

Management of Home Gardens and their Economic Prospects under Coastal Agroecosystem

V. KRISHNAKUMAR

Central Plantation Crops Research Institute
Kasaragod - 671 124, Kerala

A critical analysis of a typical home garden in the coastal region shows that farmers are giving adequate attention to utilize the available space both in the horizontal and vertical dimensions. Inclusion of different tuber crops (cassava, colocasia, amorphophallus, etc.), an array of vegetables and spice crops like ginger, turmeric, black pepper and vanilla has helped to enhance the bioresource diversity and farm resource diversity utilization in a homestead. Cultivation of different crops in the combination, in a multispecies cropping pattern model, consisting of distinct canopy stratification, helps to reduce soil temperature inside the microclimate thereby reducing evaporative losses of water and maintain humidity in the system. Recycling of agricultural waste biomass helps in build-up of soil nutrients in the long run and also helps to maintain the biodiversity of soil microflora. Farmers have started preparation of vermicompost in their home gardens for use in crop husbandry. Incorporation of components of animal husbandry will take care of the nutritional requirement of the farm family as well as earn extra income by way of sale of produce. In spite of the manifold advantages of such a cropping/ farming system in the homesteads, there is a tendency not to make use of the land and other resources to their fullest extent by a few farmers probably because of labour shortage and economic conditions. As such they are to be motivated further for adoption of homestead farming programmes.

(Key words: Homestead farming, Intercropping, Labour utilization, System management, Economics)

Among various farm models in the world, homestead cultivation claims uniqueness and the practice of home gardens being followed in Kerala from time immemorial has been receiving an outstanding recognition the world over. This highly intensified and welldeveloped indigenous system is often characterized by interactions between biotic and abiotic parameters including the farming community housed within these systems in conjunction with the agriculture and allied enterprises. However, the productivity and protective functions encountered in many of the home gardens are not well monitored, recorded and documented for use by the future generations of farmers.

Homestead farming, a typical land use system with multispecies cropping and multienterprises, utilizes maximum available resources of land and solar energy. It is believed that a myriad of sociocultural factors including food habits, consumer and market preferences have sustained this system since time immemorial. However, changes in domestic agriculture scenario thereby decline in economic sustainability and makes the farmers reluctant in adopting homestead farming.

Ruthenberg (1971) distinguished homestead cropping from arable cropping by the following

features: 1) Cropping those plants for personal consumption that cannot be collected nor supplied by arable farming, 2) Small plots, 3) Proximity to house, 4) Fencing, 5) Mixed or dense planting of a great number of annual, semi-permanent, and perennial crops, 6) High density of land use, 7) Land cultivation several times a year, 8) Permanence of cultivation, and 9) Cultivation with hand implements.

Thus, a homestead can be defined as an operational farm unit in which a number of crops, including food and cash crops, vegetables and tree crops, are grown with livestock, poultry and/or fish production, mainly for the purpose of satisfying the farmer's basic needs. The components of a homestead /home garden are so intimately mixed in horizontal and vertical strata as well as in time, that a number of complex interactions exist among soil, plants, other components and environmental factors in the farmer's plot where he lives and manages the unit (Nair and Sreedharan, 1986).

Home gardens benefit family nutrition, increase household income, provide a buffer to food insecurity during lean season, provide habitat protection and soil and water conservation (Marsh, 1996).

In India, homestead is mostly popular in Kerala, as it enjoys an equatorial climate with an optimum

for growing most of the crops, and where average land holding size is very low (0.5 ha as against 1.69 ha of national average). Kerala's homestead is unique, being more or less coconut based with an array of inter/mixed crops resulting in multistory cropping system, thereby efficiently harnessing solar radiation and using soil moisture and nutrients.

Main characteristics

Nair and Dagar (1991) has outlined the main characteristics and agroforestry emphasis of the major agroecological regions of India and the details pertaining to the tropical coastal and island regions are given below.

Characteristics	Tropical coastal and island region
Climate	Tropical humid, lowlands, rainfall 60 to 310 cm
Geographical spread	Coastal regions of West Bengal, Orissa, AP, TN, Kerala, Karnataka, Maharashtra and the Islands
Soils and vegetation	Entisols, Oxisols, Inceptisols, Alfisols, Evergreen, Semi evergreen, moist deciduous, littoral and mangrove forests
Main land use systems	Plantation crops and multistoreyed cropping, field crops, fish culture, forestry
Main land use and ecological problems	Deforestation and degradation of environment, coastal erosion, acid-soils and related soil problems, soil erosion along slopes, shortage of fodder
Major agroforestry emphasis	Afforestation of coastal regions with littoral and mangrove species, aquaculture with mangroves, multistoreyed cropping system; alley cropping

It can be noticed that with respect to main land use system, it is mostly plantation crop based which incorporates inter/mixed cropping/farming systems by inclusion of animal husbandry and related enterprises. Salam *et al.* (1992) have developed a coconut based homestead model consisting of 0.2 ha for the coastal uplands of South Kerala under irrigated agriculture. It includes various crop combinations apart from one unit each of cow, goat and poultry.

Interaction between components in homesteads

A typical homestead, with a combination of crops, presents a multitier canopy configuration. The canopy architecture of the components are arranged in such a way that they occupy different vertical layers with the tallest component having foliage tolerant to strong light and high evaporative demand and shorter components having foliage requiring or tolerating shade and high humidity. Usually the major portion of the upper canopy goes for coconut and it is followed by pepper trailed on coconut, tree spices and cocoa planted in between coconut rows. Often the lower layer of the system consists of banana, cassava and other tuber crops. At the ground level, pineapple, vegetables and other herbaceous crops including fodder grasses are cultivated. Wherever coconut is present as the major component of the system, the inter/mixed crops grown vary according to the age and canopy spread of palms. During the initial stage of growth, all sunloving crops can be grown and when the palms attain the age of bearing (7-8 years), as the light available inside the plantation is reduced due to canopy growth, shade-loving crops such as yams, ginger, turmeric etc can be grown. After the age of 25 years, tree spices such as clove, nutmeg, cinnamon can be grown as mixed crops.

Labour utilization

At present the farmer, his family members and a few labourers provide the necessary work force. In small holdings, planting, cultural operations and harvesting of different crops occurring throughout the year are attended by the farm family. Most of the crops, except coconut, in the home garden are labour intensive. As compared to monocropping, the home gardens involve high labour utilization. For example, the average requirement of labour for one-hectare home garden with an intensive crop combination with livestock (mixed farming) is about 600 man days per year (Gopalasundaram *et al.*, 1993) as compared to 120-144 man days for coconut mono cropping (Das, 1990). Introduction of vanilla, which requires frequent coiling of vines and hand pollination after flowering, as mixed crop with coconut or arecanut also makes the system more labour intensive. Recently, because of the high price being realized for fresh beans, many farmers have taken up vanilla cultivation.

System management

Most of the farmers are aware of the ill effects of crop cultivation by use of deadly pesticides and hence there is a purposeful shift to ecofriendly

farming by eliminating the use of chemicals for providing nutrition and protection of plants against pest and diseases. However, this necessitates creating facilities for appropriate organic inputs in and around the farm units. The intense multispecies cropping pattern also needs rearrangement for optimum light use efficiency so that continuous harvesting of crops and the use of soil nutrients at different levels and time can be managed and the land could be put to the best use.

Analysis and development of homesteads

Taking into account the need for collection of basic data and restructuring some of the identified homesteads in Kerala and the Andaman and Nicobar Islands, the Agro-Ecosystem Coastal Directorate (NATP) is implementing a project "Analysis and development of homestead farms of Kerala- A farmer participatory Approach" from last two years. The major objectives include: creation of data base of homesteads of Kerala and Andaman and Nicobar Islands; formulation of strategic interventions in the existing homesteads to develop farm models for resource use efficiency and income maximization; development of location specific homesteads models for different agroclimatic zones by modification of the existing system through planned interventions in input, technology and management; awareness creation among farmers and scientists.

Methodology

The Central Plantation Crops Research Institute, Kasaragod, one among the five centres, is implementing this project in the four northern districts of Kerala viz., Kasaragod, Kannur, Kozhikode and Malappuram. In order to create the database, 25 percent of *panchayaths* of these four districts have been identified (Table 1). Out of the 83 *panchayaths* identified, ten homesteads from each *panchayath* have been randomly selected to

Table 1. Details of districts and number of panchayaths selected

Name of district	No. of panchayaths	
	Total	Selected
Kasaragod	39	19
Kannur	87	21
Malappuram	79	19
Kozhikkode	99	24
Total	304	83

represent various locations in consultation with the concerned agricultural officers. Detailed survey was conducted during the first half of 2002 based on a questionnaire containing aspects like family details, cropping history, yield level, marketing strategy followed and present socio-economic status of farm families. Soil samples were also collected from these homesteads and were analyzed from the district soil testing laboratory.

Basic data from the 815 homesteads of the four districts surveyed were collected. Based on the resources (land, water and capital) availability as well as willingness of farmers for restructuring their homesteads through their participation as well as inputs supplied from CPCRI through the NAT Project, five homesteads in each district have been shortlisted in different agroclimatic subzones for further analysis and implementation of interventions. A multi disciplinary team consisting of experts from crop production, crop protection and social science divisions has been constituted and they visited these homesteads during August/September, 2002 to identify and suggest suitable interventions for restructuring of such homesteads. The details of interventions proposed in the selected homesteads are listed in Table 2.

Table 2. Interventions suggested by the multidisciplinary expert team

Sl. No.	Types of interventions suggested/implemented
1	Planting pepper rooted cuttings (Sreekara) 2 Planting tissue culture banana (G9)
3	Raising Vanilla as a mixed crop
4	Planting of hybrid cocoanut (WCTx COD)
5	Mixed cropping tree spices (Nutmeg and Clove)
6	Planting hybrid mango grafts (H 87) and sapotta grafts.
7	Raising vegetable crops
8	Planting Vetiver grass on raised bunds
9	Balanced fertilizer management for cocoanut palms
10	Introduction of pine apple
11	Construction of Vermicompost unit
12	Raising / strengthening of bunds for soil conservation
13	Introduction of Gramalakshmi chicks

Observations

The basic data collected regarding homesteads of the four states indicate that most of the farmers, in general, are cultivating a number of crops in their homesteads and adopt manuring, plant protection operations and other cultural practices. About 26 percent and 32 percent of the farmers in Kozhikkode and Malappuram districts, respectively carry out their cultivation utilizing family labour. This was more or less the same case with Kasaragod (32%) and Kannur district (26%). While majority of the farmers (56 percent) in Kozhikkode district sell their farm produces by direct marketing, it was only 26 percent in Malappuram. The cases with Kasaragod and Kannur were also more or less the same as in the case of Malappuram. More than 60 percent of farmers in these three districts resort to the marketing through intermediaries, thereby earning only low economic returns. More than 60 percent of the homesteads surveyed in all the districts are undertaking livestock rearing by maintaining one cow or the other enterprise to meet the domestic demand.

Inputs (planting materials, fertilizers earthworms, poultry chicks, etc.) for various interventions were supplied to each participating farmer, and plantings and operations were carried out. Regular monitoring of the whole programme is being undertaken. Data on growth of inter/mixed crops such as vanilla, banana and pepper are being recorded. Though most of the farmers are already growing pepper in their homesteads, it was noticed that they were cultivated without any scientific approach. Hence, new improved high yielding variety

of pepper viz., Sreekara, a Karimunda selection, which can tolerate more shade, was supplied. The tissue culture plants of banana (cv. G-9) supplied to farmers start yielding and the farmers are happy with the performance. Farmers also started production of vermicompost by utilizing agrowaste biomass and they are applying the same to various crops being cultivated. The expected outcome of different interventions is as follows (Table 3).

CONCLUSIONS

A critical analysis of a typical home garden in the coastal region shows that farmers are taking adequate attention to utilize the available space both in the horizontal and vertical dimensions. Inclusion of different tuber crops (cassava, colocasia, amorphophallus, etc.), an array of vegetables and spice crops like ginger, turmeric, black pepper and vanilla has helped to enhance the bio-resource diversity and on farm resource diversity utilization in a homestead. Cultivation of different crops in the combination, in a multispecies cropping pattern model, consisting of distinct canopy stratification, helps to reduce soil temperature inside the microclimate thereby reducing evaporative losses of water and maintain humidity in the system. Recycling of agricultural waste biomass helps in build-up of soil nutrients in the long run and also help to maintain the biodiversity of soil microflora. Farmers have started preparation of vermicompost in their home gardens for use in crop husbandry. Incorporation of components of animal husbandry will take care of the nutritional requirement of the farm family as well as earn extra income by way of

Table 3. *Expected outcome of interventions in different homesteads*

Sl. No.	Interventions undertaken	Duration	Expected improvements
1	Better crop husbandry	Short term	Improves productivity
2	Better planting techniques, adequate spacing	Short/long term	Improves growth environment, scope for intercropping
3	Introduction of improved varieties	Long duration	Increased yield, Increased economic returns
4	Inter/mixed cropping/mixed farming	Long duration	Better employment generation, resource utilization, reduces risk, more income generation
5	Integrated nutrient management	Long term	Prevents soil degradation, improves soil fertility
6	Integrate multipurpose tree species (fruits, timber, cash crops etc.)	Long term	Improves economy over a period of time

sale of produce. In spite of the manifold advantages of such a cropping/farming system in the homestead, there is a tendency not to make use of the land and other resources to their fullest extent by a few farmers probably because of labour shortage and economic conditions. As such they are to be motivated further for adoption of homestead farming programmes.

REFERENCES

- Das, P. K. (1990). Economics of coconut based farming systems. Proceedings XXII Cocotech Meeting, De Silva (ed.), pp. 539-554, APCC.
- Gopalasundaram, P., Thomas Varghese, P., Hegde, M. R., Nair, M. G. K. and Das, P. K. (1993). Experiences in coconut based farming systems in India. In *Advances of coconut Research and Development*, pp. 383-393. Oxford & IBH, New Delhi.
- Marsh, R. (1996). *Household Gardening and Food Security: A Critical Review of the Literature*, Nutrition Programmes Service, Food and Nutrition Division, FAO, Rome.
- Nair Achuthan, M. and Sreedharan, C. (1986). Agroforestry farming system in the homesteads of Kerala, Southern India. *Agroforestry Systems* 4:339-363.
- Nair, P. K. R. and Dagar, J. C. (1991). An approach to developing methodologies for evaluation of agroforestry systems in India. *Agroforestry Systems* 16(1): 55-81.
- Ruthenberg, H. (1971). *Farming Systems in the Tropics*. Clarendon Press, Oxford.
- Salam, M. A., Babu, K. S., Mohanakumaran, M., Sreekumar, D., Mammen, M. K., Girija, V. K., Mera Bai, M., Jayachandran, B. K., Asan, B. K., Shehana, R. S. and Mathew, K.P. (1992). Homestead model for the coastal uplands of South Kerala under irrigated agriculture. *Indian coconut Journal* August: 2-6.