

## **CASH FLOW ANALYSIS OF COCONUT BASED HIGH DENSITY MULTI - SPECIES CROPPING SYSTEM - A CASE STUDY**

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### **ABSTRACT**

The cash flow analysis was performed for the coconut based intercropping systems under optimum management conditions for the period 1983-84 to 1996-97, involving banana, clove and pineapple as the inter/mixed crops. The variable capital requirements for adoption of the system ranged between Rs. 8,200/ha during 1984-85 to Rs. 40, 570/ha during 1996-97 for full dose of recommended fertilizers. This was mainly due to the increase in labour cost which alone contributed to 46-72% of the annual maintenance cost. The gross margin realized from the system ranged between Rs. -1,750/ha during 1983-84 to Rs. 92,230/ha during 1996-97. The capital requirement was marginally less when 2/3rd of the recommended fertilizers were applied. The Benefit Cost Ratio of the system was more than three for full as well as two-third level of fertilizers doses.

Key words: Coconut, Cropping systems, Cash flow analysis, Cost of Cultivation,  
B : C ratio

### **INTRODUCTION**

India is the largest producer of coconut in the world. The country's annual nut production is about 13.2 billion nuts from an area of about 1.79 million ha. About 91 per cent of area and production of coconut in the country is shared by the four southern states viz., Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. During early nineties coconut farmers especially in Kerala, faced a major economic setback in coconut cultivation due to sudden and sharp decline in prices of coconut and its products. About 80 per cent of coconut holdings in the country are either small or marginal and the average holding size ranges about 0.22 ha. The

productivity level of coconut in these farms are generally low due to cultivation of local varieties, non-adoption of scientific management practices, over crowding and predominance of senile and unproductive palms. Further these small holdings can neither provide gainful employment opportunities for the family labour throughout the year nor generate sufficient income to meet the family requirements (Gopalasundaram *et. al*, 1993). Besides, a sole crop of coconut mainly under irrigated condition, at the recommended spacing of 7.5 x 7.5 m does not fully utilize the available soil and air space and incident solar radiation. Adoption of coconut based

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inter/mixed cropping systems is one of the ways to overcome this problem. Research efforts made at the Central Plantation Crops Research Institute and its AICRPP centres have developed many intensive crop combinations which involve different annuals and perennials suitable for cultivation in the interspaces of coconut. Coconut Based High Density Multi-species Cropping System is one among them suited for irrigated gardens. The model involve growing number of compatible crops in a given state to meet the diverse needs of the farmer such as food, fuel, timber, fodder and cash, and are ideally suited for smaller units of land and aim maximum production per unit area of land, time and inputs with minimum or no deterioration of land (Bavappa and Jacob, 1982). This paper aims to carryout the cash flow analysis of coconut based high density multispecies cropping system under optimum management conditions.

#### **MATERIALS AND METHODS**

The study is based on the field experiment entitled "Coconut Based High Density Multi-Species Cropping Systems Generation I in sandy loam soil at the Central Plantation Crops Research Institute, Kasaragod from 1983-84 to 1996-97. In this experiment, banana, pineapple and clove are cultivated in the interspaces of 20 year old coconut garden since 1983-84 under different levels of fertilizer doses for the main as well as for the component crops. Input and output details were collected for 1.2 ha experimental plot. The market rate for both inputs and outputs for the corresponding years were considered to workout the economics of the system. The experiment has several treatments of

fertilizer levels, of which two treatments viz., full and 2/3rd levels of fertilizers were considered for this study since these two treatments showed consistency in yield of coconut. All the calculations were performed for one hectare. Tabular analysis was performed to identify the individual share of factors of production in the total cost. Based on the total returns and total cost, gross margin was worked out. Cash flow analysis (Das, 1984) was under taken, using a discount rate of 14 per cent which was the bank interest rate for the opportunity cost for investment.

#### **RESULTS AND DISCUSSIONS**

The details of input costs for one hectare of the system is furnished in Table 1. It could be inferred from the table that the expenditure for planting and replanting of banana, pineapple and clove was Rs. 5,600/ha during 1983-84 had increased to Rs. 8,700/ha during 1994-95 excluding clove. However the share of planting materials in the total cost had declined from 35per cent during 1983-84 to about 20 per cent in 1994-95.

Labour is the huge input having a major share in the initial establishment cost as well as for maintenance of the system. The annual labour requirement for the system was 300 mandays in the initial year of establishment and then ranged between 175 and 230 mandays and it was 240 mandays during 1996-97. This indicates that adoption of coconut based HDMSCS model, provides additional employment for more days in a year for the family as compared to only 140 mandays in sole crop of coconut cultivation. The labour requirement was more whenever planting and replanting operations were

**Table 1. Details on input cost for coconut based high density multi-species cropping system (Rs./ha)**

S.No.	Year	Planting materials	Labour	Chemical fertilizers	Plant protection	Irrigation	Miscellaneous	Total Cost* (Full dose of fert.)	Total Cost* ( $\frac{2}{3}$ rd dose of fert.)
1.	1983-84	5598 (34.79)	7375 (45.83)	2499 (15.53)	-	150 (0.93)	469 (2.91)	16090	15260
2.	1984-85	-	5120 (63.58)	2548 (31.74)	-	150 (1.86)	235 (2.91)	8050	7200
3.	1985-86	-	6525 (60.60)	2958 (27.47)	820 (7.62)	150 (1.39)	314 (2.91)	10770	9780
4.	1986-87	-	8345 (59.28)	4634 (32.92)	509 (3.62)	180 (1.28)	410 (2.91)	14080	12530
5.	1987-88	450 (3.53)	7674 (60.16)	4081 (31.99)	-	180 (1.41)	372 (2.91)	12760	11400
6.	1988-89	-	9649 (62.67)	4081 (26.51)	1037 (6.74)	180 (1.17)	448 (2.91)	15400	14040
7.	1989-90	3900 (20.96)	8814 (47.37)	4081 (21.93)	1060 (5.70)	210 (1.13)	542 (2.91)	18610	17250
8.	1990-91	-	13494 (69.90)	4081 (21.14)	958 (4.96)	210 (1.09)	562 (2.91)	19310	17950
9.	1991-92	720 (3.45)	11244 (53.83)	71111 (34.05)	993 (4.75)	210 (1.01)	608 (2.91)	20890	18520
10.	1992-93	-	13624 (61.94)	6529 (29.68)	851 (3.87)	350 (1.59)	641 (2.91)	22000	19820
11.	1993-94	-	15454 (63.11)	6455 (26.36)	1514 (6.18)	350 (1.43)	713 (2.91)	24490	22340
12.	1994-95	8700 (19.74)	25304 (57.41)	7513 (17.05)	875 (1.99)	400 (0.91)	1284 (2.91)	44080	41570
13.	1995-96	-	21990 (71.69)	6640 (21.65)	750 (2.45)	400 (1.30)	893 (2.91)	30670	28460
14.	1996-97	-	25445 (62.72)	12640 (31.16)	900 (2.22)	400 (0.99)	1182 (2.91)	40570	36350

Figures in parentheses indicate percentage to total cost

\* Rounded figures

done. In general, coconut required about 68 per cent of the total labour, followed by clove (21 per cent). Banana required more labour at the time of replanting and the labour requirement for clove increases for harvesting with the increased in age of the crop. The total labour cost which was only Rs. 7,375/ha during the establishment of the system had increased to Rs. 15,454/ha (by 110 per cent) during 1993-94 and it was Rs.

25,445/ha during 1996-97 due to increase in labour wages. The share labour in the total cost of the system ranged between 45.8 per cent during 1983-84 to 71.7 per cent during 1996-97.

The cost of chemical fertilizers had increased from Rs. 2,499/ha during 1983-84 to Rs. 12,640/ha in 1996-97. However between the same period its share in the total cost of the system was ranging between 15 and 34 per

**Table 2. Details on returns of various components of coconut based HDMSCS (Rs./ha)**

Sl. No.	Year	Coconut	Banana	Pineapple	Clove	Total returns* Full dose of fertilizers	2/3rd dose* of fertilizers	Gross margin* Full dose of fertilizers	2/3rd of fertilizers
1.	1983-84	14350	-	-	-	14350	15500	1750	240
2.	1984-85	14820	3337	7830	-	25990	26400	17940	19200
3.	1985-86	42983	3900	12658	-	59540	51800	48770	42020
4.	1986-87	55489	1660	1408	-	58560	61500	44480	48970
5.	1987-88	78814	1250	24928	-	105000	84200	92240	72800
6.	1988-89	58950	7655	-	20	66630	63400	51230	49360
7.	1989-90	57666	6985	1372	150	66170	64800	47560	47550
8.	1990-91	68460	5993	2019	293	76770	66500	57460	48550
9.	1991-92	97140	1584	2304	244	101270	89700	80380	71180
10.	1992-93	112851	2107	2925	1812	119700	109700	97700	89880
11.	1993-94	72990	10665	63	1870	85590	74300	61100	51960
12.	1994-95	76926	3298	1154	3299	84680	76300	40600	34730
13.	1995-96	91910	3535	1515	4040	101000	91900	70330	63440
14.	1996-97	123848	4648	1992	5312	132800	131000	92230	94650

\* Rounded figures

**Table 3. Cash flow analysis of investment in coconut based HDMSCS with full and 2/3 rd dose of fertilizers (Rs./ha)**

Years	Full dose of fertilizers			2/3rd dose of fertilizers		
	Discounted Cost @ 14%	Discounted returns @ 14%	Discounted benefit*	Discounted Cost @ 14%	Discounted returns @ 14%	Discounted benefit*
1983-84	14114	12588	-15302	13386	13596	210
1984-85	6194	19998	13800	5540	20314	14770
1985-86	7269	40188	32920	6601	34964	28360
1986-87	8336	34672	26340	7419	36413	28990
1987-88	6627	54534	47910	5921	43731	37810
1988-89	7016	30356	23340	6396	28884	22490
1989-90	7437	26444	19010	6894	25896	19000
1990-91	6769	26912	20140	6293	23312	17020
1991-92	6424	31141	24720	5695	27583	21890
1992-93	5934	32288	26350	5346	29591	24250
1993-94	5795	20252	14460	5286	17581	12300
1994-95	9149	17576	8430	8628	15837	7210
1995-96	5584	18389	12810	5182	16732	11550
1996-97	6479	21209	14730	5805	20922	15120
Benefit-Cost Ratio (BCR)		3.44			3.77	

cent. The same was ranging between 12 to 28 per cent when 2/3rd of the fertilizers were applied. The system was given only need based plant protection and the cost of plant protection chemicals ranged between Rs. 500 and 1,500/ha. The share of these chemicals in the total cost was between 2.2 and 7.6 per cent. The Cost of energy for irrigation ranged between Rs. 150/ha and Rs. 450/ha and its share in the total cost was between 0.91 per cent to 1.86 per cent. About 3 per cent of the total cost was accounted for the miscellaneous expenditures which included cost of transportation.

The total cost for the system which was about Rs. 16,100/ha during 1983-84, increased to about Rs. 18,610/ha during 1989-90 and further to Rs. 40,570/ha in 1996-97. The increase in unit cost of labour was the major factor responsible for the increase in maintenance of the system. The total cost was reduced to Rs. 15,260/ha during 1983-84 and to about Rs. 36,350/ha during 1996-97 when 2/3rd of the recommended dose of fertilizers was given.

The total returns from the system was only Rs. 14,350/ha during 1983-84, increased to Rs. 66,170/ha during 1989-90 and further to Rs. 1,32,800/ha in 1996-97. During the same reference period it was Rs. 15,500, 64,800 and 1,31,000/ha when 2/3rd of the recommended dose of fertilizers was applied. The gross margin of the system which was Rs.-1,750/ha during 1983-84, had increased to Rs. 47,560/ha in 1989-90 and further to Rs. 92,230/ha in 1996-97. During the same period it was Rs. 200, 47,550 and 94,650/ha when 2/3rd of the recommended dose was applied. The inter year variations in

gross return as well as gross margin was mainly due to changes in coconut prices, since its share in the total output was more than 80 per cent. However this system was able to provide more stabilized income to coconut farmers'. The economic importance of this system is realized during those periods in which coconut and its products have lesser market prices.

The cash flow analysis performed using a discount rate of 14 per cent indicated that the system realized highly positive values of discounted incremental benefit for both full and 2/3rd dose of fertilizer levels. The Benefit-Cost Ratio (BCR) values were 3.74 and 3.77 respectively for full and 2/3rd levels of the recommended dose of fertilizers. This indicated that the coconut based high density multispecies cropping system under optimum management conditions is more economically viable even at 2/3rd of the recommended dose of chemical fertilizers.

Adoption of coconut based high density multi species cropping system helps to realize better stability for farm gross income. Since this system is suitable for irrigated gardens, research and development efforts in these aspects should be intensified in States like Andhra Pradesh and Tamil Nadu, choosing the component crops suitable for these regions.

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