Research Article

Journal of Plantation Crops, 2007, 35 (3) : 146-151

Restructuring of homestead farms for sustainable income and employment opportunities

V. Krishnakumar*, D.V.S. Reddy, C. Thamban and C.V. Sairam

Central Plantation Crops Research Institute, Kasaragod, Kerala
** Senior Scientist (Agronomy), Central Plantation Crops Research Institute, Regional Station, Krishnapuram (P.O), Kayamkulam-690 533*
(Manuscript Received: 27-03-06, Revised: 10-12-06, Accepted: 12-09-07)

Abstract

Under the National Agricultural Technology Project on " Analysis and Development of Homestead farms of Kerala & Andaman and Nicobar Islands-A farmer participatory approach", detailed database on various aspects from 815 homestead farms of four northern districts of Kerala (Kasaragod, Kannur, Kozhikkode and Malappuram) were collected. Based on the survey, appropriate interventions in crop production technology and management practices in a farmer participatory approach were identified and implemented in 18 homestead farms for a period of three years. It was observed that restructuring of homestead farms has led to increases in cropping intensity (ranging from 56 per cent in Kannur to 86 per cent in Malappuram district). There were significant differences in total productivity in terms of coconut yield, gross income (ranging from Rs. 39, 218/ha to Rs. 73, 289/ha) and net income per unit area (ranging from Rs. 22, 804/ha to Rs. 47,810/ha), respectively in Kannur district to Malappuram district, Benefit Cost ratio (ranging from 2.43 in Kannur to 2.82 in Malappuram) as well as employment opportunities (on an average addition of 51 days/year for all the homestead farms together) due to intercropping, introduction of subsidiary enterprises and use of coconut dryer. Further restructured homestead farms have become self-sustainable production system in the long run.

Keywords: Participatory management, sustainable income, employment opportunities, homestead farms

Introduction

Cultivation of crops in small and fragmented land holdings makes the agricultural scenario of Kerala State altogether different from other states. Homestead farms of Kerala are typical that they surround the farmer's home, mainly managed by the members of the farm family and are generally cultivated by a large number of crops and other plants along with or without a component of livestock and other subsidiary income generating activities for sustenance and for generation of additional income (Nair and Sreedharan, 1986). Thus the structural and functional diversity of this farming system make it a unique one (Salam *et al.*, 1991).

Jose and Shanmugaratnam (1993) opined that the recent trends in agrarian structure and the high market orientation exert pressures on the home garden and its sustainability is in question. In spite of rich resource endowments and high intensity of cropping, the productivity of most of the crops grown in homesteads is much lower as it could be noticed that no serious attempts are being made by the farmers to adopt scientific management practices in cultivation of various crops. Most often high intensity of shade does not allow the different crops to yield to their maximum potential (John and Nair,1999b). Taking all these into consideration and to understand the structure of homestead farms prevalent in northern Kerala as well as to evolve location specific farm models for resource use efficiency and sustainable productivity through intervention in technology and farm management, a project on "Analysis and Development of Homestead farms of Kerala & Andaman and Nicobar Islands - A farmer participatory approach" funded by the National Agricultural Technology Project was co-implemented by the Central Plantation Crops Research Institute, Kasaragod from 2001 to 2004 with the objectives to

a) develop database including yield levels of the homestead farms of northern zone of Kerala

b) restructure identified homestead farms with appropriate interventions and study their impact on socio-economic status of the farm families including employment generation.

Materials and Methods

Kasaragod, Kannur, Kozhikkode and Malappuram districts constitute the Northern Zone of Kerala. To develop the database on the existing homestead farms of these districts, out of the total 304 panchayats, 83 were randomly identified (Table 1) in consultation with the respective district Joint Directors of Agriculture and the

6-15

le 1. Details of districts and number of panchayats selected

ame of district	No. of Panchayats		
	Total	Selected	No. of farmers surveyed
1-Kasaragod	39	19	185
2-Kannur	87	21	205
3-Kozhikkode	99	24	185
4-Malappuram	79	19	240
tal	304	83	815

ch panchayat, about ten homestead farms were further ndomly selected for the detailed survey. The system ventory on land holding and use pattern, cropping stem adopted, agro-management practices followed, bour use pattern, integration of animals in the homestead ms as well as marketing structure was prepared by terviewing the farmers with the help of a pre-tested terview schedule.

During the preliminary survey, it was found that most all the farmers were following a piece meal proach in the management of homestead farms, which s neither sustainable nor scientific. In order to structure and develop selected homestead farms to ve as models, based on the basic data collected, five mestead farms in each district were further identified presenting different areas of the district.

A multidisciplinary scientific team of experts from entral Plantation Crops Research Institute, Kasaragod d Indian Institute of Spices Research, Kozhikkode sited all the selected homestead farms during early part 2002 and had detailed analyses and discussions with rmers. Considering the resource base of farmers cluding land, water, capital), preferences of the farmer, arket potential, labour availability and biomass ailability in the farms, various interventions in chnology and management were suggested. ccordingly the suggested interventions concentrated e following aspects.

1. Correcting defects in the traditional farming practices with respect to resource utilization, nutrient management and plant protection methods etc.
2. Maximizing productivity per unit area through increasing cropping intensity by reorienting existing cropping system and by introducing suitable intercrops wherever possible.
3. Integrated production approach by enterprise diversification for subsidiary source of income, employment generation, nutritional security to the farm family and effective utilization of available resources within the farm.
4. Recycling of farm wastes through vermicomposting, which is otherwise being wasted without proper utilization.

The details of interventions implemented are presented in Table 2.

Table 2. Interventions suggested by the expert team

Sl. no.	Types of interventions suggested/implemented
1	Adopt appropriate shade regulation measures wherever needed and carry out balanced fertilizer and organic manure application
2	Raise intercrops such as tissue culture banana (Grand Naine); spices (ginger and turmeric); vegetables, tuber crops (tapioca, yam and colocasia); pine apple; fodder as well as mixed crops such as pepper, nut meg, clove and vanilla
3	Introduction of Gramalakshmi breed of poultry birds, fish culture and coconut dryer wherever necessary depending on farmers interest
4	Planting of perennial crops such as hybrid coconut (WCT x COD) seedlings, mango grafts (H 87) and sapota grafts
5	Organic matter recycling through vermicomposting

As per the recommendations of the expert team and based on farmer's preferences, planting materials of various crops (vanilla, tissue culture banana, nutmeg grafts, pepper rooted cuttings (Sreekara), coconut (WCT x COD), mango grafts, sapota grafts and vegetable seeds) were supplied to grow as inter/ mixed crop to various homestead farms. Farmers used their own planting materials in case of different tuber crops, pineapple, fodder, ginger and turmeric wherever available. Coconut palms in each farm were serially numbered for regular monitoring of yield. Gramalakshmi breed of poultry birds were introduced in one farm at Kozhikkode district. Soil and water conservation measures were adopted wherever soil erosion was a problem and vetiver slips (*Vetiveria zizanoides*) and pineapple suckers were planted to reduce runoff loss of soil and water. Financial assistance was provided for construction/strengthening of bunds. Vermicompost unit was constructed in 17 units and a financial support of Rs. 2000/unit was provided. Necessary earthworm culture for production of compost was also supplied. Coconut dryer was distributed to five farmers (1 in Kasaragod, 2 in Kannur and 2 in Kozhikkode districts) at a subsidized cost for preparing copra during rainy period for increasing farm income. Out of the initial 20 homestead farms identified, one homestead each in Kasaragod and Malappuram could not continue with implementation of the project till the completion of the project due to financial problems experienced by the farmers. Pre and post project data on cropping intensity, productivity and profitability, recycling of organic biomass through vermicomposting as well as employment generation were collected. Two

way factorial analysis of total productivity of coconut, gross and net income (before and after the implementation of project) was carried out.

Results and Discussion

The average size of holding varied from 0.2 to 1.0 ha in the districts surveyed. The total number of cultivated and other species of plants in the homesteads varied mainly depending up on the holding size and the intensity of management adopted. Coconut based farming system was the most common cultivation system occupying more than 95% of the homestead farms surveyed. Arecanut and spice based homesteads were also prevalent in a few of the areas surveyed.

The interventions were implemented from August, 2002 to November, 2004. The results of restructured homestead farms were analyzed in terms of increase in cropping intensity and productivity, increased profitability and sustainable income, employment generation, residue recycling through vermicomposting, balanced food production, value addition through better post harvest processing especially of coconut etc., compared with the baseline data. The level of adoption of technology as well as the improvement in farmers' knowledge and skills was also analyzed through an impact study on conclusion of the project.

Increase in cropping intensity

During the pre-project period, the cropping intensity was around 96 per cent in Kasaragod to 149 per cent in Kannur. Wherein the former presented a situation of gross under utilization of space and solar energy resources, the latter most often was because of over crowding. This ultimately resulted in low productivity of all the components and the system as a whole (Regeena *et al.*, 2004). However, in both the types of homesteads, farm resource use efficiency could be enhanced through proper scientific planning, planting and crop management.

Regulation of excess shade by removal of unwanted trees, pruning branches of other trees and planting inter/mixed crops as well as introduction of new interventions in technology and scientific management by adoption of package of practices were carried out. These operations resulted in increasing cropping intensity per unit area. The details on the net cropped area, total area cultivated, and cropping intensity of all homestead farms before and after the implementation of the project are presented in Table 3.

The average net cropped area under the selected homestead farms ranged from 0.29 ha in Kannur to 0.34 ha in Kasaragod district. The average total area cultivated during the pre- project period varied from 0.45 ha in

Table 3. Change in net cropped area, total area cultivated and cropping intensity of homestead farms

Homestead farm		Net cropped area (ha)	Total area cultivated /yr (ha)		Cropping intensity (%)	
			Before	After	Before	After
D1- Kasaragod						
F1	Mubarak Ahmed,Daru Salam, Moggral Puthur	0.31	0.35	0.64	110.77	203.71
F2	Yatheesha, Kajor house, Kadampar, Manjeswaram	0.40	0.60	0.89	149.50	221.80
F3	Easwaran Namboothiri, Patena, Neeleswaram	0.36	0.61	0.96	169.33	266.77
F4	Raghavan Master, Pattamma Nivas, Chandera, Pilicode	0.28	0.32	0.56	115.58	198.42
D2-Kannur						
F1	K.V.Nanu, Kannadichal, Kadampur	0.32	0.51	0.74	160.52	230.80
F2	Y.Balakrishnan, Nandanam, Karivellur-P.O	0.30	0.47	0.72	155.33	239.69
F3	Cheriyan,Thakadiyel, Alakode P.O	0.30	0.48	0.73	158.89	243.09
F4	M.K.Krishnan Nair, MadathilAnjarakandy P.O	0.12	0.13	0.21	109.20	174.30
F5	Easwaran Embranthri, Madamana Illom, Mayyil P.O	0.42	0.67	1.13	160.09	270.10
D3-Kozhikkode						
F1	Varkey. C.T, Chandran Kunnel, Chakkittappara P.O	0.44	0.69	1.12	157.80	255.42
F2	Ramachandran Nair, Kuzhikandathil, Pantheerankavu. Peruvanna P.O	0.32	0.34	0.57	105.01	179.00
F3	Ramla Karaimbapoyil, Elettil P.O, Koduvelli	0.34	0.56	0.89	164.40	261.29
F4	Sebastian P.CPuthusserikunnel, Adivaram P.O	0.37	0.63	1.00	170.30	274.09
F5	Muhammad Koya, Musharakandy house, Kizhakkoth P.O,	0.16	0.20	0.32	125.00	202.30
D4-Malappuram						
F1	Moideen Kutty. P.PPazhayaputhenveedu, Pachathiri P.O	0.36	0.54	0.97	150.70	269.40
F2	Moideen.V.K Varikkodan, Marutha P.O,	0.36	0.53	1.01	148.30	282.30
F3	Sankunny Varier, P.S.R Variam, Poolamanna P.O, Pandikkad.	0.36	0.52	1.01	145.70	280.60
F4	Khalid. K.V.M, Lalsalam, Puliangadi, Anakkayam P.O	0.24	0.28	0.50	114.85	208.30

ur to 0.48 ha in Kozhikkode district. The highest ntage increase in total cropped area after the cturing was recorded in Malappuram district (86) wed by Kasaragod/Kannur (62). The increase in ping intensity was to the extent of 56 per cent in nur, 62 per cent in Kozhikkode, 63 per cent in ragod and 86 per cent in Malappuram district. eena (2005) also reported similar increase in ping intensity of homestead farms of Kollam district erala after restructuring.

ease in productivity and profitability

Integration of various enterprises and introduction of crops has resulted in higher income than pre-vention. It was revealed that the productivity of the crop (coconut) and other short duration intercrops oved when compared to the base year yield. However, nnial mixed crops such as vanilla, pepper, clove etc. et to come to the bearing stage. Adoption of integrated nutrient management practices including use of more organic manure viz., vermicompost and growing green manure crops in the base of coconut is expected to increase the yield in subsequent years. The productivity of different components integrated in each farm was converted into coconut nut equivalent to form total productivity based on the prevailing unit cost of the produce of each component. The restructured system as a whole provided opportunity to make use of the waste materials of one component as input for another enterprise and thus helped for cost reduction and to realize higher profitability. Similar report of increase in income due to farmer participatory management of homestead farms was made by Regeena (2005). The increase in base crop yield i.e. coconut ranged from 35 to 60 % in Kasaragod; 23 to 55 % in Kannur; 25 to 65 % in Kozhikkode and 11 to 49% in Malappuram districts by the implementation of the project period. The change in total productivity, gross income, net income and Benefit Cost ratio of homestead farms are presented in Table 4.

4. Change in productivity and profitability of the homesteads

stead farm	Total productivity of coconut (nut basis*)		Gross income (Rs./ha)		Net income (Rs./ha)		BC ratio	
	Before	After	Before	After	Before	After	Before	After
saragod								
	4,942	8,300	19,765	49,800	7,785	30,300	1.65	2.55
	7,015	12,064	28,060	72,384	12,890	45,765	1.85	2.72
	5,900	9,894	23,600	59,365	9,400	37,615	1.66	2.73
	2,532	4,290	10,128	25,740	4,650	16,990	1.85	2.94
	5,097	**8,637**	**20,388**	**51,822**	**8,681**	**32,667**		
annur								
	3,115	5,918	12,460	35,500	3,960	17,570	1.46	1.99
	6,098	9,475	24,392	56,850	8,650	31,100	1.55	2.20
	2,275	4,200	9,100	25,200	2,825	13,750	1.45	2.20
	2,896	5,098	11,584	30,588	4,964	18,750	1.75	2.58
	4,750	7,992	19,000	47,950	10,360	32,850	2.20	3.18
	3,827	**6,537**	**15,308**	**39,218**	**6,152**	**22,084**		
ozhikkode								
	6,095	10,125	24,380	60,750	10,430	40,550	1.75	3.01
	4,015	7,024	16,060	42,145	7,470	27,345	1.87	2.85
	5,900	9,339	23,600	56,100	11,180	36,100	1.90	2.80
	7,605	13,400	30,420	80,400	15,210	55,800	2.00	3.27
	3,127	5,998	12,508	35,975	6,250	22,950	2.00	2.77
	5,34.8	**7,497**	**21,394**	**55,074**	**10,108**	**36,549**		
Malappuram								
	13,590	19,912	54,360	1,19,470	28,505	79,910	2.10	3.02
	9,080	14,637	36,320	87,825	16,670	57,970	1.85	2.94
	2,600	4,730	10,400	28,380	4,100	17,880	1.65	2.70
	7,047	9,580	28,188	57,480	11,898	35,480	1.73	2.61
	8,079	**12,214**	**32,317**	**73,289**	**14,043**	**47,810**		
rall mean	**5,588**	**8,721**	**22,352**	**54,851**	**9,746**	**34,778**		

rops giving yield only are included]

P=0.05) for total productivity: 2455.61, for gross income: 12368.01, for net income: 13050.26

The results indicate that there is significant over all increase in total productivity, gross and net incomes of participating farmers due to restructuring of homestead farms. The diversification of farming with new interventions like poultry and fish rearing and growing short duration crops as intercrops broadened the income base of farmers and reduced the risk of complete failure of any particular crop and resulted in sustainable income. Due to the difference in maturity periods of various crop combinations, income could be generated at regular and shorter intervals. Multiplicity of crops by way of incorporation of vegetables, tuber crops and fruit crops as well as integration of other enterprises (livestock, poultry, pisciculture etc., already existing in certain farms) in the restructured homestead farms also resulted in production of different sources of nutrition for farm families.

Organic recycling through vermicomposting

Integration of vermicompost production helped to effectively recycle the farm wastes from different enterprises like coconut leaves, banana stems, vegetable waste, weeds and household wastes into the system as organic manure. This approach not only reduced the dependence on organic manure from outside source, which ultimately reduced the cost of production of system, but also prevented environmental pollution and made a clean environment in the homestead farm. The frequency of composting varied with availability of waste materials and size of the farm. In addition to compost, vermiwash was also collected at the rate of around 10-15 litres/week in each homestead, which was used for spraying on vegetables, vanilla, pepper and other crops as bio- growth regulator. A few of the farmers were able to sell earthworms to nearby farmers and earn some additional income. John and Nair (1999a) were of the opinion that coconut based homestead farms can be a classical example of a sustainable land use system. The average quantity of vermicompost produced/year varied from 2165 kg in Kannur to 3975 kg in Malappuram, which could contribute about 35 to 60 kg N, 3.5 to 6.0 kg P and 6.5 to 12.0 kg K apart from the long range beneficial effect of application of organic manures in the homestead farms.

Employment generation

Homestead farms, in general are supposed to be managed by all the members of the farm family. However, in the case of harvesting of coconut, milking of cows, etc., hired labour is also used. The survey results revealed that the percentage of family labour used ranged from 26 in Kozhikkode and Kannur to 32 in Kasaragod and Malappuram districts. The percentage of farmers exclusively hiring outside labour for farm operations ranged from 14 in Kasaragod to 26 in Kozhikkode district. The percentage of homestead farms using both family and hired labour varied from 36 in Malappuram to 62 in Kasaragod district.

In conventional farming, employment opportunity is seasonal and mostly required only during the pre and post monsoon season. Farming in restructured homestead involved more labour and generated additional employment especially for family labour because of inclusion of more crops per unit area, integration of allied enterprises and land management practices for soil and water conservation as well as vermicomposting. Due to new interventions, on an average an additional 51 man-days/year was generated not only for the farm family (especially for cultivation of vegetables and tuber crops, production of vermicompost and use of coconut dryer), but also for hired labour (which varied, based on activities included like land preparation, soil and water conservation measures; cropping intensity and size of the homestead farm). The details of labour utilization are presented in Table 5.

Conclusion

Diversification of activities in the restructured homestead farms enabled the farmers to acquire more knowledge and skills in farming system production. When once provisions were made at the farm level to generate quality food for the family use apart from commercial purposes through restructured homestead, it has created a feeling of security among the farmers. Need based integration of various enterprises in a single unit resulted in cost reduction, higher production, larger profits, more employment generation and availability of better food. All these ultimately help in improving the standard of living of the farm family. The success of the project could be attributed to the active involvement of beneficiary farmers in planning, implementing, monitoring and evaluation of various components of the project because of their convincement about the benefit of integration of various crops and enterprises in restructuring homestead farms in improving system performance as a whole.

Table 5. Labour utilization (man-days) /year (M=Male, F=Female)

Homestead	Before the project				After the project				Additional man-days generated
	Family		Hired	Total	Family		Hired	Total	
	M	F			M	F			
Kasaragod									
	65	15	40	120	90	20	50	160	40
	95	45	60	200	130	60	68	258	58
	90	20	50	160	125	30	55	210	50
	50	40	40	130	68	55	48	171	41
Kannur									
	60	25	40	125	85	35	55	175	50
	75	25	60	160	95	40	80	215	55
	45	30	25	100	70	35	35	140	40
	65	25	30	120	95	30	40	165	45
	40	30	70	140	60	30	100	190	50
Kozhikkode									
	125	30	45	200	155	40	55	250	50
	72	30	40	142	92	48	50	190	48
	60	52	40	152	80	80	50	210	58
	105	55	45	205	144	67	54	265	60
	95	30	28	153	117	40	38	195	42
Malappuram									
	85	20	90	195	105	30	120	255	60
	142	30	30	202	192	40	45	277	75
	110	20	32	162	140	26	40	206	44
	50	20	88	158	65	25	118	208	50

Acknowledgement

The authors wish to place on record their sincere nks to the National Agricultural Technology Project der the Indian Council of Agricultural Research, w Delhi for the financial assistance and Dr.V. Rajagopal, Director and Dr. George V. Thomas, Head (Division of Crop Production), Central Plantation Crops Research Institute, Kasaragod, Kerala for the constant encouragement during the project period. Sincere thanks are also due Smt.B.Jyothi, Sri.Elgy C.Alex and Sri.A.Suresh, Senior Research Fellows for their active involvement in the implementation of the Project as well as to the Principal Agricultural Officers and Agricultural Officers of various districts for their timely help. The project would not have been successful but for the active involvement of all the beneficiary farmers. The authors also express their sincere thanks to all of them.

References

John, J. and Nair, M.A.1999a. Soil fertility aspects of coconut based homestead farming. *Indian Coconut J.* **30**(6): 1-3.

John, J. and Nair, M.A.1999b. Light- a limiting factor in coconut based home gardens. *Indian Coconut J.* **30**(12): 1-3.

Jose, D. and Shanmugaratnam, N. 1993.Traditional homegardens of Kerala: A sustainable human ecosystem. *Agro Forestry Systems*. **24**:203-213.

Nair, A. and Sreedharan, C. 1986.Agro-forestry farming system in the homesteads of Kerala, Southern India. *Agro Forestry Systems*. **4**:339-363.

Regeena, S, Jacob John, Ravi, S, Krishnakumar, V. and Geetha,D. K.2004. Homestead farms- Agricultural Heritage Systems of Kerala. *Technical Bulletin*: 1-24.

Regeena, S.2005.Kerala Agricultural University and Research on Homestead farms (Malayalam). *Kalpadhenu*: April-June 14-17.

Salam, A, Sreekumar, D, Mohanakumaran, N. and Sathees Babu, K. 1991.Coconut based homestead farming: A model. *Indian Coconut J.* **22**(4):4-12.