Coconut based integrated farming system (CBIFS)

for profitability and sustainability of coconut production system

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Coconut, also known as 'Kalpavriksha' or 'Tree of heaven', provides livelihood security to millions of people across the world through nutrition, employment, enterprises and eventually income generation. In India, the crop supports the livelihood of more than twelve million people across 18 states and 3 union territories. 90% of the cultivation is confined to the South Indian states of Kerala, Karnataka, Tamil Nadu and Andhra Pradesh. As per records, more than 90% of the coconut holdings are less than 0.4 ha, revealing that coconut cultivation in the country is in the hands of small and marginal farmers. Even though occupying the largest area (34.75%) and contributing to 32.9% of the total national production, the situation in Kerala is of further concern as the small holdings neither provide enough employment opportunities to the family throughout the year nor generate sufficient income to depend on the system alone. The uncertainties owing to high degree of price fluctuations, lack of concrete mechanisms for procurement, and inadequate infrastructural arrangements for value addition altogether contribute to the reduction in dependency on the crop in addition to the difficulties in management for optimum production.

Unlike many other plantation crops, coconut is amenable to different farming system models including intercropping, multi-storied cropping and mixed farming systems. The unique plant architecture of the crop offers enough scope for utilization of the natural resources like soil, water and sunlight in the garden through accommodating other crops, poultry and animals in almost 75% of the unutilized area between trees and hence forms an ideal situation for an integrated farming system. Kerala's coastal belt which is relatively flat, and heavily crisscrossed by a network of interconnected canals and rivers offers high scope for the groves of coconut trees to be integrated with different production systems like paddy, banana, vegetables, spices and tuber crops along with animal husbandry, poultry rearing and fisheries activities. With high population density and minimum per capita land holding size, intensification of agricultural activities is a must in the coastal belt for deriving a decent income for livelihood of the farmers. Thus Coconut

Based Integrated Farming System (CBIFS) assumes relevance and deserves serious considerations in the farming sector of the mid land and coastal Kerala for enhancing the return from unit area.

In this article an attempt is made to compare the economics of CBIFS models of different land holding sizes in terms of profitability and sustainability of the system compared to coconut alone, based on the analyse, more than 10 homestead based integrated farming system units developed during the last five years in Alappuzha district, Kerala. Three land holding sizes viz., up to 0.75, 0.76-1.5 and 1.51-2.5 acres were considered for the purpose, based on the prevalence. Different components and their extend in different holding sizes, in general, are as given below.

Up to 0.75 acre	0.76-1.5 acres	1.51-2.5 acres
Coconut (25) + Banana (150) + Vegetable (5 cents) Tuber crops (2 cents) + Fodder (20 cents) + Dairy (2) + Goat (2) + Poultry (30) + Duck (25) + Fish (2cents) + Biogas (1cu.m.)	Coconut (40) + Banana (300) + Spices (1 cent) + Vegetables (5cents) + Tuber crops (5 cents) + Fodder (70cents) + Vegetable (Rain shelter) (1cent) + Dairy (10) + goat (15) + Poultry (50) + Duck (45) + Quail (20) + Fish (6 cents) + Biogas (2 cu.m.)	Coconut (70) + Banana (400) + Spices (10 cents) + Vegetables (5 cents) + Tuber crops (10 cents) + Fodder (1 acre) + Rain shelter (1 cent) + Upland paddy (50 cents) + Dairy (15) + goat (20) + Poultry (75) + Duck (50) + Quail (50) + Fish (6 cents) + Biogas (2 cu.m.)

Income and profitability

Annual returns from components of the CBIFS models of different land holding sizes are given in table 1. It is observed that the net returns from the model is Rs.2.35, 7.88, and 12.87 lakhs, respectively for <0.75, 0.76-1.5, and 1.51-205 acre holdings. At

Table 1.Comparison of economics of monocropping and CBIFS models in different of land holding sizes

Holding size	Farming System	Annual expenditure (Rs.)	Annual income (Rs.)	Net Returns (Rs.)	Additional Net Returns (Rs)	Employment generation (man days)
up to 0.75 acres	Coconut alone (50 No.s)	28150	52500	24350	-	32
	Coconut (25) + Banana (150) + Vegetable (5 cents) Tuber crops (2 cents) + Fodder (20 cents) + Dairy (2) + Goat (2) + Poultry (30) + Duck (25) + Fish (2cents) + Biogas (1cu.m.)	219125	454250	235125	210775 (865%)	175
0.76-1.5 acres	Coconut alone (100 No.s)	56300	105000	48700	-	58
	Coconut (40) + Banana (300) + Spices (1 cent) + Vegetables (5cents) + Tuber crops (5 cents) + Fodder (70cents) + Vegetable (Rain shelter) (1cent) + Dairy (10) + goat (15) + Poultry (50) + Duck (45) + Quail (20) + Fish (6 cents) + Biogas (2 cu.m.)	777920	1565548	787628	738928 (1517%)	395
1.51-2.5 acres	Coconut alone (170 No.s)	95710	178500	82790	-	93
	Coconut (70) + Banana (400) + Spices (10 cents) + Vegetables (5 cents) + Tuber crops (10 cents) + Fodder (1 acre) + Rain shelter (1 cent) + Upland paddy (50 cents) + Dairy (15) + goat (20) + Poultry (75) + Duck (50) + Quail (50) + Fish (6 cents) + Biogas (2 cu.m.)	1201000	2404748	1286538	1203748 (1453%)	426

Figures in parentheses indicate the percentage increase compared to coconut monocropping system

Table 2. Frequency of income and annual net returns from different components of CBIFS models of different land holding sizes (Rs.)							
IFS Components	Frequency of income	up to 0.75 acre		0.76 – 1.5 acres		1.51-2.5 acres	
		Area/ No of plants	Annual net Returns	Area/ No. of plants	Annual net Returns	Area/ No. of plants	Annual net Returns
Coconut	Bimonthly	25	15000	40	24000	70	42000
Banana	Annual	150	21750	300	43500	400	58000
Vegetables	Weekly	5 cents	2900	5 cents	2900	5 cents	2900
Tubers	Annual	2 cents	11700	5 cents	29250	10 cents	60000
Spices	Annual	-	-	1 cent	6200	10 cents	62000
Veg (Rain shelter)	Weekly	-	-	1cent	800	1 cent	800
Upland paddy	Once in a year	-	-	-	-	50 cents	2000
Fodder	Savings	20 cents	26400	70 cents	92400	1 acre	132000
Dairy	Daily	2	87000	10	435000	15	652500
Goat	Annual	2	4300	15	32250	20	43000
Poultry	Daily	30	21900	50	37000	75	55500
Duck	Daily	25	25175	45	45540	50	50600
Quail	Daily	-	-	20	2440	50	6100
Fish	Annual	2 cents	17800	6 cents	32748	6 cents	32748
Biogas	Savings	1 cu.m.	1200	2cu.m.	3600	2 cu.m.	3600
Total		**235125**		**787628**		**1286538**	

the same time, from the same sized holding, the net return in the case of coconut alone is Rs.0.24, 0.49, and 0.83 lakhs, respectively (Table 2). As the land holding size increased, the income level also increased when the components are integrated. Moreover, daily income to meet the family expenditure is ensured only when animal components are integrated. Income at different intervals/frequency ranging from daily to annual in the case of CBIFS provides better livelihood and social security to farmers. While poultry and dairy provides daily income, vegetables provide income on weekly/fortnightly basis and other enterprises on quarterly or annual basis. This helps the farmer in meeting the daily and long term requirements in addition to the nutritional security achieved by way of quality food at a cheaper cost. Thus among all the land holding levels, integrated farming system presents a higher degree of resource use efficiency and productivity. Significant improvement in productivity of coconut palms could be observed over a period of three years. Effective recycling of organic residues and animal wastes for crop production ensured higher productivity of all crops including that of coconut in this system.

Additional Net Returns (ANR) and employment generation by integration of different components in coconut gardens (Table 2) clearly establish that by integrating crops and livestock components and residue recycling, CBIFS could be the ideal system for the coconut farmers to realize the highest returns and sustainability of farm income. While the increase in annual net returns is almost 8.5 times in holdings up to 0.75 acres, it is 15.1, and 14.5 times in holdings of 0.76-1.5 and 1.51-2.5 acres, respectively compared to the returns from coconut monocropping plots. In the case of employment generation also CBIFS was found superior by providing almost 4 to 7 times compared to coconut alone. Considering the very high ANR realized, and the fact that additional labour requirement could comfortably met by family labour, the CBIFS becomes a very lucrative, sustainable and




manageable system for coconut farmers. The most highlighting fact is the high involvement of women in the management of poultry, goat and livestock in the CBIFS which makes it further viable. Thus CBIFS is essentially to be adopted for the profitability and sustainability of the coconut production system.

Integration of different component activities in agricultural and allied sector could be the only option for enhancing the return from coconut gardens, especially in the coastal districts of Kerala where the average land holding size is very less. Monocropping of coconut provides only a low net return and employment potential in all the land holding sizes, and majority of the works are male oriented. When coconut gardens are integrated with crops, livestock, and fisheries, it provided frequent and intermittent returns and regular employment throughout the year for the whole family. Thus in all the land holding levels, coconut based integrated farming system recorded a higher degree of resource use efficiency, productivity and sustainability which is confirmed by the consistent income and employment generation from the system. ■

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