



# Coconut Based Mixed Farming Systems and its Economic Advantages

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## Introduction

The integrated farming system approach is fundamental to agriculture to improve the efficient use of natural resources such as soil, water and solar radiation. This is specially so for wide spaced crop like coconut. Coconut farmers practise some kind of mixed farming where inputs and associated materials are transformed into output. Coconut farming system is an intensive farming practice involving inputs and the environment in which crops and livestock are produced. The production alternatives can take the form of a single intercrop, a mixture of crops, or crop/livestock combination which are compatible with each other and other environmental factors. One of the most common farming systems practised in the humid tropics of India is the coconut based farming system. The integration of crops and / or livestock in coconut garden requires careful studies with respect to its socio-economic benefit and impact of productivity of coconut.

Coconut is a small holder's crop in India and more than 90% of the five million coconut holdings in the country are less than one ha in size. These small holding coconut farms, often do not provide adequate income to the dependent families and not providing gainful employment opportunities for the family labour throughout the year. However, there are possibilities of increasing the productivity and net returns from coconut stands by raising compatible subsidiary crops and integrating livestock (Gopalsundaram *et al.*, 1993). Adoption of coconut based farming systems is one among the ways to augment the productivity by improving soil characters and coconut

nutrition (Maheswarappa *et al.*, 1998) as well as the income per unit area.

One among such system was being maintained at the Central Plantation Crops Research Institute, Kasaragod. The economic worthiness of investment in coconut based farming system model under optimum management conditions based on experimental data is dealt in this paper.

## Components of the System

The study was based on the field experiment entitled "Coconut Based mixed farming system" in sandy loam soil at the Central Plantation Crops Research Institute, Kasaragod from 1988-89 to 1997-98 in an 18 year old coconut garden in which pepper was trailed on the coconut trunk and banana all along the border. Following were the livestock enterprises included in the system.

### Dairy Unit :

Five to six Jersey and Holstein Friesian breed cows were maintained

in the system

### Poultry Unit :

100 numbers of layers and 100 numbers of broiler (for each batch) birds were maintained in the system in a year. Six batches of broilers were reared. 100 numbers of quail birds were also maintained.

### Biogas Unit :

Biogas unit of 3 m<sup>3</sup> was installed for generating biogas. The cow dung slurry from the gas plant and cow shed wastes along with urine were recycled within the experimental area.

### Rabbits :

10 female and 4 male Russian chinchilla breeds were maintained.

### Aquaculture (625 m<sup>2</sup> surface area):

About 4-6 cm long fingerlings of four selected species viz. Catla (*Catla catla*), Rohu (*Sebeo rohita*), Mrighal (*Cirrhinus mrigala*) and Grass carp (*Ctenopharyngodon idellus*) were reared in the pond.

**Table 1 : Details on the cost and return of coconut based mixed farming system in Rs./ha (1989-90 to 1997-98)**

Year	Total Cost	Annuity	Total*	Gross return**	Net return
1989-90	94300	36400	130700	184500	53800
1990-91	93500	36400	129900	188300	58400
1991-92	118700	36400	155100	190600	35500
1992-93	122000	36400	158400	191900	33500
1993-94	139700	36400	176100	231700	55600
1994-95	138800	36400	175200	254300	79100
1995-96	159300	36400	195700	284700	89000
1996-97	164300	36400	200700	290100	89400
1997-98	130600	36400	167000	293900	126900

\*Rounded total

\*\* In the case of FYM and poultry manure, the imputed value of quantity produced within the system was considered as return



Input and output details were collected and the market prices prevailed during the corresponding years in northern Kerala were considered to work out the economics of the system. All the calculations were performed for one hectare. The fixed cost was reduced to an annuity using a discount rate of 14% considering the economic life span of the system as 10 years. Tabular analysis was performed to identify the individual share of factors of production in the total cost. Based on the total return and total cost, the net return was worked out for individual years. Cash flow analysis (Sairam *et al.*, 1999) was performed, using a discount rate of 14 percent and the economic viability of the system was assessed through economic indicators *viz.*, Benefit-Cost Ratio, Net Present Worth, Internal Rate of Return and the Pay Back Period.

### Details on Input and Output of the System

#### Input

The details on the cost of mixed farming system over years is furnished in *Table 1*. It could be inferred from the table 1989-90 to 1997-98 that the total cost of the system (including the annuity value) which was Rs. 1,34,800 during 1989-90, had increased to Rs. 1,67,000 during 1997-98 (by 23.9%). Among the different factors of production, the share of cattle feed and

hired labour together had accounted between 56.33% to 75.72% of the total cost. In addition the entire system is maintained by 365 person days for one male and one female labour. This system is labour intensive and under the present socio-economic conditions of states like Kerala, in which hired labour is both scarce and costly, the economic viability of this system could be increased, only through active participation by the family labour. Hence it could be inferred that this model is more suitable for medium or larger coconut holdings with more number of persons depending on agriculture.

#### Output

The output data from the different components of the system is furnished in *Table 2*. From the table it was inferred that during the period 1989-90 to 1997-98, the total production of coconut had exhibited an increasing trend. The same in the case of milk was fluctuating since the number of milch cows had declined. This was mainly due to the reduction in the number of milch cows reared under this system had declined to three from 1996-97 onwards. Pepper was removed from the system during 1993-94 since high rate mortality had occurred due to quick wilt disease. The yield performance of banana was not satisfactory till 1992-

93, however the same had significantly improved in later years. The performance of other live components like rabbitry, poultry and fishery was optimum over the years.

In addition, the system yielded biogas which can be used as fuel and organic manures like biogas slurry, FYM and poultry manure generated from the system were recycled in the garden, which has helped in maintaining the soil health.

#### Returns

The detail on the returns over the period from the coconut based mixed farming system is given in *Table 1*. The real gross returns had increased from Rs. 1,84,500 during 1989-90 to Rs. 2,93,900 (by 59.29%) and the returns from Rs. 49,700 to Rs. 1,26,000 (by 155.33%). It could be inferred from the table that the returns from coconut and milk was maximum accounting 50 to 70 per cent of the total returns. The returns from coconut had increased from Rs. 50,361 during 1989-90 to Rs. 88,200 during 1997-98 by (75.3%). The share of coconut in the total returns was stable over years. However inter year fluctuations were there due to price fluctuations for coconut. In the case of milk the total returns decreased from Rs. 92,071 to Rs. 78,000 (by - 14.7%), since the number of milch cows was reduced. The share of milk

**Table 2 : Production of different components in coconut based mixed farming system**

Year	Coconut no (1 ha)	Milk (litres)	Pepper (kgs)	Banana (kgs)	Quails (nos.)	Hen egg (nos.)	Quail egg (Nos.)	Rabbits (kgs)	Fish (kgs)	Green grass (kgs)	Poultry man. (kgs)	Fish (kgs)
1989-90	16787	13153	90	530	100	7990	3768	87.5	-	4800	2000	1000
1990-91	21347	12719	96	319	100	1729	3948	45	-	5200	2500	1000
1991-92	16793	9305	62	608	112	965	3359	24	400	5830	2000	1000
1992-93	17674	7877	60	307	80	2819	4084	28	400	5940	2500	1000
1993-94	18404	10873	-	320	86	2696	2515	20	380	6360	3000	1000
1994-95	19125	9235	-	526	90	3500	1100	10	400	6360	3000	1000
1995-96	19388	10701	-	502	100	2887	1018	-	390	6360	2000	1000
1996-97	19412	5948	-	1090	80	272	2077	-	380	6360	2000	1000
1997-98	19600	6543	-	885	80	-	2096	-	380	6360	2500	1000



gross return exhibited a declining trend. The returns from broiler birds exhibited an increasing trend, and the same, which was Rs. 10,600 during 1990-91 had increased to Rs. 70,800 during 1997-98 and its share in gross return had increased from 5.96% to 15.5%. The share of fish in the gross return also exhibited an increasing trend. One of the major advantages of this system is that it produces and recycles organic manures like farm yard manure, biogas slurry and poultry manure at regular intervals. This could meet about 75 percent of the organic requirement for coconut and other subsidiary crops and their value was worth about 1% to 2.62% of the gross return.

The system is able to provide fodder grass for feeding the cows worth of Rs. 4,800 to Rs. 6,400 per year and if the value is not imputed to the cattle feed cost, the BCR could increase to 1.41 and the Net Present Worth to Rs. 3,15,400.

However there was change in the values of IRR and Pay Back Period.

### Summary

The economic analysis of coconut based mixed farming indicated that the realized net return from the system had exhibited an increasing trend which confirms the economic viability of the system. However these are more suitable for medium and larger coconut holdings under irrigated conditions. Future research and development efforts should be further strengthened to understand and improve the existing status of coconut based farming systems under different agro-climatic and socio-economic environments of all the coconut growing States.

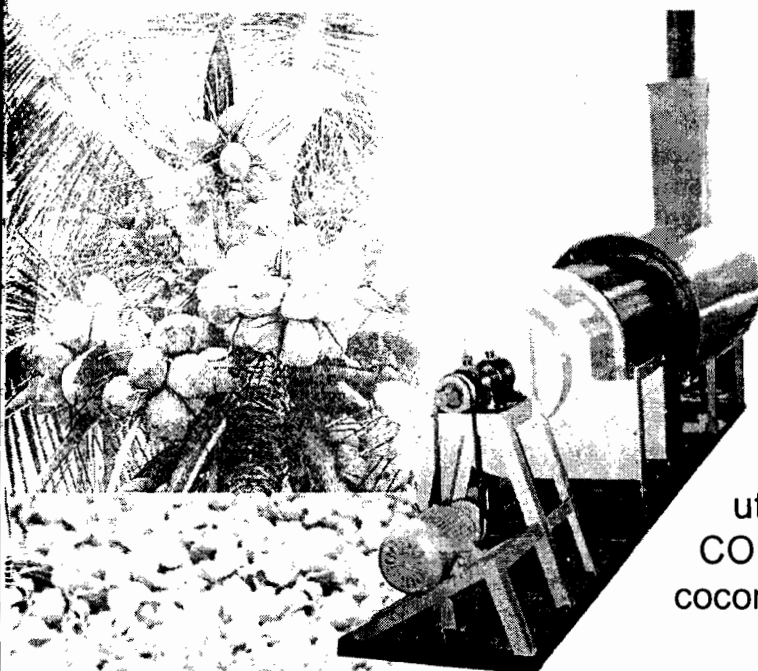
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### References

- 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 in coconut research and development, (eds) M. K. Nair, H. H. Khan, P. Gopalasundaram and E. V. V. Bhaskara Rao, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, pp. 383-394
- Maheswarappa H. P., Hegde M. R., Dhanapal R. and Biddappa C. C. 1998. Mixed farming in coconut garden : Its impact on soil physical, chemical properties, coconut nutrition and yield *J. Plant. Crops* 26 (2) : 139-143.



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