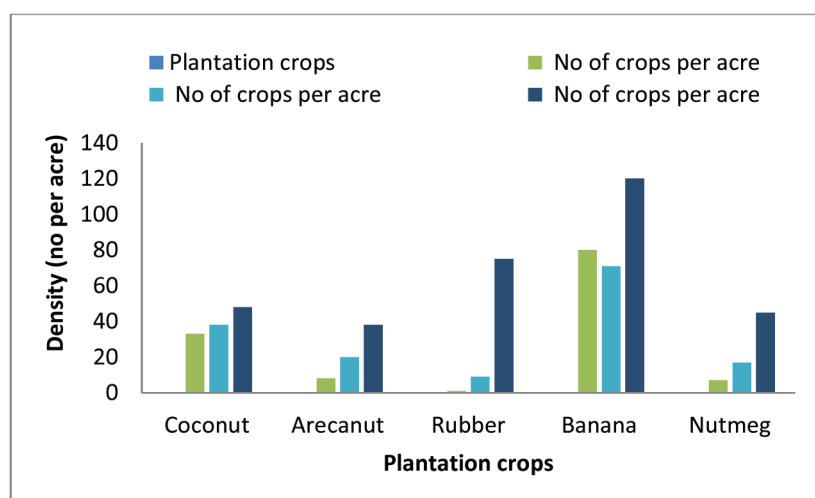


*Fig. 3: Graphical representation of density of fruit trees in three categories of homegardens of Mulakunnathukavu Gram Panchayath*

### Horticultural plantation crops

Horticultural plantation crop includes coconut, arecanut banana and nutmeg. The occurrence of

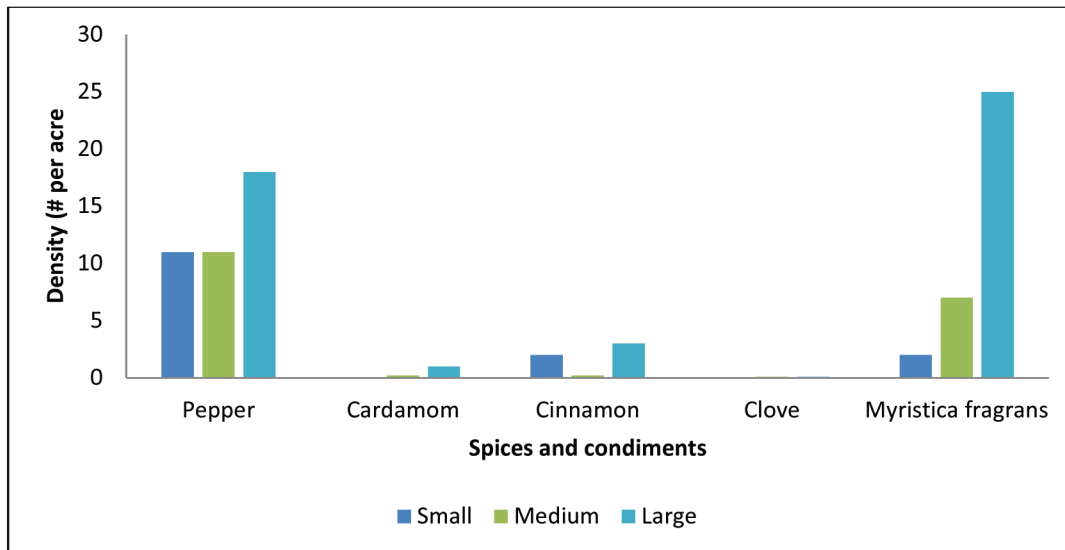
plantation crops in small home garden was less compared to medium and large (Fig. 4).



*Fig. 4: Graphical representation of density of plantation crop in three categories of homegardens of Mulakunnathukavu Gram Panchayath.*

### Spices and condiments

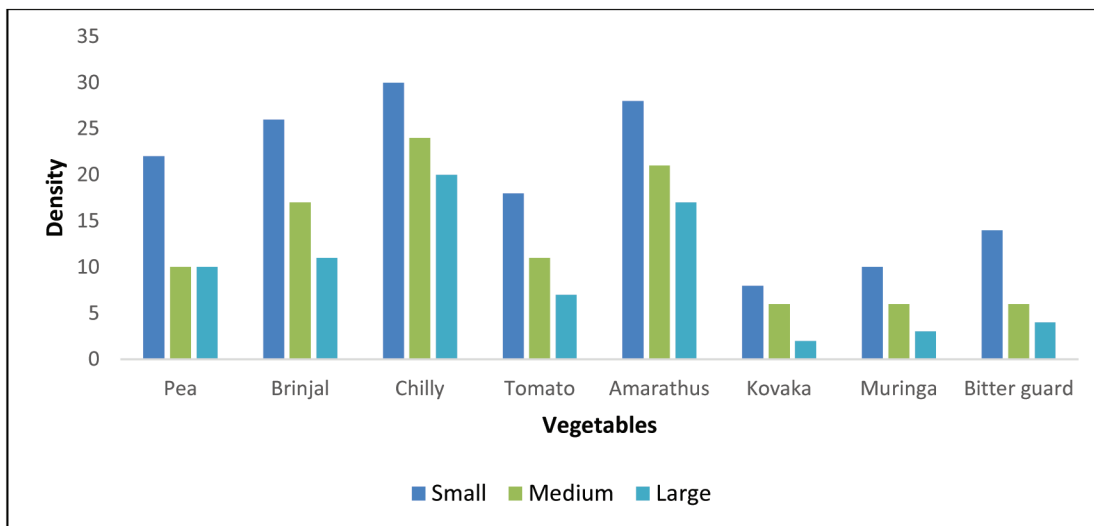
The economically important crops like nutmeg and pepper were mainly cultivated. Higher cultivation of spices can be seen in large home gardens (Fig. 5).



*Fig. 5: Graphical representation of density of spices in spices and condiments of Mulakunnathukavu Gram Panchayath.*

### Vegetable crops

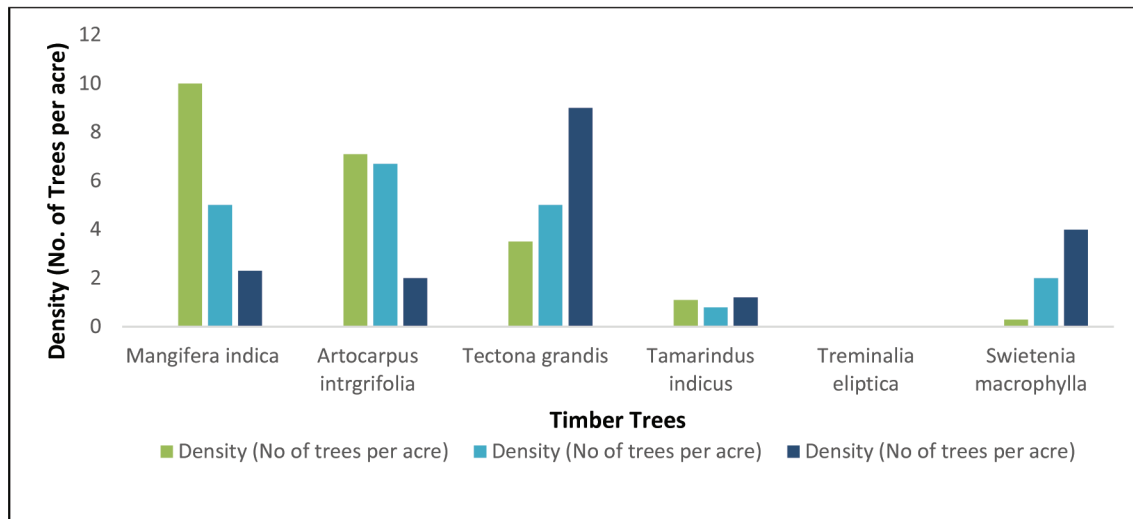
The most cultivated vegetable were Pea, Brinjal, Chilly, Tomato, Amaranthus etc. the cultivation of vegetable were more seen small home gardens compared medium and large (Fig. 6).



*Fig. 6: Graphical representation of occurrence of vegetables in three categories of home gardens of Mulakunnathukavu Gram Panchayath.*

## Timber

The density of timber species were higher small home gardens which was followed by medium and large home gardens (Fig. 7).



**Fig. 7: Density of timber trees in three categories of home gardens of Mulakunnathukavu Gram Panchayath.**

## DIVERSITY INDICES

The Simpson index was 0.66, 0.70 and 0.75 for small, medium and large home gardens, respectively.

The functional diversity index was high in large scale home gardens compared to small and medium (Table 1, 2 and 3).

**Table 1: Details of functional diversity index of small-scale home gardens**

| SI No | Species                        | Number (n)                        | (n/135) ^2 |
|-------|--------------------------------|-----------------------------------|------------|
| 1     | <i>Tectona grandis</i>         | 21                                | 0.024198   |
| 2     | <i>Mangifera indica</i>        | 62                                | 0.210919   |
| 3     | <i>Artocarpus integrifolia</i> | 42                                | 0.096790   |
| 4     | <i>Swietenia macrophylla</i>   | 2                                 | 0.000219   |
| 5     | <i>Tamarindus indicus</i>      | 6                                 | 0.001975   |
| 6     | <i>Garcinia gummi-gutta</i>    | 2                                 | 0.000219   |
|       | Total (N)                      | 135                               | 0.334102   |
|       |                                | $D = 1 - (\sum (n/N)^2) = 0.6657$ |            |

**Table 2: Details of functional diversity index of medium- scale home gardens**

| SI NO | SPECIES                        | NUMBER(n)                             | (n/149) <sup>2</sup> |
|-------|--------------------------------|---------------------------------------|----------------------|
| 1     | <i>Tectona grandis</i>         | 43                                    | 0.083285             |
| 2     | <i>Mangifera indica</i>        | 62                                    | 0.173145             |
| 3     | <i>Artocarpousintegrifolia</i> | 28                                    | 0.035314             |
| 4     | <i>Sweitenia macrophylla</i>   | 3                                     | 0.000405             |
| 5     | <i>Tamarindus indicus</i>      | 7                                     | 0.002207             |
| 6     | <i>Garcinia gummi-gutta</i>    | 1                                     | 0.000045             |
| 7     | <i>Terminalia elliptica</i>    | 5                                     | 0.001126             |
|       | TOTAL(N)                       | 149                                   | 0.295527             |
|       |                                | $D = 1 - (\sum(n/N)^2) = 0.704472772$ |                      |

**Table 3: Details of functional diversity index of large-scale home gardens.**

| SI NO | SPECIES                         | NUMBER(n) | (n/368) <sup>2</sup> |
|-------|---------------------------------|-----------|----------------------|
| 1     | <i>Tectona grandis</i>          | 123       | 0.111716             |
| 2     | <i>Mangifera indica</i>         | 113       | 0.094289             |
| 3     | <i>Artocarpous integrifolia</i> | 43        | 0.013653             |
| 4     | <i>Swietenia macrophylla</i>    | 60        | 0.026583             |
| 5     | <i>Tamarindus indicus</i>       | 16        | 0.001890             |
| 6     | <i>Garcinia gummi-gutta</i>     | 6         | 0.000266             |
| 7     | <i>Terminallia elliptica</i>    | 2         | 0.000030             |

|   |                                 |                                    |          |
|---|---------------------------------|------------------------------------|----------|
| 8 | <i>Delonix regia</i>            | 3                                  | 0.000066 |
| 9 | <i>Anacardium occidentallae</i> | 2                                  | 0.000030 |
|   | TOTAL(N)                        | 368                                | 0.248523 |
|   |                                 | $D = 1 - (\sum(n/N)^2) = 0.751477$ |          |

## DISCUSSION

The present study was carried out in homegardens of Mulakunnathukavu Grama Panchayath (10 wards) in Thrissur to explore the crop and tree diversity, farmer's preference in crop selection, arrangement of plants and its management and the overall change in land use system and probable reasons in the Mulakunnathukavu grama panchayath in Thrissur district Kerala. The study was carried out in 90 homegardens of 10 wards in Mulakunnathukavu grama panchayath. In the study, 42 plant species (excluding vegetables) with 9 timber tree species, 9 fruit tree species, 2 fodder species, 9 medicinal species, 6 spices and condiment species, 7 rhizome and tuber species were reported. Cash crops like coconut, arecanut, nutmeg were dominated in most of the home gardens. The dominated timber trees include teak, mango, mahogany and jack. Fruit trees include guava, tamarind, annona, garcinia, loobica and citrus. Colocasia and cassava were the food crops in home gardens apart from rice.

Nair and Sreedharan (1986) had reported 30 arboreal taxa from the homegardens of Kerala. Babu et al. (1992) however observed a total 36 species of woody perennials from the homesteads of southern district of Kerala. In small scale home garden of this panchayath, *M indica*, *A integrifolia*, *T indicus*, *Garcinia gummi- gutta*, *T. grandis* etc were commonly found for timber.

In addition to that small-scale cultivations of coconut and arecanut were also seen. The functional diversity of plant species was lower compared to the small scale homegardens. This type of homegardens practice cultivation of cash crops such as Coconut and arecanut and cultivations of nutmeg, pepper, rubber were also seen. The cultivations of food crops and vegetables were low when compared to small homegardens. The land use patterns of the farmers were all different from one another. However, all practices were predominantly coconut based. In smaller home gardens farmers cultivate short duration plants compared to long duration plants. In these home gardens, farmers were raising food products such as fruit trees, vegetables and tuber crops. From medium to large homegardens a trend commercialization was clearly visible. Livestock such as cow, goat buffalo, hen duck were found in few homegardens. Livestock helped in generating extra income in addition to meeting dietary needs of the family. Home garden is an example of multi layered farming system, in which crowns of tree components are arranged in such away that they occupy different vertical layers, with the tallest component that are tolerant to strong light and high evaporative demand and shorter components that are tolerant to shade and high humidity (Nair, 1979).

## CONCLUSION

The diversity of plant species was low in this panchayath compared to other similar studies. The diversity of plant species was high in small homegardens when compared to medium and large homegardens. In medium and large-scale homegardens, the cultivation of vegetables was low and they gave more importance to the economically important cash crops and timber trees. However, the standing stock of timber trees appears to be stable with major contribution from *M. indica*, *A. integrifolia*, and *T. grandis*. A large proportion of homegardens were being converted in to small scale plantations of coconut, arecanut, nutmeg, timber trees, rubber etc. due to their commercial advantages. Integrated farming system approach may be a viable option in this scenario where the integration of different components such as tree, crop, fish, livestock etc. can be seen in more systematic framework.

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