IMPACT OF THE COCONUT REHABILITATION PROGRAMME OF 'SADU' IN TRIVANDRUM DISTRICT

By

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THESIS

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DECLARATION

I hereby declare that this thesis entitled "Impact of the Coconut Rehabilitation Programme of 'SADU' in Trivandrum District" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any University or Society.

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CERTIFICATE

Certified that this thesis entitled "Impact of the Coconut Rehabilitation Programme of 'SADU' in Trivandrum District" is a record of research work done independently by Sri. N. Lekshminarayanan Nair under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

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We, the undersigned members of the Advisory Committee of Sri. N. Lekshminarayanan Nair, a candidate for the degree of Master of Science in Agriculture with major in Agricultural Economics, agree that the thesis entitled "Impact of the Coconut Rehabilitation Programme of 'SADU' in Trivandrum District" may be submitted by Sri. N. Lekshminarayanan Nair in partial fulfilment of the requirement for the degree.

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Introduction

INTRODUCTION

Perennial crops predominate the cropping pattern of Kerala accounting for over 69 per cent of the net area under cultivation. Out of a net cultivated area of 21.79 lakh hectares in the State 14.98 lakh hectares are utilized for perennial crops (1981). Among them coconut is the most important, occupying around one third of the total cultivated area in the State. It provides employment to about 10 million* people and raw material for a number of traditional industries. According to the agricultural census 1976-77 the contribution by the agricultural sector towards the net domestic product of the State was Rs. 1016 crores at current prices of which the coconut and its products alone accounted for Rs.303 crores (29.8 per cent). The importance of coconut in Kerala's economy does not therefore need any emphasis.

Coconut is one of the traditional crop of Kerala. According to the data published by the Directorate of Economics and Statistics the area under coconut in Kerala was 6.51 lakh hectare in 80-81 with an annual production of 3008 million nuts. Kerala accounts for 61 per cent of the coconut production in the country. The total demand of coconut in the country as projected by the Directorate of Coconut Development, Government of India for the year 2000 AD would be about 10400 million coconuts at the present level of

* Source:- Fifth Five Year Plan Proposals on Coconut - Report of the study group Directorate of Coconut Development, Cochin.

living standards. If the relative position of Kerala in the national coconut output is to continue, the production in Kerala in 2000 AD should be about 6400 million nuts to meet the demand. Efforts to increase coconut production, therefore, assumes paramount importance in the crop production programmes of the State.

In Kerala coconut is essentially a small holders' crop. It is grown mostly in homestead gardens and small holdings. There are about 2.5* million coconut holdings in the State with 98 per cent of such holdings falling within the category of below 2 hectares. It has been estimated that coconut growers and their dependants constitute about 50 per cent of the rural population and that they depend mostly on the coconut palm for their livelihood. The processing industries and other activities provide direct employment opportunities to over one million people. Thus a substantial proportion of the rural population depend mainly on coconut for their livelihood and their economic prosperity is closely interlinked with the fortunes of this crop.

But all is not well with coconut cultivation. Prevalence of the root wilt disease of coconut, resulting in uneconomic yield of around 12.5 per cent of the palms, lack of irrigation facilities and poor maintenance are the important limiting factors of production of coconut in Kerala. According to

* India - Appraisal of Kerala Agricultural Development Project - January 25, 1977 Document of the World Bank.

the estimates of the Directorate of Coconut Development Cochin the average productivity of the palm in the country is 25 nuts (1977-78). The position of Kerala with an average productivity of 24 nuts per palm is far below the national average. This is very low when compared to the productivity levels in the other producing states in the country viz. Tamil Nadu (47 nuts per palm) and Karnataka (26 nuts per palm) and disturbing trend is the further decline in productivity.

Land is the most scarce natural resource for agricultural development in Kerala. Because of the high density of population, the pressure on land is high and consequently several intercrops are indiscriminately cultivated in coconut gardens. The agroclimatic conditions of the State are ideal for cultivation of high value intercrops. By adopting judicious intercropping it would be possible to increase substantially the income of the coconut grower.

As already stated, the majority of the coconut farms are in tiny holdings and the farmers do not have adequate finance of their own to adopt scientific recommendations or to augment facilities for irrigating their gardens. They would need financial assistance in the form of agricultural credit. Hitherto the dynamic role of credit as a development tool for technology transfer to the farmer has not been fully appreciated.

The economic uplift of the coconut grower is feasible only through the total development of his small holdings. A package approach, involving replanting of unproductive palms, irrigation, scientific manuring and plant protection dovetailing it with adequate institutional finance has been the strategy for coconut development adopted by the State in the recent past. Apart from the crop development angle, this strategy also aims at maximising the net return of the coconut grower through an effective intercropping programme. Eventhough isolated attempts were made in this direction during the Fourth Five Year Plan, an organised effort on an area wide basis was intiated only from the Fifth Five Year Plan onwards, when the Kerala Agricultural Development Project was initiated.

The Kerala Agricultural Development Project (KADP) implemented with World Bank Assistance from 1977 onwards, is the first of its kind in the State. It is a composite project aiming at the improvement in productivity of major cash crops of Kerala, namely, coconut, cashew and pepper, with emphasis on improving the economic status of the small holder farmer. Among other things, the project comprises a programme for the rehabilitation of coconut including replacing of senile and unproductive palms in 30000 hectares in Cannanore, Kozhikode, Malappuram and Trivandrum districts. This programme aims at attaining an optimum stand of 175 healthy and high yielding palms

per hectare through a combination of selective thinning and under planting of senile and unproductive palms. Educating and encouraging farmers to adopt improved cultural practices and to cultivate suitable intercrops both under irrigated and unirrigated conditions and mixed farming in suitable coconut areas are also envisaged under this project. Credit has been built in in this project as an effective tool for bringing about long term improvements in the holdings of the project participants so as to ensure a steady flow of additional income in a sustained manner. The project is being implemented through a Special Agricultural Development Unit (SADU), a new Department setup under the State Government. The project has now been under implementation for six years. The improvement in the productivity of the palm and additional income from the intercrops are expected to have commenced. It is therefore appropriate to study the impact of the programme and the extent of realisation of its objectives. This thesis embodies the results of detailed field investigations on the following aspects of this programme:

(a) Impact of the coconut rehabilitation programme implemented by 'SADU' in Trivandrum District.

(b) Analysis of the comparitive efficiency of different approaches followed under the rehabilitation programme in increasing the net return from the coconut holdings.

(c) Identification of the key constraints in improving coconut cultivation in the district in the light of the experience of the programme.

(d) Benefits accrued to scheduled caste/scheduled tribes sections of the people on account of this programme.

The thesis is devided into seven chapters including the present one. The second and third chapters relate to the Socio-economic conditions of Trivandrum District and a brief description of the project proper respectively. The fourth chapter contains a brief review of literature covering the research work done on the various aspects of coconut production while the methodology adopted for collection, analysis and interpretation of data is dealt with in the Fifth chapter. The results of the study are presented and discussed in detail in the sixth chapter with a summary of the main findings in the seventh chapter.

It is hoped that the findings of this study would be helpful in reorienting the implementation of the project by adopting midcourse corrections during the remaining part of the project period and also in the planning and implementation of projects of similar nature in future.

Area of Study

AREA OF STUDY

2.1 Location.

Trivandrum, the southern most district of Kerala is situated between north latitudes 8°17' and 8°51' and east longitudes 76°41' and 77°17'. It is bounded by Quilon district in the north, Tirunelveli district in the east, Kanyakumari district in the south and the Arabian sea in the west. The district consists of four taluks viz. Neyyattinkara, Nedumangad, Trivandrum, and Chirayinkil. There are 12 National Extension Service Blocks in the district spread over 84 panchayats and 94 villages.

2.2 Area and physical features.

The district extends over an area of 2192 sq.km. Based on physical features the district can be divided into 3 natural divisions, viz. the highland, the midland and the lowland. Neyyattinkara, the southern most taluk of the district falls under all these natural divisions. Trivandrum taluk falls under the low land region. Nedumangad the largest taluk in the district lies to the south east and the taluk as a whole is hilly in topography. About 10 per cent of its area is classified as highland. Chirayinkil the northern most taluk of the district is hilly in nature and is partially interspersed with backwaters and lagoons. The district has a sea coast which is about 72 km long.

2.3 Soil and Crops.

The soil in the high land region is clay loam. It is black in colour and rich in organic matter, nitrogen and potash and is slightly acidic. In the midland the soil is clay loam of lateritic origin with an admixture of gravel and sand. The valleys in the midland have loamy clay with high sand content. The soil of the coastal strip is sandy with lateritic foundation.

Paddy and coconut are the important crops grown in the lowland regions of the district. Tapioca, pepper, and coconut are cultivated on a large scale in the midland region. The high land region is mainly under crops like rubber, tea, arecanut and pepper and under grass land.

2.4 Climate.

Heavy annual rainfall, high humidity and more or less uniform temperature throughout the year are some of the important characteristic features of the climate in this district. The district benefits from the south west monsoon and to a lesser extent from the north east monsoon. There are four seasons, the dry weather from December to February, hot weather from March to May, south west monsoon from June to September and north east monsoon from October to November. Table 2.1 shows the average monthly rainfall in Trivandrum district for the years 1977 to 1982. Table 2.2 shows monthly maximum and minimum temperature at Trivandrum for the years 1977-1979.

Table 2.1 Monthly rainfall in Trivandrum district (for the period 1977 to 1980) - and Normal rainfall for Trivandrum and Kerala.

Months	Monthly rainfall (mm)				Normal rainfall (mm) (Average during 1901 - 1950	
	1977	1978	1979	1980	Trivandrum	Kerala
January	4.1	7.7	-	40.5	21.2	17.5
February	19.9	22.6	-	31.4	18.0	17.3
March	33.2	66.8	21.9	35.1	48.0	41.4
April	88.2	76.6	92.6	121.1	118.1	109.3
May	361.3	388.0	128.9	150.8	213.7	238.2
June	228.8	231.4	361.9	479.9	391.1	676.1
July	175.2	342.5	178.0	174.4	257.4	702.9
August	97.5	163.3	163.2	145.8	204.5	426.3
September	106.0	53.8	179.9	361.6	168.9	238.2
October	527.7	92.4	207.3	300.9	280.2	302.7
November	202.7	643.1	150.5	297.0	210.2	184.6
December	18.2	42.9	75.7	29.8	70.1	49.3
	1862.8	2131.1	1559.9	2168.3	2001.4	3003.8

Source: 1. Statistics for Planning 1980,
Directorate of Economics and Statistics Kerala.

2. Farm Guide 1983,
Farm Information Bureau, Trivandrum.

Table 2.2 Monthly maximum and minimum temperature at Trivandrum centre for the years 1977-1979

(In degree centigrade)

Month	1977		1978		1979	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	31.4	21.5	31.6	21.9	32.0	22.7
February	31.4	23.0	32.3	23.2	32.1	23.5
March	33.0	24.1	32.7	24.5	32.7	24.3
April	32.9	25.1	33.0	25.3	33.5	25.4
May	31.0	24.1	31.6	24.5	32.4	25.0
June	29.8	23.4	29.6	23.1	30.6	24.0
July	29.9	23.2	29.0	22.8	29.5	23.4
August	30.2	23.7	28.8	22.8	29.9	23.2
September	30.6	23.5	30.1	23.0	30.3	23.4
October	29.4	23.3	30.3	23.4	30.8	23.7
November	30.4	23.1	30.3	22.5	29.6	23.2
December	31.8	22.3	31.3	23.2	31.4	23.1

Source: Statistics for planning 1980, Directorate of Economics & Statistics, Kerala.

2.5 Population.

The population of the district as per 1981 census was 25.91 lakhs. Females outnumbered males and the sex ratio was 1032. In density of population Trivandrum district ranks second in the State with an average density of 1182 persons per sq.km. The literacy as per 1981 census was 69.2 per cent (Male 74 per cent and Female 64.55 per cent).

Agriculture is the basic occupation of the people and it is more or less of a subsistence type. Almost all farmers in the district pursue some subsidiary occupation to supplement the income from the land. According to 1981 census cultivators and agricultural labourers together constituted 42.15 per cent of the working population. The per capita income (79-80) in the district was Rs. 1095.1 against the State average of Rs. 1141.2.

2.6 Water resources.

The chief water resources in the district are the Neyyar river, the Karamana river and the Vamanapuram river. Endowed with abundant rainfall and watered by the three rivers, Trivandrum district has an abundance of natural water resources. A number of lakes or backwaters also lie along the coast, the important ones among them being the Veli, the Kadinamkulam, the Anjengo and the Edava Nadayara Kayals. Besides these there is a fresh water lake at Vellayani in Neyyattinkara taluk.

The district is also well endowed with adequate ground water resources. The coastal sandy belt stretching from Veli to Varkala offers scope for large scale exploitation of ground water resources for irrigating coconut through the installation of filter point tube wells. As per the exploratory studies undertaken by the State Groundwater Department, the district has an annual recharge of 276.15 million cubic meters of ground water.

2.7 Irrigation facilities.

The present sources of irrigation in the district are natural streams, channels, channel fed and rainfed tanks, natural water resources formed by constructing embankments across natural streams and storage facilities provided by the major, medium and minor irrigation works. The only major irrigation scheme so far undertaken in the district is the Neyyar Irrigation Project. About 12000 hectares of land in the Neyyattinkara taluk are benefited by this project. A number of medium and minor irrigation schemes have also been taken up in some parts of the district under the Five Year Plans. These together benefit a gross cropped area of 10345 hectares by way of minor irrigation facilities. Particulars of source wise and crop wise area irrigated from minor irrigation sources in the district are furnished in Table 2.3.

Electricity is available in all the villages in the district.

Table 2.3 Source-wise and crop-wise area irrigated in Trivandrum district 1977-78

Source of irrigation	Area in hectares
Government canal	6544
Private canal	23
Government tanks and wells	1425
Private tank and wells	744
Minor and Lift irrigation	945
Other sources	382
	10063
Crop.	
Paddy	6183
Vegetables	221
Tubers	34
Coconut	1903
Arecanut	8
Clove, Nutmeg etc.	16
Other condiments and spices	13
Banana	131
Betel vine	105
Sugarcane	2
Others	1729
Total	10345

Source: Farm Guide 1980,
Farm Information Bureau, Trivandrum.

2.8 Land use pattern.

Details of classification of the area put to different uses in the district (1980-81) are given in Table 2.4. The total geographical area of the district as per village records is 218600 hectares of which 143756 hectares are utilized for crop production. The percentage works out to 65.76. The total cropped area in the district during 1980-81 was 227925 hectares with a cropping intensity of 159. The district enjoys the highest cropping intensity in the state, the state average being 133 for the year. Cultivable waste land available in the district is only 2154 hectares accounting for less than one per cent of the total geographical area. This is a major constraint for increasing the net cropped area through extensive cultivation.

2.9 Cropping pattern.

Coconut is the major crop grown in the district. Against a net cropped area of 143756 hectares available in Trivandrum district, coconut occupies 73771 hectares the percentage of coverage being 51.31. In respect of gross cropped area it works out to 32.37 per cent. Tapioca, Rice, Pepper, and Arecanut are the other principal crops grown in the district. Cropping pattern in the district during 1980-81 is given in Table 2.5.

Table 2.4 Land use pattern in Trivandrum district (1980-81).

Sl. No.	Category	Area in hectares
1.	Total geographical area according to village papers.	218600 (100)
2.	Forests	49861 (22.81)
3.	Land put to non-agricultural uses	17346 (7.94)
4.	Barren and uncultivable lands	2229 (1.02)
5.	Permanent pastures and other grazing lands	34 (0.01)
6.	Land under miscellaneous tree crops	216 (0.10)
7.	Cultivable waste land	2154 (0.98)
8.	Fallow other than current fallow	1705 (0.78)
9.	Current fallow	1301 (0.60)
10.	Net area sown	143756 (65.76)
11.	Area sown more than once	84169 (38.5)
12.	Total cropped area	227925 (104.26)

(Figures in parentheses are percentages to total)

Source: Farm guide 1983,

Farm Information Bureau, Kerala.

Table 2.5 Area under principal crops in Trivandrum district (1960-61, 1970-71, 1980-81) in hectares.

Sl. No.	Crops	1960-61	1970-71	1980-81
1.	Rice	37417 (19.03)	39496 (16.26)	32583 (14.29)
2.	Pulses	2662 (1.35)	2507 (1.03)	3240 (1.43)
3.	Palmyrah	N.A	N.A	719 (0.32)
4.	Pepper	8346 (4.24)	10232 (4.21)	5362 (2.35)
5.	Ginger	-	-	183 (0.08)
6.	Cardamom	-	-	104 (0.05)
7.	Arecanut	3590 (1.83)	5008 (2.06)	3292 (1.44)
8.	Tamarind	N.A.	N.A	1531 (0.67)
9.	Mango	5815 (2.96)	7386 (3.04)	7588 (3.33)
10.	Banana and other plantains	2160 (1.1)	3741 (1.54)	5591 (2.45)
11.	Pineapple	N.A	N.A	327 (0.14)
12.	Tapioca	56918 (28.96)	70084 (28.84)	56545 (24.81)
13.	Sweet potato	351 (0.18)	55 (0.02)	100 (0.04)
14.	Tubers	N.A	N.A	2348 (1.03)

Table 2.5. (contd.)

Table 2.5.(concl.)

Sl. No.	Crops	1960-61	1970-71	1980-81
15.	Cashew	4587 (2.33)	3741 (1.54)	6403 (2.81)
16.	Coconut	55039 (28.0)	76515 (31.49)	73771 (32.37)
17.	Betel leaves	N.A	N.A	150 (0.07)
18.	Tea	1130 (0.57)	1076 (0.44)	1072 (0.47)
19.	Rubber	3175 (1.61	7040 (2.9)	8735 (3.83)
20.	Cocoa	-	-	699 (0.31)
21.	Others	15420 (7.84)	16115 (6.63)	16640 (7.30)
		196610 (100)	242996 (100)	227925 (100)

(Figures in parentheses are percentages to total)

Source: 1. Farm Guide 1983,
Farm Information Bureau, Kerala.

2. Agricultural Statistics in Kerala, 1975
Directorate of Economics and Statistics, Kerala.

2.10 Production and productivity of crops.

Tables 2.6 and 2.7 show the cropwise production and productivity in Trivandrum district for the years 1960-61, 1970-71 and 1980-81. It can be seen that production and productivity of almost all major crops grown in the district such as Rice, Pulses, Pepper, Cashew nut and Coconut recorded a declining trend during the period.

The district accounted for 7 per cent of the total coconut production in the state during 1980-81. The production of coconut in the district has declined from 470 million nuts to 354 million nuts over a period of 10 years from 1970-71 to 1980-81. The productivity also recorded a declining trend during the period. Productivity of coconut in the district during 1980-81 was 4798 nuts per hectare against 4617 nuts per hectare estimated for the state as a whole.

Trend of production and productivity of coconut for the state and the district for the past 10 years is graphically represented in Fig.1.

Table 2.6 Production of important crops in Trivandrum district 1960-61, 1970-71 and 1980-81.

Sl. No.	Crops	Unit	1960-61	1970-71	1980-81
1.	Rice	Tonnes	57259	56868	45986
2.	Pulses	"	1015	968	774
3.	Black pepper	"	3638	3776	2027
4.	Arecanut	Million nuts	512	778	327
5.	Mango	Tonnes	N.A	N.A	24509
6.	Banana	"	N.A	N.A	10795
7.	Other plantains	"	15879	28364	30024
8.	Raw cashewnut	"	7147	5172	3025
9.	Tapioca	"	395505	834700	965789
10.	Sweet potato	"	N.A	N.A	603
11.	Coconut	Million nuts	354	470	354
12.	Tea	Tonnes	1021	970	894
13.	Coffee	"	-	2	28
14.	Rubber	"	573	3523	5933
15.	Cocoa	"	-	-	58

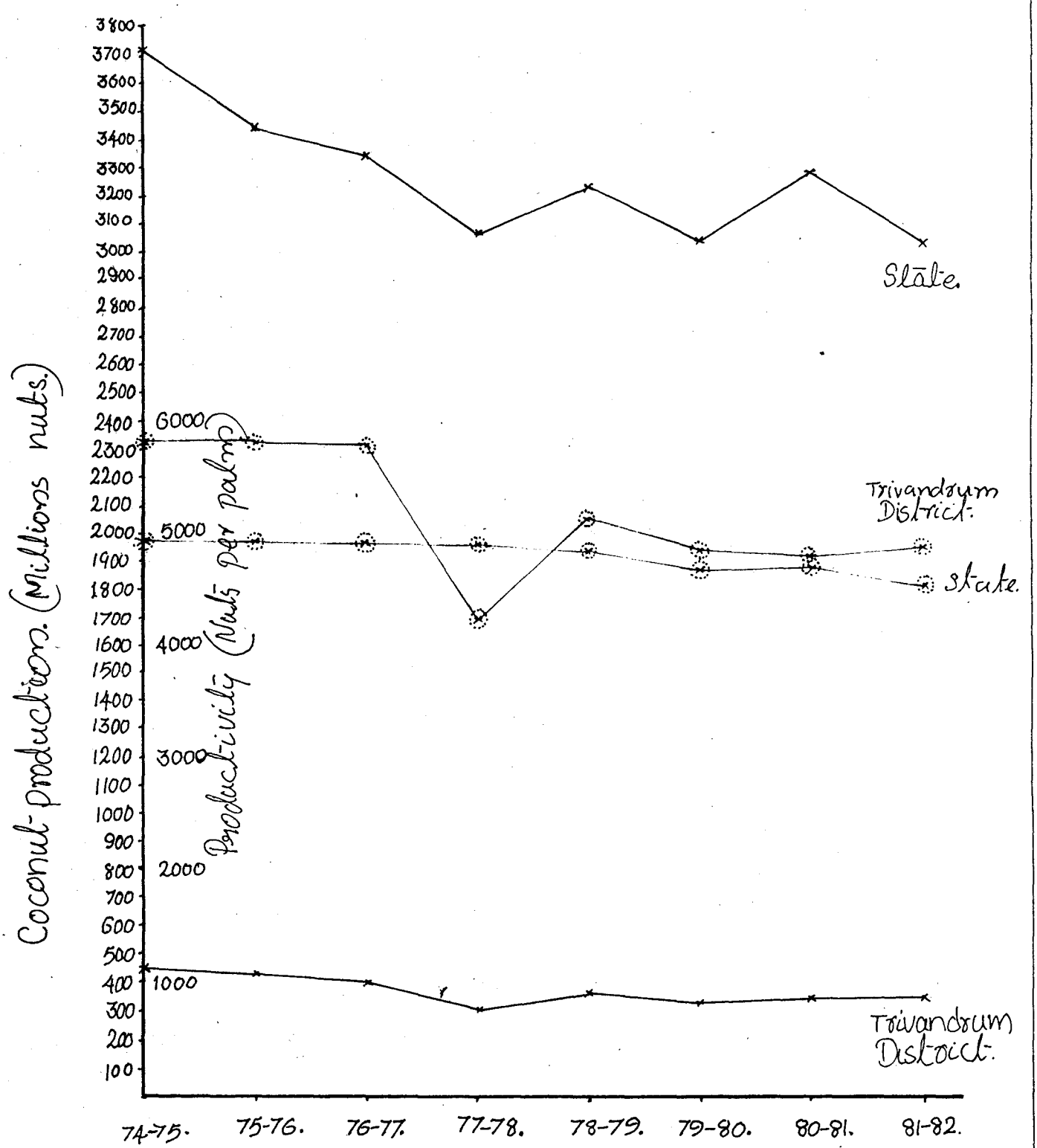
Source: 1. Farm Guide 1983,
Farm Information Bureau, Trivandrum.
2. Agricultural Statistics in Kerala 1975,
Directorate of Economics and Statistics, Kerala.

Table 2.7 Productivity of crops in Trivandrum district 1960-61, 1970-71 and 1980-81

Sl. No.	Crops	Unit	Trivandrum			Kerala
			1960-61	70-71	80-81	80-81
1.	Rice	Kg/ha	1531	1440	1411	1587
2.	Pepper	"	431	369	378	263
3.	Arecanut	Nuts/ha	142547	155351	99331	176431
4.	Banana	Kg/ha	7353	7582	6248	6430
5.	Cashewnut	"	1558	1122	472	579
6.	Tapioca	"	6950	11910	17080	16575
7.	Coconut	Nuts/ha	6432	6143	4798	4617
8.	Tea	Kg/ha	904	901	1307	1402
9.	Rubber	"	154	500	679	590
10.	Cocoa(dry beans)	"	-	-	83	128

Source: 1. Farm Guide 1983,
Farm Information Bureau, Trivandrum.

2. Agricultural Statistics in Kerala, 1975
Directorate of Economics and Statistics, Kerala.



LEGEND.

×——× Production.

⊗——⊗ Productivity.

Figure-1. Trend of Production and Productivity of Coconut in Kerala and Trivandrum District.

2.11 Credit facilities.

The district is served by a network of credit institutions. The Trivandrum District Co-operative Bank Limited makes available short term and medium term loans through the 242 primary service co-operative societies affiliated to it. Several commercial banks are also operating in the district with 233 bank branches of which 139 are in rural areas.

Four primary co-operative land mortgage banks operate in Trivandrum district catering to the long term credit needs of the farming community.

The lead bank scheme was introduced in the district in 1969 and Indian Overseas Bank is operating as the lead bank of the district. Details of credit disbursed by the various financing institutions in the district during the year 1980-81 are given in Table 2.8.

2.12 Agricultural holdings.

Distribution of operational holdings according to size of holding in Trivandrum district is given in Table 2.9. More than 94 per cent of the holdings belong to the category of less than 1 hectare in size. This category constitutes only 63.8 per cent of the total area of the holdings.

2.13 Agricultural prices.

Average farm prices of important agricultural commodities in the district for the period from 1960 to 1980 is given in Table 2.10. Cashewnut registered the biggest increase in price followed by banana, tapioca, and coconut. The percentage increase in 80-81 price of coconut over 70-71 price was 84 per cent.

Table 2.8 Disbursement of agricultural credit from different Institutional sources in Trivandrum District

Sl. No.	Source	Amount disbursed (1982) (Rs. in 000)	Percentage
1.	Commercial Banks	118411	60.71
2.	District Co-operative Bank Limited.	55627	28.52
3.	Kerala Co-operative Central Land Mortgage Bank.	21001	10.77
		195039	100

Table 2.9 Distribution of operational holdings in different size classes in Trivandrum district.

Sl. No.	Size classes (hectares)	No. of operational holdings	Area	Percentage distribution	
				No.	Area
1.	0.02-0.99	310765	63492	94.2	63.8
2.	1.00-1.99	14310	19300	4.3	19.4
3.	2.00-3.99	3984	10551	1.2	10.6
4.	4.00-9.99	794	4360	0.2	4.4
5.	10 and above	127	1772	0.1	1.8
		329980	99475	100	100

Source: Agricultural census - 1976-77
Directorate of Economics and Statistics, Kerala.

Table 2.10 Average farm prices of important agricultural commodities grown in the district for the period 1960-61, 1970-71 and 1981-82

Sl. No.	Commodity	Unit	1960-61	1970-71	1981-82
1.	Paddy	Rs./qtl	40.51(100)	90.53(223)	114.40(282)
2.	Coconut	Rs./1000 Nos.	215.05(100)	571.30(265)	1050.30(488)
3.	Arecanut	"	27.34(100)	37.30(137)	83.4(307)
4.	Tapioca	Rs./qtl	7.74(100)	20.59(266)	47.17(610)
5.	Cashewnut	Rs./qtl	77.32(100)	139.93(181)	731.56(945)
6.	Banana	Rs./100 Nos.	6.73(100)	15.69(234)	51.15(759)
7.	Pepper	Rs./qtl	404.59(100)	616.25(152)	1160.94(287)

Source: Farm guide 1983,

Farm Information Bureau, Trivandrum.

2. Agricultural Statistics in Kerala 1975,

Directorate of Economics and Statistics, Kerala.

(Figures in parantheses show the percentage increase in prices during the years 1970-71, and 1981-82 over 1960-61 price level).

About Kerala Agricultural Development Project

ABOUT THE KERALA AGRICULTURAL DEVELOPMENT PROJECT

The present study deals with certain aspects of the impact of Kerala Agricultural Development Project in Trivandrum district. In order to enable the reader to view the analysis, which follow, in proper perspective it is felt that a brief summary of the relevant aspects of the project would be useful. This chapter is an attempt in that direction. The main source of information here is the project document itself.

The Kerala Agricultural Development Project formulated by the Government of Kerala was approved for World Bank assistance in February 1977. The project has, as its main objective, the improvement in productivity of major foreign exchange earning tree crops and pepper, with emphasis on the economic uplift of the small holders. The project comprises the following programmes.

(i) New planting of coconut in 5000 hectares in Cannanore and Malappuram districts.

(ii) Rehabilitation of coconut, including replanting of senile and unproductive palms, in 30000 hectares in the districts of Cannanore, Kozhikode, Malappuram and Trivandrum.

(iii) Provision of minor irrigation facilities in 1000 hectares of area newly planted and 7500 hectares in rehabilitated area of coconut.

(iv) Intercropping in coconut areas - 26500 hectares of various garden crops under unirrigated gardens and 3000 hectares of cocoa, 3000 hectares fodder and 2500 hectares of other crops in irrigated coconut gardens.

(v) Rehabilitation of 10000 hectares of pepper including replanting of uneconomic vine in 1000 hectares in Cannanore, Wynad, Idukki and Kottayam districts.

(vi) Rehabilitation of state owned cashew plantation of 2280 hectares and new plantings of 1470 hectares in Cannanore district by providing assistance to Plantation Corporation of Kerala.

(vii) Establishing seed gardens for coconut, cashew, cocoa and spices covering 435 hectares in Malappuram district.

(viii) Establishment of ten crumb rubber factories each of ten tonne capacity per day by providing assistance to Co-operative Rubber Marketing Societies.

(ix) Strengthening of research by Central Plantation Crops Research Institute (CPCRI), Kerala Agricultural University and Indian Rubber Board.

(x) Provision of improved extension service and investment of credit facilities for project participants.

The Project is phased over a period of seven years at a total cost of about Rs.6210 lakhs. A summary of project cost is given in Appendix I.

The coconut and pepper development components of the project mentioned as items i to v above are otherwise named as small holders' Farm Development. For the implementation of the same and for the establishment of seed gardens, Government of Kerala has constituted a Special Agricultural Development Unit (SADU) under the overall control of the Agricultural Production Commissioner. A project co-ordination committee with representatives of all participating agencies as given in Appendix II and a Joint Technical Committee for evaluating the progress of research work as given in Appendix III have been constituted by Government.

As the present study aims at evaluating the performance of the coconut rehabilitation sub project, salient features of the same are dealt with in detail hereunder.

3.1 Project location.

Rehabilitation of coconut including replanting of senile and uneconomic palms was programmed to be achieved in 30000 hectares over a period of seven years from a gross project area of 37500 hectares. A package approach on an area basis was conceived in the project for the purpose. Giving due

consideration for the factors like incidence of pests and diseases, senility and low productivity of plantations, keenness of farmers to participate, receptiveness by farmers to extension service advice, availability of adequate ground water resources for irrigated development, availability of contiguous areas for the type of development proposed etc. 75 package units of 500 hectares each were selected for the implementation of the rehabilitation programme. List of units identified for coconut rehabilitation is furnished in Appendix IV.

3.2 Project phasing.

Assuming 25 per cent response from the participating farmers in a package unit during the first year, 50 per cent and 25 per cent responses during the second and third years, phasing for the rehabilitation programme has been projected as given in Table 3.1.

By the time the field staff came into position the planting season of 1977-78 was over and hence the programme was rephased as given in Table 3.2.

Bench mark surveys were carried out in all the 75 units identified for the programme. The results thereof indicated that farmers' participation would be forthcoming to the tune of 80 per cent thereby ensuring an effective area for rehabilitation of 400 hectares out of 500 hectares available in each package unit.

Table 3.1 Coconut rehabilitation programme - Project phasing

Year	No. of package units.	Project years 1	2	3	4	5	6	Total
		(Area in hectares)						
(a) Unirrigated								
First	15	1125	2250	1125	-	-	-	4500
Second	40	-	3000	6000	3000	-	-	12000
Third	20	-	-	1500	3000	1500	-	6000
	75*	1125	5250	8625	6000	1500	-	22500
(b) Irrigated								
First	15	-	375	750	375	-	-	1500
Second	40	-	-	1000	2000	1000	-	4000
Third	20	-	-	-	500	1000	500	2000
Total	75*	-	375	1750	2875	2000	500	7500

* 25 per cent of the coconut palms are rehabilitated with irrigation and 75 per cent without irrigation in the same package units.

Source: KADP - Small Holders Farm Development Programme - February 1978, SADU.

Table 3.2 Coconut rehabilitation programme - revised phasing.

Year	No. of package units.	Project years 1	2	3	4	5	6	Total
		(Area in hectares)						
(a) Unirrigated								
First	15		2700	1800				4500
Second	40		3000	6000	3000			12000
Third	20			1500	3000	1500		6000
Total	75*		5700	9300	6000	1500		22500
(b) Irrigated								
First	15		375	750	375			1500
Second	40			1000	2000	1000		4000
Third	20				500	1000	500	2000
Total	75*		375	1750	2875	2000	500	7500

* Same units.

Source: KADP - Small holders Farm Development Programme - February 1978, SADU.

3.3 Replanting of uneconomic palms.

Bench mark survey of the first year units revealed that the holdings exhibit wide variation in respect of stand of coconut palms ranging from 16 to 320 trees per hectare. Further, percentage of young (29 per cent) and senile trees (6 per cent) worked out to 35 per cent of the total. It was estimated that on an average the farmers would have to replant 20 palms per hectare by way of senile and uneconomic palms. Quality seedlings required for the purpose were programmed to be supplied by the Department of Agriculture. An average stand of 175 palms per hectare of all healthy and high yielding palms was envisaged to be achieved at the end of the project through selective thinning and replanting. Capital investment required for the replanting part of the programme was estimated to be Rs. 552 per hectare and was phased over a period of 4 years.

3.4 Cultural practices.

Cultural practices would be in accordance with the package of practices recommended by the Department of Agriculture. For an adult palm 0.34 kg N, 0.17 kg P_2O_5 and 0.68 kg K_2O and 2 kg dolomite or 0.5 kg Magnesium sulphate and 1 kg lime per tree was recommended to be applied. For the replanted seedlings 1/10 of this dose would be applied after 3 months, 1/3rd after 1 year and 2/3 rd

after 2 years. This dose of chemical fertilizers was recommended over and above 25 to 30 kg organic manure to be applied par palm. A schedule of plant protection covering two annual sprayings with fungicides and treatment with BHC 10 par cent and sand in tha leaf axils far seedlings was also recommended for coconut under the programme.

3.5 Intercropping.

Cocoa: Interplanting of cocoa was recommended to be adopted only under irrigated condition in gardens where the stand of trees would not exceed 175 par hectare. The crop was proposed to be organised in continuous and compact areas with a view to facilitate primary processing and marketing on collective basis. Single rows with an average stand of 350 plants par hectare was generally recommended for this intercrop though double row planting was also permitted. At planting time application of 10 tonnes of organic manure per hectare and in the subsequent years 1 kg of 10:4:14 NPK fertilizer mixture was recommended to be applied per plant.

A capital cost of Rs.2180 by way of input and wages for the first three years of tho project towards planting cocoa in 0.80 hectare out of 1 hectare irrigated coconut was projected in the programme.

3.6 Mixed farming.

Mixed farming under the project was proposed to be encouraged only where irrigation facilities could be provided. Hybrid Napier or Guinee grass mixed with suitable fodder legumes was recommended to be planted as intercrop. The carrying capacity fixed as per the lending models was 3 cows per hectare of interplanted area. On the basis of Rs.2500 per cow and Rs. 1000 for cattle shed and Rs.1752 for the establishment of fodder during the first year, a total capital investment of Rs.10252 per hectare was projected to be required for the mixed farming component of the project. Organic manure at the rate of 20 tonnes per hectare and inorganic fertilizers at the rate of 50 kg P_2O_5 and 50 kg K_2O was recommended at the time of planting of fodder. After each cutting 18.5 kg N was also recommended to be applied to the grass. In addition to this, two split doses of 25 kg P_2O_5 and 50 kg K_2O per hectare each also were to be applied before and after the monsoon.

In respect of cocoa as well as fodder, it was envisaged that only 0.80 hectare out of 1 hectare will be devoted for the same, while the remaining 0.2 hectare would be earmarked for other intercrops like vegetables, pulses, ginger, tapioca etc.

3.7 Other intercrops.

The unirrigated models provide for intercrops like tapioca, pulses, rainy season vegetables and ginger. Under

the irrigated model also 0.20 hectare has been earmarked for these crops to be selectively allocated.

An amount of Rs. 1166 per hectare without irrigation and Rs. 1332 per hectare with irrigation has been projected to be required by way of annual operating cost for these annuals. However this did not form part of the project financing.

3.8 Yield assumptions.

Benefits from the project were projected based on the following yield assumptions.

Sl. No.	Crop	Unit	Yield rates	
			Pre-project	Post-project
1.	Coconut			
	(a) Unirrigated	nuts/tree	21	40
	(b) Irrigated	"	21	60
2.	Cocoa	kg dry beans/ hectare		650
3.	Fodder	kg/hectare		30000
4.	Tapioca			
	Unirrigated	kg/hectare	8750	12500
	Irrigated	"	8750	15500
5.	Pulses			
	Unirrigated	"	125	350
	Irrigated	"	125	400
6.	Vegetables			
	Unirrigated	"	1500	3000
	Irrigated	"	1500	3750
7.	Ginger			
	Unirrigated	"	-	3500
	Irrigated	"		4250
8.	Milk	Litres/cow/day	-	3.7

3.9 Irrigation.

The project provided for irrigation support for 7500 hectares of rehabilitated coconut gardens. Investments supported under the project were to cover new dug wells, deepening and repair of existing wells, installation of filter point in sandy soils, supply and installation of electrically operated pumpsets. The smaller holdings of less than 1 hectare were recommended to be provided with 1.5 H.P. pumps and holdings of more than 1 hectare were eligible for pumpsets of3H.P. and above.

Capital investment of Rs.3800 (filter point Rs. 1200 pump Rs.1900 and installation charges Rs.700) for holdings upto 1 hectare, Rs. 11550 (Pump 2850 installation charge Rs. 700 and well Rs. 8000) for holdings of 1 hectare and above and an annual operating cost of Rs. 200 exeluding family labour were projected as requirement under the irrigation component of the programme.

3.10 Farm models.

Typical farm development operations related to the rehabilitation programme were represented by farm models incorporated as part of the project and as reproduced in Appendices V to VII. Models for unirrigated development of coconut are seen to have been built up on the assumption of o minimum holding size of 0.5 hectare. The models for irrigated development indicated that it is not financially

viable to invest in a new well and a 3 HP pumpset for holdings less than 1 hectare size. Installation of filter points or improvement of existing wells with 1.5 HP pumpsets was conceived as the appropriate strategy for irrigated development of smaller holdings of not less than 0.5 hectare.

The models provide a rate of return of 40 per cent for unirrigated development and 18 per cent for irrigated development of coconut based on 25 years stream of costs and benefits.

3.11 Lending programme.

Capital investment required for the programme were financed from project funds routed through National Bank for Agricultural and Rural Development (formerly Agricultural Refinance and Development Corporation). This includes the following items.

i) Cost of replanting and maintenance of replanted seedlings for 4 years under irrigated condition and 5 years under unirrigated condition.

ii) Cost of planting and maintenance of cocoa for 3 years under irrigated condition.

iii) Cost of establishing fodder during the year of planting.

iv) Cost of well or filter point including renovation.

v) Cost of pumpsets and installation charges including pumphouse.

vi) Cost of cow to be provided during the second year after establishing fodder.

vii) Cost of cattle shed.

viii) Cost of land development.

ix) Loss of income from the pre-project level, if any, during the initial years of the project.

The project provide financial support for 4 years under the irrigated condition and for 5 years under the unirrigated condition by which time additional income was expected to be forthcoming from the investment. The operational expenses towards the maintenance of existing palms, maintenance cost of cocoa from 4th year onwards, maintenance cost of cows, cultivation expenses for fodder from second year onwards and cultivation expensesof all annual crops adopted as intercrops from the beginning of the project have to be found from other sources.

Maximum loans required for the rehabilitation programme and the income after debt service were estimated as follows:

Category	Maximum loan Rs. per hectare	Income after loan repayment Rs./hectare
Without irrigation	6400	5400
With irrigation and cocoa as intercrop	19800	10300
With irrigation and fodder and dairy	22500	9300

The loans taken by project participants to finance the investments are to be repaid in full with interest from the 11th to 15th year as per the schedule of repayment to be fixed in each case. The lending institutions charge interest at the rate of 10 per cent per annum for small farmers and 12.5 per cent for others.

National Bank for Agricultural and Rural Development would route the financing through the primary land mortgage banks as well as the nominated Nationalised Banks. The State Government is providing an interest subsidy of 5 per cent for those who have availed the loan from the co-operative sector for prompt repayment.

Allocation of package units in Trivandrum district among banks participating in the lending programme under the project is given in Table 3.3.

Table 3.3 Allocation of units among participating banks.

Sl. No.	Name of unit	Name of financing banks	
		Primary Land Mortgage Bank	Commercial Banks
1.	Kadinamkulam	PLMB, Trivandrum.	Central Bank of India.
2.	Mangalapuram	-do-	-do-
3.	Anayara	-do-	Indian Overseas Bank.
4.	Vattiyoorkavu	-do-	-do-
5.	Attippra	-do-	Union Bank of India.

Table 3.3. (contd.)

Table 3.3 (concl.)

Sl. No.	Name of unit	Name of financing banks	
		Primary Land Mortgage Bank	Commercial Banks
6.	Azhoor	PLMB, Kilimanoor.	Bank of Baroda.
7.	Keezhvalom	-do-	-do-
8.	Edakode	-do-	-do-
9.	Cherunniyoor	-do-	Indian Overseas Bank.
10.	Manampoor	-do-	Bank of Baroda.
11.	Karakulam	-do-	Union Bank of India.
12.	Venpakal	PLMB, Neyyattinkara	State Bank of Travancore.
13.	Karumkulam	-do-	-do-
14.	Poovar	-do-	-do-
15.	Balaramapuram	-do-	Indian Overseas Bank.

3.12 Organisation and management.

'SADU' is functioning as a separate entity under the Agricultural Production Commissioner with exclusive staff and facilities. The Chief Executive of SADU is the Director who also functions as Secretary to Government to facilitate co-ordination of project activities at Government level. The Director is assisted by one Additional Director of Agriculture and two Joint Directors, (One Joint Director is for Finance and Administration

and the other for credit), one Deputy Director (Monitoring), one Deputy Director (Animal Husbandry), One Assistant Director of Agriculture. Necessary supporting staff have also been provided for the project work.

Field Administration is looked after by 6 District Level Officers namely Deputy Directors of Agriculture in Cannanore and Calicut and Assistant Directors of Agriculture in the Districts of Malappuram, Kottayam, Idukki, Wynad and Trivandrum. In the districts of Cannanore, and Calicut the services of one Assistant Director for Animal Husbandry have also been provided.

At the unit level the services of one Junior Agricultural Officer and 2 Agricultural Demonstrators are provided. The working hours of the field staff have been fixed from 8 AM to 3 PM so as to facilitate effective field visits during the morning hours. The field staff are expected to spend most of their time in the field and help the farmers, in preparing individual farm production plans, loan applications, and also for keeping laison with input supplying agencies including lending agencies. The choice of the financing institution was left to the farmer.

Review of Literature

REVIEW OF LITERATURE

Research work and published papers on the impact of development projects similar to the one dealt with in the present study are limited. However, studies on the development of coconut, intercropping and mixed farming techniques in coconut gardens and on irrigation are germane to the present study. The available literature on these topics is presented below by grouping the same in 4 broad categories (a) studies on coconut cultivation and production (b) studies on intercropping and mixed farming in coconut gardens (c) studies on irrigating coconut gardens and (d) studies on the impact of finance on crop production.

4.1 Studies on Coconut cultivation and Production.

The coconut survey (1965, 66, 67) conducted by the Bureau of Economics and Statistics, Kerala revealed that the density of coconut palms in the state varied between 220 and 250 per hectare which was 30 to 50 per cent more than the optimum. This study also indicated that only 1 per cent of the palms were receiving chemical fertilizers. However, about 50 per cent of the palms were found to receive organic manures though quantity applied was very low.

An evaluation study made by the State Planning Board (1969) to find the adoption of improved agricultural practices by the paddy, coconut, arecanut, and tapioca growers in the state revealed that 57 - 70 per cent of the farmers adopted fertiliser application.

Sample survey conducted by Directorate of Coconut Development (1972) revealed that less than 25 per cent of the coconut growers were adopting fertilizer application and the average dose was less than 1.5 kg per palm.

Chandan Mukkerjee (1975) developed a statistical model for suggesting the optimal year of replacement for the coconut palm whose yield is declining over years after comparing the net present worth of the likely income from the tree to be replanted and the net present value of the future stream of income from the replanted seedling. He also recommended a phased replantation of 50, 50 for old and uneconomic plantations requiring large scale replantation, that is removal of 50 per cent at the optimal time and the rest only after the new seedlings start yielding.

Radha (1977) after analysing the yield records at Central Plantation Crops Research Institute, Kayamkulam observed that application of 3 kg NPK fertilizers (0.5:0.5: 2.0) per tree per year with 50 kg of green manure and 500 kg lime per acre increased the yield of diseased palms by four nuts per tree per year while the yield of apparently healthy palms increased by 11 nuts per tree per year. It was also observed that intercropping with fodder grasses and legumes like Hybrid Napier, Stylosanthes and Pueraria under irrigated conditions increased the yield of coconut palms in different stages of disease by 28 per cent on an average.

Karman et al. (1977) based on studies on spacing in coconut conducted at coconut research station Pilicode observed that there was no significant difference in the individual palm yield among the 3 spacings of 22 ft. 25 ft and 30 ft tried under the triangular method of planting.

Chandan Mukkerjee (1978) attempting to arrive at an age dependent replantation model suggested that low yielding palms should be removed at the early bearing stage so that satisfactory yield is ensured from the palms during the later stage. The model did not recommend removal of any palm even if it yielded very low in some year during the full bearing stage as the probability of the palms recovering to a satisfactory level at the full bearing stage was found to be very high.

George (1978) in an economic analysis of the rehabilitation of plantation crops applying the principle of net present worth of the future stream of income from coconut, suggested that it may be better, in economic terms to replace the existing palms and suffer a loss of income only when their yield declines below 15 nuts per palm. He further subjected the cash flow to sensitivity analysis with a 15 per cent price change for coconut (at Rs. 80 and Rs. 60 for 100 nuts) and found that the old palms would qualify for replantation at 14 to 16 nuts per palm at the above price level respectively.

Jacob Mathew (1978) analysing the trend of area and production of coconut in Kerala for the period 1957-58 to 1974-75 by fitting an exponential model found that the compound rate of growth for area under coconut in Kerala at 3.26 per cent was slightly lower than that for the country as a whole which was 3.39 per cent. The rate of growth of productivity of coconut for the period was found to be negative for the state (1.66 per cent) and for the country (1.32 per cent).

Nelliat et al. (1978) conducted an experiment to determine the NPK fertilizer requirement of 3 coconut genotypes viz W.C.T. (West Coast Tall), Dwarf x Tall and Tall x Dwarf and found that these genotypes did not differ in their performance in any of the treatments. The response of tall was found to be linear at the higher level of fertilizers ie 1000:1000:2000 gm per palm while the response of hybrids to higher levels of fertilizers was negligible.

Potty and Radhakrishnan (1978) in the studies conducted at the Coconut Research Station, Nileswar observed that stem bleeding incidence in coconut appears to be associated with deficient supply of N or an increase in P content without a concomitant increase in other nutrients.

Pandurangaiah et al. (1978) conducted a diagnostic study on the deterioration in yield of some coconut gardens

in Karnataka and observed that the red soils of unhealthy gardens were low in Phosphorus, Potassium, Calcium, Magnesium and Zinc compared to those of healthy ones. The black soils of sick gardens were found to be low in organic carbon, calcium, magnesium, phosphorus, zinc and manganese.

Soil samples collected and analysed by Bhaskaran et al. (1978) from areas where coconut palms exhibited pencil point disease symptoms indicated a low level of nitrogen and phosphorus at all levels of depth in the soils of the disease affected area. Among the micronutrients Iron and Manganese contents were low while there was no significant difference in Zinc and Copper. Application of micronutrients alongwith fertilizers increased the girth of the palm.

Mathai (1979) studied the effect of cultural practices on the yield of coconut palms in Coconut Research Station, Kumarakom and found that the method of clean surface removal of grass was superior to the other 3 treatments tried namely (1) intercultivation with 2 diggings per annum (2) perennial cover of leguminous crop (3) perennial cover of grass.

4.2 Intercropping and mixed farming in coconut gardens.

Rambirsingh (1965) studied the input output relationship of mixed farming in Meerut district and found that

combination of dairy with crop raising would increase gross farm income of the farm families.

At Central Plantation Crops Research Institute, Kasargode a multistoreyed cropping system was successfully established from 1972. The crop combination consisted of coconut + pepper + cocoa + pineapple. The findings of CPCRI after seven years indicated that such a cropmix acquired a capacity to sustain itself without irrigation over a period of time.

Singh et al. (1973) based on a study on the impact of dairying on productivity and employment in Sangrur district in Punjab using linear programming technique advocated keeping two buffaloes in small farms upto 8 acres, three on medium farms between 8 and 17 acres and eight for large farms of above 17 acres for optimising returns.

Nair (1975) conducted a study at Central Tuber Crops Research Institute, Trivandrum on intercropping of Cassava in coconut gardens comparing the shade tolerance and performance of 9 varieties. Considering the tuber yield and quality of tuber of this study, the varieties like H.165, H312, H.2304 and H.1687 were recommended for growing in coconut gardens.

Hrishi (1976) studied the performance of 12 varieties of tapioca under the shade of coconut palms in the coconut

Research Stations Pilicode and Balaramapuram. He found H.165, H.2304, H.1687, H.312 and S.1310 can be recommended for growing in coconut gardens by following a fertilizer dose of 75:75:75 kg per hectare of NPK.

A trial conducted at coconut research station Pilicode during 1967 to 1974 on intercropping coconut garden with annual crops (Kannan et al. 1976) proved that intercropping has resulted in increased production of nuts and enhanced the overall return from the coconut garden. The increase in nut production ranged from 2.70 per cent in groundnut intercropped area to 30.3 per cent in the Colacassia intercropped area. Among the intercrops tapioca gave the maximum net profit per hectare (Rs. 1503) followed by Colacassia, Paddy, Ragi and Groundnut.

Subramonian and Pillai (1977) opined that raising fodder and milch animals is a profitable venture as a component of an intercropping programme for coconut gardens.

Potty et al.(1977) on observing the samples of roots collected from the interspaces of palms intercropped with hybrid napier found that there was significant increase in the total bacteria and nitrogen fixing bacteria counts in respect of the experimental plot.

Kannan et al. (1977) based on a trial on interplanting cocoa in coconut gardens conducted at coconut research station

Pillcode observed that the net return on intercropping of cocoa in coconut gardens was Rs.3953.80 per hectare under the single row planting of cocoa. The net return increased to Rs.9480.20 under the double row system of planting of cocoa. An increase of 6.5 nuts and 6.8 nuts per tree in the case of coconut was also reported by them.

Singh et al. (1977) in a study of the relative costs and returns of fodder crops in Meerut and Bulandshr districts observed that the average production cost of different fodder crops was appreciably low when compared to the market rate.

Leela and Bhaskaran (1978) found that growing groundnut as a rainfed intercrop in coconut gardens registered a net additional income of Rs.2772 per hectare realised through the sale of intercrop produce and savings in expenses effected by skipping certain cultural practices and inputs to the maincrop. The cost benefit ratio worked out to 1:1.6.

A study conducted by Menon and Nair (1978) on the effect of intercropping with tubercrops in root wilt affected coconut gardens at CPCRI, Kayamkulam brought to light the beneficial effects of intercropping with Elephant foot yam and yams with coconut. A slight decline in severity of disease was noticed in the plots intercropped with the above two. Yield of tuber was highest in the case of tapioca. The cost benefit analysis showed that coconut

and tapioca gave the highest net return per rupee invested (50 per cent more income).

Potty (1978) based on an experiment laid out in coconut research station Nileswar recommended that rice, groundnut, sweet potato can be successfully raised in trenches of 5 m x 4 m with 0.3 m depth while tapioca, redgram, sesamum and ginger can be raised in beds of 4 m x 4 m x 0.3 m to be prepared in the interspace of coconut.

A field experiment conducted at CPCRI Kayamkulam during 1975-77 (Nair and Subramoniam 1978) on the performance of four fodder crops in coconut garden under rainfed and irrigated conditions proved that the graminaceous fodders Pusa giant, NB_{21} and Guinea grass were on a par in herbage yield but gave significantly higher yield than the legume stylosanthes both under rainfed and irrigated conditions. The increase in the yield of green fodder due to irrigation was highest in the case of NB_{21} (55 per cent) followed by Pusa giant (44 per cent) under rainfed condition and during dry season, highest green fodder yields were obtained from Guinea grass.

Santha Malliah et al.(1978) studying the factor product relationship and family labour employment in small coconut gardens of Karnataka recommended crop diversification and integrating livestock activities for stabilizing farm income and employment.

Another study conducted by Thomas Varghese et al. (1978) at CPCRI Kasargode revealed that raising tubercrops had no adverse effect on the main crop of coconut, provided the same intercrop was not grown on the same plot every year and that both the intercrop and main crop were manured adequately and separately. A 5 per cent increase in yield of coconut over pre experimental yield was obtained when tapioca and elephant yam, sweet potato, ginger and turmeric were grown in rotation as intercrops and 15 per cent increase when greater yam, lesser yam, colacassia, and chinese potato were rotated. Besides giving higher net returns per unit area, intercrop generated additional employment of about 130 man days per hectare per year.

Another study conducted at CPCRI Kasargode by Thomas Varghese et al. (1978) on the beneficial interaction of coconut - coca crop combination revealed that the combination has brought about favourable alterations in the factors affecting crop production ie soil temperature and soil fertility.

Thomas Varghese et al. (1978) observed that under irrigated conditions competition among the crops grown in the cropmix can be overcome by judicial input management. Reduction in the productivity of main crop and that of intercrop may result if management practices were inadequate and incompatible.

Kurian (1979) recommended multistoreyed cropping in coconut gardens as an effective method for increasing agricultural production per unit area per unit of time. According to him intercropping can be successfully adopted when the palms are in the age group of 20 to 70 years.

Jain and Rao (1980) suggested a relative net return index as a new approach to analyse the yield data in intercropping system. The index suggested is RNR = $\frac{PiYi + PjYj + Dij}{Pi\ Yii}$ where YiYj are yields of the ith major crop per hectare and jth intercrop per hectare respectively of i - jth crop combination. Pi Pj are prices of ith major crop and jth intercrop respectively. Yii is yield of ith sole crop per hectare, Dij is the differential cost of cultivation of (i-j)th crop combination in comparison to ith sole crop.

Rao and Singh (1980) based on their studies on the cost and return from different cross bred cows covering 150 house holds in Karnal city found that net income per milch cow was positive in case of all the breeds and highest for Holstein cross. It was Rs.1003 for Jersy cross, Rs. 1084 for Brownswiss cross and Rs. 2133 for Holstein cross.

Jaggit Singh and Singh (1981) also studied the economic performance of different species of milch animals purchased using the loan facility offered by State Bank of Patiala. The results of this study revealed that dairy

enterprise with non descript local cows is not a profitable proposition. Cross bred cows on the other hand provided the highest returns on the investment and could be considered as a bankable proposition.

4.3 Impact of irrigation on crop production.

Yashwanth (1965) made a case study of six farms in Uppathur village, Ramanathapuram district. It has revealed that provision of irrigation has been instrumental for cultivation of more profitable crops and more intensive cropping in the farms. Gross value of farm output increased from Rs.97.43 to Rs.1128.78 per acre consequent to irrigation.

Venkitesan (1973) analysing the yield data of CPCRI Kasargode observed that 92 per cent of the irrigated palms come to bearing before 10th year as against only 1.4 per cent of the unirrigated palms. Similarly the average productivity per palm during the pre and post irrigation periods was observed to be 6.98 and 18.46 nuts per palm per annum respectively.

The evaluation reports of the Small Farmers Development Agency, Cannanore (1973) and Quilon (1980) report incremental benefit to small and marginal farmers as a result of minor irrigation facilities provided.

In a study conducted by Nelliat and Padmaja (1976) to determine the irrigation requirement of coconut and optimum

fertilizer dose under irrigated conditions at CPCRI Kasargode it was concluded that during early bearing stage of coconut the irrigation requirement was found to be 660 to 680 mm per dry season. West coast tall variety responded favourably to split application of 750 gm N 670 gm P_2O_5 and 1500 gm K_2O, 170 gm MgO per palm per year with summer irrigation.

Bhaskaran and Leela (1977) conducted studies on summer irrigation in Coconut Research Station, Nileswar and recorded increase in yield at 214.9 per cent, 130.1 per cent, 57.4 per cent and 33.8 per cent in the yield groups of below 20 nuts, 20-40 nuts, 40-60 nuts and 60-80 nuts per palm per annum respectively.

In another study conducted by Bhaskaran and Leela (1978) at Coconut Research Station, Nileswar it was found that the yield of coconut increased by 31 nuts per palm per year due to supplementary basin irrigation given during summer months. Among the different yield groups under study maximum response was given by low yield groups (20-40). The benefit cost ratio of irrigation was estimated as more than 3.

In their comprehensive study on the impact of Small Farmers Development Agency, Trichur on the target group of farmers, Radhakrishnan and Rajendran (1981) have concluded that there was significant change in the relative importance of various crops raised by the beneficiaries in productivity

of crops and in employment of labour as a result of availability of irrigation.

4.4 Impact of finance on crop production.

According to a study* conducted by Reserve Bank of India during 1969, even in the villages which borrowed relatively large amounts of loans for coconut cultivation, the levels of different inputs were below the optimal dosages.

Singh et al. (1971) observed that the inadequacy of credit to supplement own resources was one of the important constraints in increasing agricultural production.

Singh et al. (1971) and Singh and Jha (1971) identified the inadequate availability of capital as a major cause for low productivity and slow adoption of technology on a majority of Indian farms.

Desai and Desai (1971) studied the problems of credit needs in a changing agricultural sector with particular reference to national policies. The study was conducted in Baroda district of Gujarat using linear programming technique. Per farmer and per acre credit use was found to increase with advances in technology and expansion of irrigation. Increased credit use in changing agriculture increased farm income and provision of farm credit would therefore be remunerative. The study also suggested to adopt a preferential approach concentrating on those farmers who do not have adequate amounts of their own finance but have the potentialities for increasing farm income with the

help of additional credit supply. Aggregate approach was found to lead to over supply af credit in many cases and under supply in some cases.

In an impact study on credit on farm income conducted in West Godavari district using linear programming technique Subramonyam and Patel (1973) found that credit is important for the adoption of new technology and for bringing more area under high yielding varieties. They recommended that credit policy should be biased in favour of the small farmers.

Agrawal et al. (1974) studied the potentialities of increasing farm income through credit and new technology in Jaipur district using linear programming technique. They found that provision of additional credit increases tho farm income even at the existing level of technology by 41 per cent. The increase in income reported was 73 par cent while adoption of technology and additional credit were combined.

Based on their study on the role of various economic factors in determining demand for credit, Sarma and Prasad (1978) observed that irrigation had a significant role in augmenting credit needs of the farmers.

* Original not seen.

Methodology

METHODOLOGY

The present study aims at analysing the impact of the coconut rehabilitation programme implemented as a part of the Kerala Agricultural Development Project in Trivandrum district. In economic terms the direct impact of any agricultural development project has to be viewed in the light of benefits meted out to the participants by way of additional income. Intangible evidences such as changes in the knowledge, attitude and skill of the farmer are also important in studying the impact of an extension cum development project. However for the present study emphasis is given to the economic benefits from the programme.

The ultimate returns from an agricultural holding are the net result of very many factors such as productivity of land, climatic factors, cropping pattern adopted, intensity of cropping, productivity of crops, input management, cultural practices adopted, factor and product prices and the entrepreneurial talents.

The project sought to optimise the income of the farmers from their holdings by combining all manageable factors. Information by way of pre and post project levels of cropping intensity, area irrigated, average quantity of fertilisers used, area treated against pests and diseases, cultural practices adopted etc would be a

reliable indicator of the efforts put in under the programme for the development of the holding. However there are factors like the vagaries of climate, endemic outbreaks of pests and diseases which may go beyond the control of the project and which influence the ultimate benefits accruing to the farmers. A comparison of post project levels of achievement in respect of the beneficiaries with those of the nonparticipating farmers would be relevant to get an idea of the growth rate due to factors other than the project.

5.1 Sampling procedure.

Fifteen package units were identified for implementing the coconut rehabilitation programme in Trivandrum district. One of these units was dropped due to technical reasons. Thus, the project is now under implementation in 14 units only and therefore the universe for the present investigation is the 14 units, where the programme is under implementation. Taking into account the limitation of time and other resources, it was decided to proceed with a sample survey of 100 beneficiaries of the project and 22 non beneficiaries. A two stage random sampling procedure was adopted in selecting the sample, the first stage being the package units in Trivandrum district and the second stage, the beneficieries of the units. As it takes at least 3 years for full benefit to accrue from manuring of coconut, the ultimate sampling units were confined to the beneficiaries who

completed participation in the project for at least 3 years by 1982-83. The list of beneficiaries under the project till the end of 1980-81 was therefore collected from each of the existing 14 units in the district. Since the number of beneficiaries in the different units varied widely, sample units from each package unit was fixed in proportion to the number of beneficiaries in the unit, limiting the sample size to 100. The unitwise number of beneficiaries selected accordingly is given in Table 5.1.

Table 5.1 Unit-wise number of beneficiaries selected for the study.

Sl. No.	Name of unit	Total beneficiaries in each unit	Area covered till 80-81 (Hectares)	No. of beneficiaries selected
1.	Keezhvalam	344	268	11
2.	Vattiyoorkavu	362	376	11
3.	Balaramapuram	404	379	13
4.	Manampoor	272	203	8
5.	Edakode	217	173	7
6.	Mangalapuram	109	109	3
7.	Anayara	137	122	4
8.	Attipra	166	116	5
9.	Karakulam	347	321	11
10.	Poovar	309	259	10
11.	Venpakal	317	259	10
12.	Cherunniyoor	71	51	2
13.	Azhoor	59	108	2
14.	Karimkulam	97	64	3
		3211	2808	100

One of the objectives of the study was to investigate the benefits accrued to the Scheduled Castes/Scheduled Tribes from the project. None of the 100 participants selected for the study of the project in general represented the S.C/S.T. category. The total number of beneficiaries under this category who participated till the end of 1980-81 in all the units was only 12 and hence data from all the beneficiaries were collected for the purpose.

For collection of comparable data in respect of non participating farmers from the project area, 22 farmers were selected purposively by allocating the number to the different units in proportion to the project participants selected in each unit.

5.2 Data.

Primary data were collected from the selected beneficiaries during the period April to August 1983 using a well structured schedule. Copy of the schedule is given in Appendix VIII. The respondents were personally interviewed to collect the required information. Pre project and post project data covering the following aspects were collected. (1) land use pattern (2) production and productivity of crops (3) investment estimated, sanctioned and spent for each item (4) details of irrigation facility acquired and utilised (5) input management and cultural practices adopted for various crops (6) disposal of products and income thereof and (7) details of livestock purchased, maintenance cost and returns. Besides,

an opinion survey was also conducted to bring out the impression of the participating farmers about the content of the project and the mode of its implementation.

The pre project details collected and kept in the selected coconut package units of Trivandrum district were gathered and checked with the information elicited during the personal interviews. Similarly individual farm production plans drawn up by the field staff in respect of the selected participating farmers based on which loans were sanctioned by the financing institution were gone into in detail and data collected so as to compare it with the actual field performance. Since most of the farmers were not in the habit of keeping farm records, information furnished by them was based on their memory. Along with the interview, field verification was also resorted to for such of the items like areas allocated for different crops, livestock maintained, condition of the farm and livestock, conditions of the crops then available, estimate of yields from the same based on visual observation etc. It is expected that the inaccuracies which are likely to creep into such post operation studies could be minimised in the present study through the procedure followed in this investigation.

5.3 Tools of analysis.

Out of 100 holdings selected from the 14 package units functioning in the district, 4 farmers, even after the

sanction of the loan did not either avail of the loan or utilize the amount for the development of their holdings due to various reasons. Analysis of the data has therefore been confined to the remaining 96 beneficiaries, who have been grouped into three category. Among tho 96 selected beneficiaries 29 happened to be those who opted for unirrigated development. These 29 came under category I. Though the remaining 67 farmers applied for loans for development of their holdings with irrigation facilities and the loans were sanctioned by the financing institution, 13 beneficiaries could not instal pumpsets and irrigate their farms due to unforeseen difficulties that crept in during the operation and so their plots still remain unirrigated. These 13 cases were considered as a separate category (Category II) for the purpose of analysis. The remaining 54 sample farmers came under category III. The respondent farmers under the 3 categories were further classified into 3 sub classes on the basis of holding size as given in Table 3.2.

Table 5.2 Classification of the respondents.

Category	Ia	Unirrigated holdings of and below 0.40 hectare.
Category	Ib	Unirrigated holdings of 0.40 to 0.80 hectare.
Category	Ic	Unirrigated holdings of above 0.80 hectare.
Category	IIa	Loan with irrigation component but failed to provide irrigation - holdings of 0.40 hectare and below.
Category	IIb	Loan with irrigation component but failed to provide irrigation - holdings of 0.40 - 080 hectare.
Category	IIc	Loan with irrigation component but failed to provide irrigation - holdings of and above 0.80 hectare.
Category	IIIa	Loan with irrigation component of 0.40 hectare and below.
Category	IIIb	Loan with irrigation component of 0.40 to 0.80 hectare.
Category	IIIc	Loan with irrigation component of and above 0.80 hectare.

Statistical analysis was done separately for each class so as to facilitate comparison.

Analysis and interpretation of the data were attempted on the following aspects of the problem.

a. Characteristics of the participating farmers.

The respondents were classified into different classes based on holding size, income and occupation and tabulated.

b. Project Investments.

Categorywise, holding size wise and itemwise details of investment estimated, sanctioned and spent under the project were worked out and are presented in tables.

c. Pre and Post project Cropping Pattern.

Pre and post project details in respect of land use pattern, cropping intensity and average stand of coconut per hectare in respect of different size classes under each category have also been worked out and presented in the form of Tables.

Comparison was also made between the cropping pattern as prescribed in the individual production plans and as adopted by the beneficiaries so as to know the extent of deviation.

d. Input management and Cultural practices at the pre and post project levels.

Pre and post project date on irrigated area, organic manure used, fertilizers applied, plant protection measures adopted and intercultivation practised for the various crops in the different size classes under each category were worked out. Per hectare doses of inputs used at the pre and post project levels were compared. Relevant details are presented in the form of Tables.

e. Changes in Crop Output and Yield rates.

Total as well as average yield of coconut as well as tha intercrops taken up under the project along with the

milk yield from livestock at the pre and post project levels were also worked out in respect of different size classes falling under each category.

f. Increase in Income.

Pre project gross farm and net farm income at base level prices as well as 1982 prices were worked out for different size classes in each category and compared it with 1982 level income after the implementation of the project. Average income per holding and per hectare were also worked out and presented.

g. Comparison of the Efficiency of different approaches for development followed in the Project.

Development of the coconut holdings under irrigated as well as unirrigated conditions was taken up under the project. Pre and post project data in respect of each category have been worked out covering the various indicators of progress as mentioned under items 2 to 5 above and presented in the form of Tables. A comparison of the same would help in determining the efficiency of irrigation.

Another aspect studied in this connection is the study of the relative efficiency of different intercrops in increasing the net return of the growers. Details of cost and return in respect of cocoa, banana, tapioca and dairying for the different classes were worked out. Based on the same average annual net return per hectare for these intercrops were estimated and compared.

Concepts and Definitions

5.4 Cropping pattern.

Venkataramanan and Prahladachar (1980) defined an unchanging cropping pattern as a situation where the respective areas under all crops bear the same proportion to the gross cropped area over the years. The rate of growth in individual crops differing significantly from the rate of growth of gross cropped area was taken by them as evidence of change in cropping pattern. They took the area-gross cropped area-elasticity which could be defined either as the ratio of the rate of growth of area under a crop to the rate of growth in gross cropped area or as the ratio of the area under the crop to the gross cropped area before and after the change to measure the shift in cropping pattern.

5.5 Cropping intensity.

Johl and Kapur (1973) have defined cropping intensity as the ratio of area cropped to total cultivated area and expressed as a percentage.

$$\text{Cropping intensity} = \frac{\text{Area cropped}}{\text{Total cultivated area}} \times 100$$

5.6 Yield per hectare (Production efficiency).

Production efficiency of a project with respect to any particular crop enterprise can be expressed in terms of percentage and can be compared with average yield at the pre project level (Johl and Kapur 1973).

For eg:

Wheat yield per hectare of farm A after irrigation = 13 qtls.

Wheat yield par hectare of Farm A before irrigation = 10 qtls.

Production efficiency of irrigation = $\frac{13 \times 100}{10}$

= 130 per cent

5.7 Farm Income.

Chauhan et al. (1972) referred to gross income as the value at prevailing prices of retained as well as marketed crop output and also the income from allied activities such as dairy, goats and poultry. In the present analysis the difference in gross farm income at the pre and post project levels and corresponding net farm income were taken as indicators of progress. Gross farm income worked out thereon included value of crop output both main crop and by-product including those used for consumption purposes, calculated at the prices prevailing at the base year as well as at 1982 price levels. Net farm income was arrived at by deducting from gross income cost of seeds, hired human labour, hired bullock labour, hired machinery, manures and fertilizers, insecticides and fungicides, irrigation and fuel charges and repair and maintenance charges ie cost c.

Results and Discussion

RESULTS AND DISCUSSION

6.1 Characteristics of the Beneficiaries

In this section an attempt is made to present the background information about the general economic conditions of the participating farmers in the programme.

6.1.1 Taluk-wise coverage.

The coconut package units are mainly concentrated in the 3 taluks of Neyyattinkara, Trivandrum and Chirayinkil. Out of 14 units 13 are located in these taluks, with the result that 83.33 per cent of the beneficiaries selected in the sample also happened to be from these taluks. The taluk-wise and category-wise distribution of samples was as given in Table 6.1.

Table 6.1 Taluk-wise and category-wise distribution of sample.

Sl. No.	Name of taluk	No. of units	No. of samples covered under each category			
			I	II	III	Total
1.	Neyyattinkara	4	15	7	13	35(36.46)
2.	Trivandrum	4	-	4	13	17(17.71)
3.	Chirayinkil	5	7	-	21	28(29.16)
4.	Nedumangad	1	7	2	7	16(16.67)
		14	29	13	54	96(100)

(Figures in parentheses are percentages to total).

6.1.2 Holding size-wise distribution of samples.

Table 6.2 shows the distribution of the beneficiaries in different holding size subclasses. It can be seen that 51.03 per cent of the holdings belong to the size group of less than 0.8 hectare. This is almost in conformity with the observation that 65.48 per cent of holdings belonging to holding size of less than 1 hectare fmund in the bench mark survey conducted by SADU in the units. However this group constitutes only 27.36 per cent of the area covered by the samples. This is against 94.2 per cent and 63.8 per cent in respect of number and area of holdings for Trivandrum district as a whole for all crops put together (please see Table 2.9). The difference can be explained by the fact that only farmers owning more than 0.2 hectare came under the purview of this project.

Under the irrigated category 59.26 per cent of the holdings are in the size group of more than 0.8 hectare while under the unirrigated category 65.42 per cent are less than 0.8 hectare. This indicates that there is a positive trend on the part of bigger holdings towards acquiring irrigation facilities. Category II where irrigation was intended but failed also confirm this conclusion in view of the fact that only 38.46 per cent of the holdings belong to the size group of more than 0.8 hectare.

Table 6.2 Holding size-wise distribution of samples.

Sl. No.	Sub-Class	Category I		Category II		Category III		Total	
		No.	Area	No.	Area	No.	Area	No.	Area
1.	a	7 (24.14)	2.10	3 (23.08)	1.19	6 (11.11)	1.93	16 (16.66)	5.22 (5.60)
2.	b	12 (41.38)	6.74	5 (38.46)	2.77	16 (29.63)	10.77	33 (34.37)	20.28 (21.76)
3.	c	10 (34.48	11.88	5 (38.46)	10.72	32 (59.26)	45.09	47 (48.97)	67.69 (72.64)
		29 (100)	29.72	13 (100)	14.68	54 (100)	57.79	96 (100)	93.19 (100)

(Figures in parentheses are percentages to total)

6.1.3 **Income.**

Distribution of beneficiaries according to gross farm income at the pre project level is given in Table 6.3.

Table 6.3 Income-wise distribution of beneficiaries at base level prices.

Sl. No.	Category	No. of beneficiaries in annual income groups at base level prices.					
		Below Rs.600	Rs.600-1200	Rs.1200-2400	2400-3600	Above 3600	Total
1.	I a	1	4	2			7
2.	I b	-	5	6	1		12
3.	I c	-	-	4	4	2	10
		1	9	12	5	2	29
4.	II a	-	1	2	-	-	3
5.	II b	-	-	2	1	2	5
6.	II c	-	-	-	-	5	5
		-	1	4	1	7	13
7.	III a	1	2	3	-	-	6
8.	III b	-	3	4	5	4	16
9.	III c	-	-	5	5	22	32
		1	5	12	10	26	54
Grand total		2 (2.08)	15 (15.62)	28 (29.17)	16 (16.67)	35 (36.46)	96 (100)

(Figures in parantheses are percentages to total)

Sixty one of the beneficiaries had a gross farm income of less than Rs.3600 per annum at the preproject level, two had below Rs.600 per annum, fifteen beneficiaries 600-1199, twenty eight of them Rs.2000-2399 and sixteen had Rs.2400-3599.

Distribution of holdings in different income categories (Pre-project) computed at 1982 level prices is given in Table 6.4.

Table 6.4 Income-wise distribution of beneficiaries at 1982 prics level.

Sl. No.	Category	No. of beneficiaries in income groups						Total
		Below Rs.600	Rs.600-1200	Rs.1200-2400	Rs.2400-3600	Rs.3600-4800	Above Rs.4800	
1.	I a	1	3	3				7
2.	I b		1	8	2		1	12
3.	I c			2	5	1	2	10
		1	4	13	7	1	3	29
4.	II a		1	1		1		3
5.	II b			1	2		2	5
6.	II c						5	5
			1	2	2	1	7	13
7.	III a		2	3	1			6
8.	III b		2	4	2	4	4	16
9.	III c			2	6	2	22	32
			4	9	9	6	26	54
Grand total		1 (1.04)	9 (9.38)	24 (25.00)	18 (18.75)	8 (8.33)	36 (37.50)	96 (100.00)

(Figures in perantheses are percentages to total).

The preproject income levels when analysed at 1982 level prices indicate that only 54.17 per cent of the beneficiaries fall in the category of less than Rs.3600 per annum. While 36.46 per cent had income of more than Rs.3600 at base year prices, 37.5 per cent were found to have income of more than Rs.4800 per annum at 1982 level prices.

6.1.4 Source of Income.

About 49 per cent of the households depended on non-agricultural pursuits for their main source of income. Of the non-agricultural sources Government services formed the major constituent accounting for 34 per cent. Around 1 per cent depended remittances from foreign employment in Gulf countries and 14 per cent on business. About 14 per cent of the beneficiaries were not living in their farms and the management of the farms were being done through either their relatives or paid workers. The fact that nearly 50 per cent of the farmers' main source of income was from non-farming pursuits combined with the fact that around 14 per cent of them lived in places far away from their holdings make extension work difficult and ineffective.

6.1.5 Family size.

Table 6.5 shows the distribution of beneficiaries according to family size. Thirty nine out of ninety six families had a membership of 5-7 and thirty eight had less than 5. Only nineteen beneficiaries had more than 7 members in their families.

Table 6.5 Distribution of beneficiaries according to Family size.

Sl. No.	Classification according to members in the family	No. of family	Percentage
1.	Below 3	15	15.6
2.	4 and 5	23	24.0
3.	6 and 7	39	40.6
4.	Above 7	19	19.8
	Total	96	100.0

6.1.6 Occupation.

Occupation wise distribution of the beneficiaries is given in Table 6.6. This is based on the occupation of the head of the family concerned.

Table 6.6 Occupation-wise distribution of samples.

Sl. No.	Main occupation	No. of beneficiaries in holding sizes.			Total	Percentage to total
		0-0.40	0.40-0.80	Above 0.80		
1.	Agriculture	12	14	30	56	58.33
2.	Government service	2	9	11	22	22.92
3.	Foreign Employment	1	-	4	1	1.04
4.	Business	1	10	6	17	17.71
		16	33	47	96	100.00

Fifty six (58.33 per cent) persons had Agriculture as their chief occupation while twenty two (22.92 per cent) were in Government service, seventeen were in business and one was in foreign employment.

6.1.7 Membership in co-operatives.

Only 36 out of 96 were members of service co-operatives even after the implementation of the programme. Though co-operatives are the major source of crop finance in the villages,62.5 per cent of the farmers are yet to avail of this facility.

6.1.8 Cropping pattern.

The cropping pattern followed was more or less of a mixed type involving a number of intercrops haphazardly planted. Out of 96 holdings pure coconut holdings were only 12. Tapioca was the universally accepted intercrop in almost all holdings at the preproject stage (85 per cent). In 21 cases (21.8 per cent) Banana was raised as an intercrop with coconut.

The average stand of coconut was 125 per hectare in the preproject stage. Wide variation ranging from 30 to 300 palms per hectare were exhibited in the selected holdings. Senile and unproductive palms accounted for only 3.31 per cent. Non yielding palms constituted 36 per cent of the total. Table 6.7 shows the distribution of holdings in different classes according to number of palms per hectare.

Table 6.7 Distribution of holdings according to number of coconut per hectare.

Sl. No.	Number of palms per hectare	Number of holdings	Percentage to total
1.	Below 50	6	6.25
2.	51 - 100	25	26.04
3.	101 - 150	31	32.29
4.	151 - 200	21	21.88
5.	201 - 250	7	7.29
6.	Above 250	6	6.25
		96	100.00

Only twenty one out of 96 holdings had the optimum stand of 150 - 200 per hectare. Sixty two holdings had below the optimum density of coconut palms (below 150 per hectare) of which six had only less than 50 palms per hectare.

6.2 Impact of the Programme

As stated earlier out of 100 holdings selected from the 14 package units functioning in the district, 4 farmers even after the sanction of the loan, have not either availed the loan or utilise the amount for the development of their holdings. In one case the loanee expired after availing of the loan and consequently there was nobody

in the family to take up the technical programme for developing the farm. In another case the beneficiary was hesitant to pledge his property for the sake of a loan and hence backed out from the programme. In a third case the beneficiary has misutilised the first instalment of loan and hence disbursement of further instalments has been withheld. In the fourth case the loanee has disposed off the property after availing of the loan but without taking up the development programme and the present owner of the land is also not interested in participating in the programme. Such midcourse disassociations from the programme seem to be a peculiar feature of this project. There are beneficiaries other than the above four who have refused to avail the full amount of loan assistance sanctioned to them at later stages of development. In one case after the sanction of the loan the farmer did not come forward to avail of the loan for more than two years. But subsequently he got interested in the project and availed of the loan after a time lag of two years. Thus 4 to 5 per cent intentional or accidental deflections on the part of the beneficiaries was observed during the course of implementation of the project.

6.2.1 Utilization of loans.

For the development of the 96 holdings covered under the study an investment of Rs.16.70 lakhs was estimated. This was arrived at based on the individual development plans formulated for each holding by the project staff. Against this, the financing institutions have sanctioned an amount of Rs.13.41 lakhs. Actual amount found to have been spent by the beneficiaries during the course of the survey was Rs.13.94 lakhs. Thus the entire loan amount sanctioned was spent. Investment from the farmers' own resources amounts to only Rs.0.53 lakhs against the actual requirement of Rs.3.39 lakhs. Though the overall performance in respect of utilization of loans is commendable, there is widespread disparity in the extent of utilization in the different categories. Table 6.8 shows the class-wise utilization position of the loans. In the irrigated category the actual investment made against the amount sanctioned by the financing institutions works out to 122.43 per cent. There is shortfall in utilization both under category II and category I. There is justification for the non-utilization of the sanctioned loans under category II since development works were held up in almost all cases for want of commissioning of pumpsets and resultant failure to provide irrigation facilities. An amount of Rs.21025 is not seen availed of by the beneficiaries yet, out of the sanctioned loan under this category.

Table 6.8 Category-wise utilization of sanctioned loan under the programme.

Sl. No.	Category	Total loan amount rupees			Percentage utilization in sanctioned amount
		Estimated	Sanctioned	Spent	
1.	I a	16616	16485	9168	55.60
2.	I b	59256	54988	28052	51.01
3.	I c	90154	79736	38663	48.49
		166026	131209	75883	50.18
4.	II a	49138	44127	35713	72.68
5.	II b	89078	73314	49671	55.76
6.	II c	177963	149302	102267	68.49
		316179	266743	187651	59.35
7.	III a	57327	57353	60675	105.8
8.	III b	290956	260894	273568	104.8
9.	III c	839761	605147	796305	131.6
		1188044	923394	1130548	122.43
10.	a	123081	117965	105556	89.48
11.	b	439290	389196	351291	90.26
12.	c	1107878	834185	937235	112.35
Total		1670249	1341346	1394082	103.93

The percentage of utilization of loans in category I, namely unirrigated category was only 50.18. Subclass-wise analysis of utilization shows that percentage of utilization increases as the holding size increases.

One of the items for which loan was sanctioned as part of the investment was loss of income found in the initial years of the project. There is no tangible evidence towards the utilization of this item and as such the amount shown as spent in Table 6.7 does not accommodate this item, though the amount shown as estimated and sanctioned includes this item also. In order to get a clearer picture of the extent of utilization of loans, it is necessary to analyse the amounts estimated, sanctioned and spent excluding the amount set apart to compensate loss of income. This has been attempted and furnished in Table 6.9. The data furnished in the Table indicate that when the loss of income part is eliminated the overall percentage of investment against sanctioned amount has further increased to 112.45. The highest percentage (131) is in irrigated category and lowest is in unirrigated category (66.12). The data reveal that the percentage of non utilization is more in holding sizes of less than 0.40 hectare.

The overall average investment estimated, sanctioned and spent per hectare for the 96 holdings under study works out to Rs.17923.05, 14393.67 and 14959.57 respectively as shown in Table 6.10.

Table 6.9 Utilization of loans excluding amount sanctioned towards loss of income.

Sl. No.	Category	Amount of long term loan rupees			Percentage of utilization of sanctioned amount.
		Estimated	Sanctioned	Spent	
1.	I a	9982	9874	9168	92.85
2.	I b	40900	36632	28052	76.58
3.	I c	71982	68254	38663	56.64
		122864	114760	75883	66.12
4.	II a	48152	44127	35713	80.93
5.	II b	73280	71047	49671	69.91
6.	II c	175045	146761	102267	69.68
		296477	261935	187651	71.64
7.	III a	56431	57353	60675	105.79
8.	III b	280971	230357	273568	118.75
9.	III c	802016	575319	796305	138.41
		1139418	863029	1130548	131.00
	a	114565	111354	105556	94.79
	b	395151	338036	351291	103.92
	c	1049043	790334	937235	118.58
		1558759	1239724	1394082	112.45

Table 6.10 Average investment per hectare estimated, sanctioned and utilised.

Sl. No.	Category	Average investment/hectare(in rupees)		
		Estimated	Sanctioned	Spent
1.	I a	7912.38	7850.00	4365.71
2.	I b	8791.69	8158.45	4162.01
3.	I c	7640.16	6711.78	3254.46
		8012.84	7297.73	3662.31
4.	II a	41292.44	40115.45	30010.92
5.	II b	35158.12	26467.15	17931.77
6.	II c	16601.02	13927.42	9539.83
		21538.08	18170.50	12782.76
7.	III a	29703.11	29716.58	31437.82
8.	III b	27015.41	24224.14	25400.93
9.	III c	18624.11	13420.87	17660.34
		20561.51	15978.44	19563.04
10.	a	23578.73	22598.66	20221.45
11.	b	21661.24	19191.12	17322.04
12.	c	16391.15	12323.61	13845.99
	Total	17923.05	14393.67	14959.57

On a further analysis of the purpose-wise utilization of the loan, it was seen that there was severe shortfall in utilization in respect of planting cocoa, coconut gap filling/ replanting, purchase of cows and fodder (Table 6.11). Marginal shortfall in achievement was noticed under well construction also. Utilization under cocoa planting under different categories varied from 11 to 48 per cent with an overall percentage of 42. The performance under coconut replanting/gap filling was also more or less similar with an overall percentage utilisation of 59. Though there was shortfall under the items purchase of cow (23 per cent) and Fodder (17 per cent) these were mainly under category II where the dairy component could not be implemented for want of irrigation facilities. The shortfall in utilisation of sanctioned loans for construction of wells was mainly under category I (62 per cent). There was no justification for loan support for construction of wells under the category of unirrigated development of coconut. Provision of well was seen included in two unirrigated development plans (7.9 per cent of the sample under this category) and in both the cases it ultimately resulted in diversion of part of the sanctioned loan for purposes other than construction of wells. Similarly, cocoa was seen recommended as an intercrop in 3 unirrigated holdings (10 per cent of the sample under this category) and the crops has failed miserably in all the 3 cases resulting a shortfall of 52 per cent under this item in category I. These two

cases represent clear deviations from the models originally projected and the failures thereof seem to be due to defective operation of the scheme.

Shortfalls of 29 per cent noticed under category II and 23 per cent under cow were entirely due to the non-availing of the sanctioned loan by the beneficiaries and therefore cannot be considered as a misutilization. An amount of Rs. 32025 under cow and Rs. 38705 under pumpset loan are still remaining to be availed of by the beneficiaries. When this is also added the position in respect of these two items would be one of overspending rather than shortfall. (Please see Table 6.11).

Table 6.11 Purposewise utilization of loan in percentages to sanctioned amount.

Sl. No.	Items	Percentage utilization to sanctioned loan in different categories			
		I	II	III	Overall
1.	Land development	107	118	165	141
2.	Pumpset	-	71	112	105
3.	Installation charges	-	115	190	180
4.	Well	38	80	106	98
5.	Coconut replanting/ gapfilling	48	68	66	59
6.	Cocoa	48	11	48	42
7.	Fodder	-	65	78	83
8.	Cow	-	37	94	77
9.	Cattle shed	-	141	132	135

The shortfall in achievement in respect of cocoa noticed in all cases can be considered as a consequence of the set back in cocoa production now experienced in the state due to marketing difficulties experienced in the past.

As per the project only long term loans by way of infrastructural development and for perennial plantations alone were expected to be provided from the project funds. Working finance for the maintenance of the existing coconuts and for the recurring expenditure towards the annual inter-crops had to be found from other sources mainly co-operatives. The estimated amount for the purpose as per the individual production plans worked out to Rs.16.97 lakhs. Compensation for loss of income sanctioned as part of the long term loan from project funds was also seen disbursed in kind as fertilizers for manuring the existing coconut palms. No effective tie up was seen made with other institutional agencies for providing the short term finance. However, the investment actually made by the beneficiaries under this item works out to Rs.16.71 lakhs against the estimated requirement of Rs.17.78 lakhs including the loss of income component sanctioned under the project. Investment percentage thereon works out to 93.98. Classwise requirement of working finance estimated and actually spent are given in Table 6.12.

Statement showing the crop-wise and category-wise investment estimated, sanctioned and spent under the project is given as Appendix IX.

Table 6.12 Estimated requirement of working finance and amount actually spent (in rupees).

Sl. No.	Category	Working expenses estimated	Loss of income sanctioned	Total	Amount actually spent	Amount spent as percentage of total
1.	I	308611	36449	345060	298237	86.4
2.	II	319055	4808	323863	193636	59.8
3.	III	1069932	39742	1109674	1179646	100.6
		1697598	80999	1778597	1671519	93.9

6.2.2 Choice of lending institution.

As per the project choice of the lending institution is left to the beneficiaries themselves. Table 6.13 gives the instution-wise number of loans availed of by the beneficiaries. Out of 96 beneficiaries, 61 opted for primary land mortgage banks. Next in order of preference came Indian Overseas Bank (17), State Bank of Travancore (12), Bank of Baroda (4) and Union Bank of India (2).

Special preference shown to Primary Land Mortgage Bank (63.54 per cent) over the Commercial banks can be attributed to the interest subsidy of 5 per cent extended to the loanees of Land Mortgage Banks for prompt repayment.

Table 6.13 Institution-wise number of loans availed.

Sl. No.	Category	Name of financing institution				
		PLNB	IOB	SBT	BOB	UBI
1.	I a	5	-	2		
2.	I b	8	3	1		
3.	I c	8	1	1		
		21	4	4		
4.	II a	3	-	-		
5.	II b	2	3	-		
6.	II c	2	3	-		
		7	6	-		
7.	III a	3	1	1	1	-
8.	III b	11	2	2	-	1
9.	III c	19	4	5	3	1
		33	7	8	4	2
10.	a	11	1	3	1	-
11.	b	21	8	3	-	1
12.	c	29	8	6	3	1
		61	17	12	4	2

6.2.3 Change in cropping pattern.

Intensive use of the interspaces of coconuts through multiple cropping had been one of the main objectives of the project. Pre and post project cropping pattern in the selected holdings have been summarised classwise and given in Table 6.14. The cropping intensity which was 111.17 per cent before the introduction of the project had increased to 189.87 per cent by 1982-83, an increase of around 80 per cent over 5 years. The cropping intensity in the 22 holdings of the non-beneficiaries covered in the study by the end of 1982-83 was only 139 per cent which is much below the cropping intensity of 189.87 per cent achieved by the beneficiaries. It is therefore reasonable to assume that on an average the project had been instrumental for an increase of 50 per cent in cropping intensity in its areas of operation. The percentage increase in area under different crops raised in the holdings are given below.

Sl. No.	Name of crop	Area under the crop (Hectares)		Percentage over the pre-project level
		Preproject	Post project	
1.	Coconut	66.82	93.95	40
2.	Cocoa	-	31.05	-
3.	Banana	2.38	12.47	523
4.	Tapioca	35.01	12.47	-24
5.	Fodder	-	13.23	-
6.	Total cropped area	104.21	176.94	70
7.	Cropping intensity	111.17	189.87	

Cocoa and fodder were new introductions to the project and therefore the entire area brought under these crops are on account of this project. The highest increase in the area was recorded in Banana with an overall increase of 523 per cent over the base level. Banana is not seen recommended as an intercrop in any of the models projected under the project. It is a paradox that maximum acceptance was realised by the banana crop which was not considered as having potential for inclusion as an intercrop in the project. The area under tapioca has declined by 24 per cent giving way to new intercrops like cocoa banana etc. especially under irrigated condition.

The area under coconut has increased by 40 per cent. The total number of palms at the pre project level was 11695 which has increased to 16441, the percentage increase being 40. This increase in palm density was achieved through replanting/gapfilling. As per the project the estimated requirement of replanting of senile and unproductive coconut palms was 20 per hectare (11.42 per cent). Against this the actual replanting done was only 57 palms, the percentage being 0.48. It is therefore evident that almost 100 per cent of the new plantings made were by way of gapfilling and under planting. Though this is a welcome feature from the point of view of the development of holdings, it has brought to focus another problem

vis-a-vis the repayment of loans. The coconut rehabilitation programme was basically a programme for the rejuvenation of the existing palms and as such the economic feasibility has been tested with additional income flows from development of coconut from 4th/5th year onwards. But the average stand of trees at the Pre project level in respect of the selected holdings worked out to 125 per hectare only and as such it necessitated a large scale gapfilling. The result is that the bulk of additional income from coconut would be forthcoming only after 8 - 10 years thereby affecting the repayment capacity adversely to a very great extent.

As could be seen from Table 6.7 only 21.88 per cent of the holdings had optimum level of coconut stand per hectare (151-200). Bulk of the plantations had sparse density of less than 150 palms per hectare, six per cent of the sample had less than 50 palms per hectare which means that the programme implemented in such holdings was more of a fresh planting nature rather than rejuvenation of the existing palms. In other words, bulk of the additional income will be forthcoming in such plantations only after 8 to 10 years.

At the post project level the sample holdings have attained an overall average stand of 176 palms per hectare which is in conformity with the project objective. The

average density of coconut palms par hectare in respect of the 22 non beneficiary holdings covered under the study was only 167. Though the overall average stand of palm has reached an optimum level in the holdings of the participating farmers it showed wide variation in different classes ranging from 168 to 245 per hectare. Though upper limit exceed for above the recommended stand of 175 palms per hectare it is still within the traditional norm of one palm in one cent of land. The percentage of bearing palms has registered an increase of 19.23 per cent over the pre project level while the non bearing palms declined by 33.7 per cent as could be seen from Table 6.15.

The post project cropping pattern was further analysed comparing the same with the cropping pattern as recommended in the individual production plans. Relevant data is furnished in Table 6.16. In the case of gross cropped area the achievement of 176.94 hectaresis commendable when compared to the projected target of 163.09 hectaresas per the individual plans, an increase of 8 per cent over the target. The performance exceeded the target in all the categories. This tendency was even noticed in category II where the cropping pattern suggested was an irrigated one while the irrigation component has totally failed. Instead of a likely shortfall in

cropped area over the targetted level under this category, in actual performance, the target has been exceeded by 23 per cent.

The overall percentage of achievement in gross cropped area is 108 per cent of the targetted level. Maximum coverage was seen registered under Banana with an achievement of 119.3 per cent. Though the area under tapioca has also registered an increase of 92.75 per cent over the targetted level, this cannot be considered as a positive achievement of the project, as the aim of the project was to divert the traditional tapioca areas for other remunerative crops such as cocoa, fodder etc. especially under irrigated condition. There was 98 per cent increase over the targetted area under tapioca in category III, and 570 per cent increase over the targetted area under tapioca under category II. This has to be considered as a negative attribute of the project for reasons already stated.

The dairy component does not seem to have attained the target. The shortfall is over 18 per cent in fodder area planted and 36 per cent in live stock purchased. There had been shortfalls in achievement both in categories II and III. The only category where this component has exceeded the target is category I. However the area targetted and covered in this category is only

marginal (9.8 per cent). Recommendation of the dairy component as a part of the unirrigated development programme tantamounts to a deviation from the strategy for development projected in the scheme.

Failure of coverage of the dairy component in category II stands to reason in view of the total failure to provide irrigation. Under the project loans for purchase of cows are to be released only after the successful establishment of the fodder crop with irrigation. The shortfall in achievement of area under fodder in category III and the simultaneous increase of area under tapioca in the same class indicate that some of the beneficiaries had no faith in the dairy project apparently because it requires a good deal of personal involvement of the farmer in the form of close attention and care. Instead, they preferred tapioca which tolerates indifferent cultivation to a greater extent and thus could be managed through remote control, so to say.

In the 22 holdings of the non-beneficiaries also tapioca constituted the major intercrop. Out of 11.45 hectares covered by these 22 holdings, tapioca occupied 4.2 hectares, Banana and Cocoa covered marginal area of 0.12 and 0.13 hectare respectively. This shows that the project had been successful in diversifying the cropping pattern in the adopted holdings by changing the relative

importance of the crops as well as by introducing new crops and combinations as could be seen from Fig.2.

6.2.4 Input management.

Irrigation.

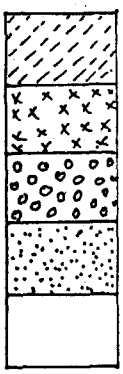
Providing irrigation in potential area was one of the principal objectives of the programme. Out of 96 sample beneficiaries, irrigated development was contemplated in 67 cases. But on actual implementation only 54 farmers had developed the necessary infrastructure for irrigation. In the remaining 13 cases, though irrigation development was programmed in the individual development plans drawn up, this goal could not be reached due to operational constraints. In 6 out of 13 cases irrigation could not be provided for want of power connection. Among the affected loanees 4 had already purchased the pumpsets availing of the loan assistance provided and the pumpsets are remaining idle for more than 2 years. In all 6 cases, where power connection is pending, extension of either electric lines as such or three phase lines would be required over distance of one to five km. Interest is payable on such infructuous loans also and as such the loan repayment commitment is mounting on a cumulative basis. The pumpsets and accessories purchased and installed are depreciating in value due to improper maintenance. Availability of power connection has not obviously been ensured before sanctioning

loans for purchase of the pumpsets in these six cases. Atleast disbursement of the loan for the purchase of pumpset and installation ought to have been deferred till electric connection was obtained. Had such considerations been given in time, during the operation of the loans, such infructuous investments could have been avoided. In four out of thirteen cases insufficiency of water or granite formations in the substratum rendering boring impossible, had been the constraint in developing irrigation. In such instances the investments made towards construction of the failed wells only have been infructuous. No loans were availed of for purchase and installation of pumpsets and accessories. In two out of thirteen cases delay in completing the construction of the well by the beneficiaries was the cause for the abortive irrigation attempt. In both the cases construction work of the wells has now been abandoned. The farmers are of the view that the loan provided under this item was insufficient for completion of work. In yet another case the beneficiary has successfully completed the construction of a well, installed the pumpset, but the pumpset was kept idle, demise of the beneficiary's wife and consequent mental depression, was stated to be the reason.

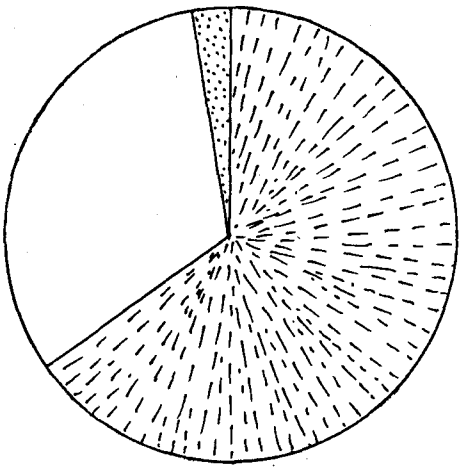
Table 6.17 shows the crop-wise area irrigated consequent to the implementation of the project. Sixtytwo

PRE PROJECT.

LEGEND



COCONUT
COCOA
FODDER
BANANA
TAPIOCA



POST PROJECT.

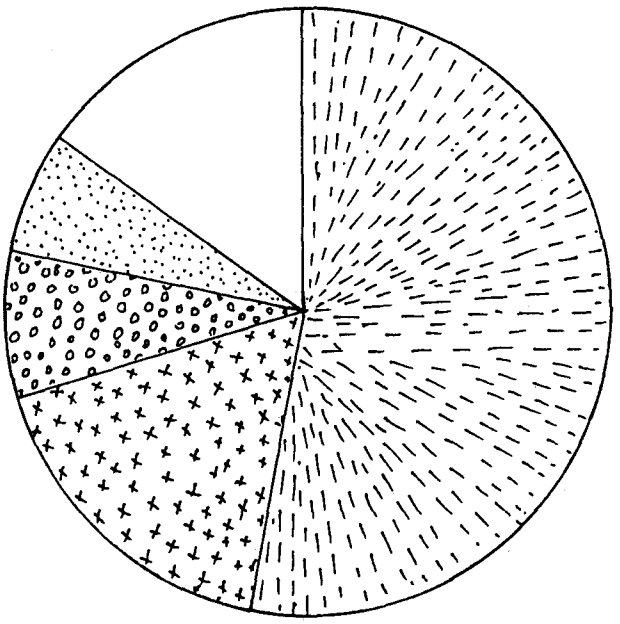


Figure.2. Cropping pattern at Pre and Post Project Levels.

per cent of the net area got the benefit of irrigation. The percentages of area irrigated in respect of cocoa, banana, and fodder were 81,66 and 67 respectively.

Details of source-wise area irrigated in the selected samples is also given in Table 6.17. Electrically operated pumpsets predominate the scene. In 49 out of 54 cases, irrigation is with electrically operated pumpsets, 2 by oil engines and in 3 cases irrigation is availed from the Neyyar Irrigation Project.

The average cost of pumpset with accessories worked out to Rs.8717.68 against which the average lending support provided was only Rs.7751. The average amount spent by the beneficiaries for installation of pumpsets including pumphouse worked out to Rs.1641 whereas the project provided an average amount of Rs.828 per pumpset towards this item.

In twelve out of fifty four irrigated holdings, insufficiency of water due to natural scarcity was reported. This is pronounced in the summer months from January to April, when irrigation is most essential. Pumpsets of 3 horse power capacity were found to be in use in most cases. Out of 57.79 hectares expected to be served by the pumpsets under category III only 50.02 hectares have been effectively covered. The inadequately irrigated areas require further infrastructural developments by way of deepening of wells, extension of pipe lines etc.

In the case of loans issued and where irrigated development was unsuccessful due to failure of wells, no further steps were seen taken either to provide a supplementary loan for attempting to dig another well or to convert the loan into unirrigated.

Among the 22 holdings of the nonparticipants surveyed (control) none happened to be irrigated and hence the entire credit for the achievement under irrigation goes to this project.

(ii) Replanting of uneconomic palms.

The models projected as part of the project report anticipate an average replanting intensity of 20 palms per hectare. But the actuals as per the individual plans formulated in respect of the 96 holdings covered under the study indicated cutting and removal of only 388 palms. This means that 3.6 palms per hectare on an average were senile and uneconomic. Against this, the farmers have cut and removed only 77 palms. In other words, the project has failed to impress upon the farmers the necessity for the removal of 311 out of 388 palms identified.

The economy of the small farmer is very much dependent on the coconut palm and he depends for his daily household expenses to a great extent on income from sale of coconuts and other products. Majority of the farmers, being small and marginal, number of palms possessed by them is meagre.

They would therefore be reluctant to cut and remove uneconomic palms even though the yield is less than 10 nuts a year. This should have been foreseen at the time of project formulation and sufficient incentive included in the project for compensating removal of the uneconomic palm from the farm stead. In a similar scheme being implemented by the State Agriculture Department for the comprehensive development of coconut provision has been made to give a compensation of Rs.75 to the farmer for each diseased and uneconomic palm cut and removed.

A total number of 4790 coconut seedlings were programmed to be planted in the holdings inclusive of the 388 seedlings necessary for the replacement of the uneconomic palms. The project has succeeded in planting 4762 seedlings or 99.4 per cent of target set. (Please see Table 6.16).

The particulars of year-wise planting and maintenance of replanted seedlings and the expenditure thereon are given in Table 6.18. Though the achievement by way of planting of seedlings was satisfactory, the maintenance of the planted seedlings does not seem to be up to the desired standard. The average dose of organic manures applied per seedling during the project period ranged from 6.6 kg to 22.26 kg only. Fertilizer application was still worse with average doses ranging from 0.10 to 0.36 kg of fertiliser mixture per seedling, against a recommended dose of 2 kg, 4 kg and 6 kg of fertilizer mixture respectively for the first, second and third years after planting.

In the cost benefit analysis of the project cash out flows with respect to production of nuts from the replanted seedlings was reckoned to be forthcoming from the 5th year onwards under irrigated condition and 6th year onwards under unirrigated condition. But so far not even a single replanted seedling has been reported to have come to flowering even after the completion of six years in the case of first year plantings. The poor management of the planted seedlings can be considered as the reason for the delay in the palms coming to bearing.

(iii) Use of organic manure.

The total as well as per unit use of organic manures at the pre and post project levels are furnished in Tables 6.19 and 6.20 respectively. The quantity of organic manures used per palm increased from 17 to 46 kg, the percentage increase over pre project level being 171. This is against the recommended dosage of 25 to 30 kg per palm as per the project. The performance under this item in all the 3 categories has exceeded the target. The average dose of organic manures applied per palm in respect of the 22 non participants covered under the study was 30 kg per palm which is below the post project level application of 46 kg per palm achieved by the participants.

Per plant application of organic manures for cocoa and banana at 3 kg and 6 kg respectively in the post project

stage is not upto the projected standard. The situation is similar in all the 3 categories. Recommended dose for cocoa in the project was 10 tonnes per hectare, which would work out to 33.3 kg per plant.

The per hectare application of organic manures recommended for fodder cultivation was 20 tonnes per hectare while the average dose actually applied worked out to 2.20 tonnes per hectare. This is only 11 per cent of the projected target.

In respect of tapioca also organic manure use has not registered substantial improvement. Increase is only nominal from 4.14 tonnes to 4.49 tonnes per hectare. It is disturbing to note that the dose of application of organic manures for tapioca under the unirrigated situation has even declined from 3755 kg to 3698 kg per hectare. Since bulk of the area under the crop is unirrigated this trend has to be viewed with concern.

(iv) Fertilizer use.

Particulars of cropwise use of fertilizers at the pre and post project level indicating the difference in total use as well as per unit use are given in Tables 6.21 and 6.22 respectively. The per hectare use of fertilizers in respect of coconut has increased from 0.22 kg per palm to 1.52 kg per palm, an increase of 59 per cent over the pre project level. Though in terms of percentage the

achievement apparently seem to be encouraging, the quantity applied per hectare is far below the recommended dose. The average dose of fertilizers applied by the 22 non participants was only 0.38 kg per palm. The recommended dose of fertilizers for adult palm in the project report is 0.34 N 0.17 P_2O_5 and 0.68 K_2O which works out to 6 kg of coconut mixture. The position in category I was much less with an average application of 0.95 kg per palm and in category II it was 1.22 kg. Fertilizer is a key input. By its judicious use full production potential of coconut is expected to be realised under the project. Heavy outlays on infrastructure for irrigation envisaged in the programme with respect to coconut was based on the assumption that the farmers would readily respond to the incentives meant to promote increased consumption of this key input. The extension machinery also devoted considerable time in educating farmers on proper fertilizer use. Inspite of this the reluctance of the coconut growers to apply adequate quantities of fertilizers merits serious consideration. The future in this respect also seems to be bleak, since 28 out of 96 participating farmers have reported that they do not believe in fertilizer application They harbour the fear that continuous fertilizer application will impair the fertility of the soil and also affect the longivity of the palm.

The reluctance of farmers to fertilize their coconut crop with chemical fertilizers holds true with respect to other crops also. The average doses of fertilizers applied are 0.08 kg per plant for cocoa, 0.25 kg per plant for banana, 33 kg per hectare for fodder and 113 kg per hectare for tapioca. This is against the recommended average dose of 1 kg per plant for cocoa, 1 kg per plant for banana, 1000 kg per hectare for fodder and 300 kg per hectare for tapioca.

All the figures reported are in terms of fertilizers. The per hectare dose in terms of nutrients could not be worked out for effective comparison, since most of the farmers were ignorant about the kind or brand of mixtures used by them. The tendency of the farmers for soft peddaling the fertilizer use for the intercrops is a harbinger of a likely set back in future. Raising voracious feeders such as cocoa, fodder and tapioca without balanced and adequate application of fertilizers would tend to be harmful to coconut palms. It would be much better to maintain the gardens under monoculture. The manurial requirement for the entire crop mix should be applied as per recommendation to avoid serious set backs in the yield of the main crop.

The tendency of farmers to purchase and use any kind of fertilizers without understanding the need for balanced use could result in a poor crop response and even in adverse effects in seasonal crops. The trend of increased use of

organic matter with accompanying decrease in fertilizer use could be due to the relative availability of organic wastes in their farms at much lower cost when compared to fertilizers.

(v) Plant protection.

Only in 6 out of 96 cases coconut growers have adopted plant protection measures in their holdings. The opinion of the farmers revealed through the survey was more or less unanimous that there was no necessity for the adoption of plant protection measures, as there was no serious incidence of pest or disease in their holdings.

(vi) Cultural practices.

Comparison of the relative levels of adoption of cultural practices would be difficult excepting through a study of the level of expenditure incurred under this item. Total expenditure on intercultivation of various crops as well as per unit cost incurred on this account has been tabulated categorywise and presented in Table 6.23 and 6.24 respectively. From the data it can be seen that level of cultural operations in the holdings has increased many fold. In respect of coconut the percentage increase in cultural practices registered over pre project level was 462. The average expenditure of Rs. 6.35 per palm reported by the beneficiaries for intercultivation is almost double the average expenditure of Rs.3.58 per palm incurred by the 22 non beneficiaries. The per plant expenditure on cultural operations for cocoa and banana were 31 ps and 58 ps respectively.

This expenditure is considered meagre. Similarly the per hectare expenditure of Rs.127 and Rs.551 incurred in respect of fodder and tapioca also cannot be considered adequate. However the expenditure accounted towards cocoa, banana, fodder and tapioca form only part of the actual expenditure incurred for these crops. They relate to the cost towards only those cultural operations which are exclusively meant for the intercrops. The general practice followed by the farmers is to plant the intercrops in the season when coconut receives its annual intercultivation. So the expenditure on account of land preparation for the intercrops is credited mainly to the cost of intercultivation to the coconut crop. So it is difficult to assign the proportionate cost of interculture for each of the intercrops with a fair degree of accuracy. This is why the level of intercultivation of intercrops is low.

6.2.5 Production and productivity of crops.

Tables 6.25 and 6.26 indicate total production and average yield per unit of crops and livestock under the programme at the pre and post project levels. The date reveal that all the pre existing crops except tapioca have registered substantial increase in total production. The biggest growth in production was for banana with an increase of 677 per cent over the pre project level. Coconut production registered an increase of over 62.45 per cent

over base level. An analysis of the average yield per unit at the pre and post project levels as given in Table 6.26, indicates that the increase in total production was mainly due to increase in area under the crop rather than increase in productivity.

For the sample as a whole the productivity of coconut has registered an increaaa of only 38 per cent over the productivity at the pre project level. The biggest increase is in the irrigated category (47 per cent) followed by unirrigated category (20 per cent). In category II, where irrigated development could not be pursued, the increase in productivity is only 19 per cent which almost falls in line with the growth under unirrigated category in category I. Against the post project yield of 40 nuts per palm projected to be achieved by the end of the project under unirrigated development as per the project report, the project has achieved an average yield of 30 nuts per palm under category I and 37 nuts per palm under category II. The achievement under category III was 44 nuts per palm. On estimating tha increase in productivity of coconut for categories II and III put together, which actually represent the target group for irrigated category under the project, the increase was from 30 nuts per palm to 42 nuts par palm (40 par cent). This is against the productivity level of 60 nuts per palm targeted for irrigated development under the project. Post project productivity of coconut attained

under all the categories were higher than the productivity of 28 nuts per palm recorded in respect of the 22 non participants.

For coconut it would take a minimum of 36 months for getting the full benefit of irrigation and manuring by way of additional production. A good number of plots under 80-81 series and at least some of the plots in 79-80 series which received irrigation and manuring late in the year or early in the following year are yet to complete this gestation period. This is evident in Tables6.27 and 6.28. An increase of 67 per cent is seen registered in the 78-79 plots while the increase is only 31 and 29 per cent respectively in 79-80 and 80-81 plots.

The average per hectare yield of fodder attained by the beneficiaries is only 4825 kg. Here again maximum productivity (5605 kg per hectare) is under irrigation and lowest (1770 kg per hectare) is in category II. Even the productivity in category III (5605 kg per hectare) is very low while considering the targeted level of 30 tonne per hectare visualized in the project report.

Since the farmers have no accurate record of the quantity of cocoa produced excepting the total revenue obtained, yield rate at the post project level could not be arrived at. However the average receipts of Rs. 59 per hectare reported by the beneficiaries itself is an indication

of the low level of yields of cocoa under the programme. This is against the anticipated yield of 650 kg of dried beans valued at Rs. 10 per kg in the project report.

The overall increase in productivity of banana was only 37 per cent with a post project yield level of 6.95 kg per plant. This is also low. The biggest increase in productivity was registered in the unirrigated category (152 per cent) while the increase in productivity in the irrigated category was only marginal (27 per cent). In the unirrigated category the pre project yield rate of banana was very low (2.5 kg per plant) and the increase in yield registered is therefore substantial. Yield per plant increased from 2.5 kg to 6.31 kg. In the irrigated group the pre project yield itself was relatively higher (4.98 kg per plant) than the unirrigated category. The post project yield level of 6.35 kg per plant attained by the irrigated category and 6.31 kg per plant attained by unirrigated category do not show much difference. The impressive performance of unirrigated category with a productivity almost comparable to the irrigated category is attributable to the higher dose of manures and fertilizers applied in this category. The average dose of manures and fertilizers applied in category I was 8 kg and 0.45 kg respectively, against 5 kg and 0.26 kg applied in the irrigated category. This high lights the need for adoption of scientific manuring for

realising the full benefit of the production potential created by irrigation. The productivity attained under category II is 10.43 kg per plant which is much higher than category I and category III. But this cannot be considered as an outcome of this programme since the pre project yield of this category also was fairly high (9.08 kg).

The overall productivity of tapioca had declined from 5161 kg to 5055 kg per hectare. The overall productivity of 5055 kg per hectare however was more than double the productivity level of 2523 kg per hectare registered by the 22 non participants covered under the study. There is a decline of 2 per cent in post project yield rate from the pre project level. The productivity has increased under category II and category III, the rate of increase was 23 per cent and 1 per cent respectively. The decline of productivity in category I without irrigation (9 per cent) is attributable to the decrease in organic manure use (2 per cent) noticed in this class. The increase in productivity attained was highest in category II (23 per cent) and this can be considered as the outcome of fairly higher doses of manures applied in this category. The use of organic manure has increased from 2886 kg to 3483 kg per hectare in this category. The fertiliser dose applied was 158 kg per hectare which was the highest among all classes.

Increase in productivity of coconut in different categories of holdings on account of the project is represented in Fig.3.

6.2.6 Increase in income.

In order to find the overall impact of the various development measures adopted in the holdings the gross farm income and net farm income in the period prior to and after the development were worked out and compared. Relevant data are furnished in Table 6.29 and 6.30. The pre project level of income from the holding was worked out at the base year level of prices as well as at 82-83 level prices. Post project income was worked out at 1982-83 level prices in all cases. By comparing the post project income worked out at 82-83 level of product prices, the actual increase in income attributable to the project could be arrived at. The data in Table 6.29 reveals that the average gross farm income per holding increased from Rs.4478 to Rs.9224 at constant prices. In per hectare terms the increase was from Rs.4613 to Rs. 9502. The percentage increase was 105. The biggest increase was in category II (142 per cent) followed by category III (111 per cent). In absolute terms the average income per hectare was highest in the irrigated category (Rs. 11093) followed by category II with Rs. 8411 per hectare. It was lowest in unirrigated category with Rs.5846 par hectare.

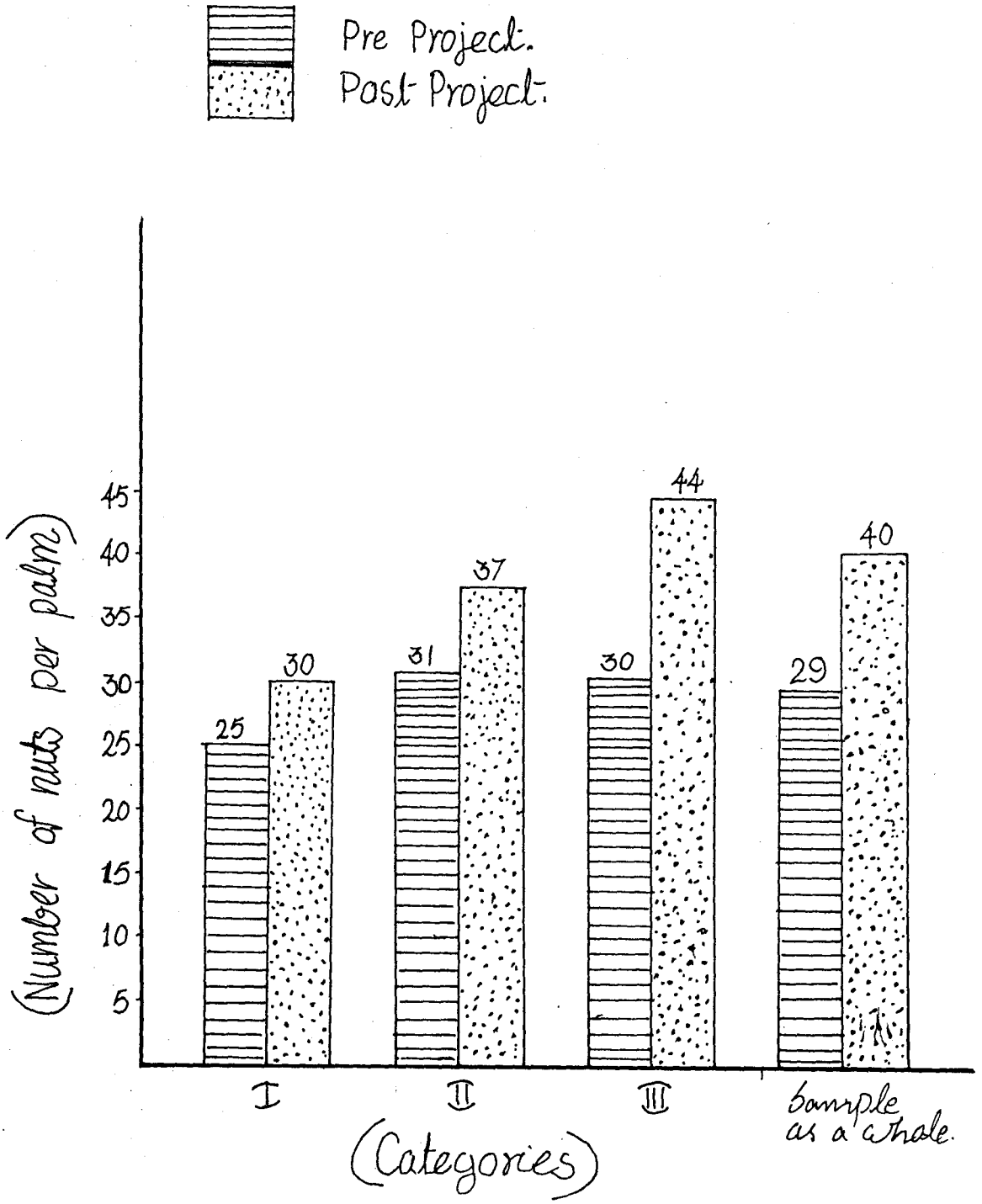


Figure.3. Category wise average yield of Coconut at pre and post Project levels.

Analysis of the category-wise increase in net farm income is presented in Table 6.30. The data reveal that the increase in net farm income is not commensurate with the rate of increase of gross farm income. Average net farm income has registered only 34 per cent increase over pre project levels against 105 per cent increase recorded by gross farm income. The average net farm income which was Rs.2860 per hectare during the pre project level has increased to Rs.3821 per hectare at constant prices. The average net farm income per holding at the post project level worked out to Rs.3709 against Rs. 2776 at the pre project level at constant prices. There was substantial increase in gross farm income ranging from 70 per cent to 142 per cent in all the 3 categories. The situation was different when the net farm income was considered. The increase was marginal under the unirrigated holdings (4 per cent) but it was 37 per cent in the irrigated holdings.

The performance of different size group of holdings in respect of net farm income was also analysed. At the pre project level maximum income per hectare (Rs.3746) was obtained by medium size holdings of 0.40 to 0.80 hectare. Post project income levels indicate that the performance of the lowest group of less than 0.40 hectare was far superior to other categories. Per hectare income attained by the size category of 0.40 hectare and below was Rs.5743

followed by Rs.5116 by the size category of 0.80 hectare and below and Rs.3284 by the size class of above 0.80 hectare.

The study reveals that there is an overall increase of 34 per cent in the average net farm income of the beneficiaries under this programme. Development works contemplated in the project could be taken up only from 1978 onwards and as such the project has completed only 5 years during the reporting period. Out of 96 beneficiaries 10 have completed 5 years, 39 four years and 47 just three years of development. The combined incremental benefits due to manuring and irrigation of coconut accompanied by an intercropping programme is expected to increase the net farm income of all farmers who have completed 3 years under the project. But it is quite likely that at least some of the holdings which were included in the programme from 79 and 80 onwards might have received the benefit of irrigation and manuring late in the respective years or early in the following years. The benefits of these measures might not have stabilized in such cases. The net farm income was therefore analysed for the 3 different categories which had completed 5 years, four years and three years respectively. The results are furnished in Table 6.31.

Table 6.31 Pre and Post project income levels attained by different classes according to year of completion.

Sl. No.	Year of completion	No.of plots	Area	Net farm income		Average net farm income per holding		Average net farm income per hectare	
				Pre	Post	Pre	Post	Pre	Post
1.	5	10	10.76	48804	82618	4880	8261	4536 (100)	7678 (169)
2.	4	39	41.32	102082	134315	2617	3444	2470 (100)	3250 (132)
3.	3	47	41.11	115624	139111	2460	2960	2812 (100)	3384 (120)
		96	93.19	266510	356044	2776	3709	2860 (100)	3821 (134)

These indicate that there is difference in the rate of increase in the three categories. Net farm income has increased by 69 per cent in the case of the 10 holdings which have completed 5 years. The increase is only 32 per cent and 20 per cent respectively in the case of holdings which have completed 4 years and 3 years. This indicates that the time element has played a significant role in determining the level of income. The impressive performance of the holdings which have completed 5 years (69 per cent) brighten the prospects for further increase in the average net farm income of the beneficiaries after the completion of five years by all the holdings.

Incremental net farm income attained by the beneficiaries was also compared with the rate of increase

projected for the 5th year in the models incorporated in the project report and the details are presented in Table 6.32.

Table 6.32 Incremental benefits as projected in the project and actually achieved.

Sl. No.	Category	As per project report			As attained by the beneficiaries		
		Pre	Post	Incremental	Pre	Post	Incremental
1.	Unirrigated	2958 (100)	4464 (151)	1506	2410 (100)	3043 (126)	633
2.	Irrigated with cocoa	2958 (100)	3929 (133)	971	3135 (100)	4297 (137)	1162
3.	Irrigated with fodder and dairy	2958 (100)	7518 (254)	4560			

Against 51 per cent increase over the pre project income projected under the unirrigated category the actual achievement by categories I and II put together was only 26 per cent. The increase in net farm income projected for the irrigated model with cocoa was 33 per cent and with fodder and dairying was 154 per cent in the project report. But the irrigated category as a whole registered an increase of 37 per cent only. When category II and III were considered together which actually represent the irrigated target group as per the farm production plans drawn up under the project the increase in average net farm income per hectare was from Rs.3033 to Rs.4243 (39 per cent). There is shortfall in

achievement under both unirrigated and irrigated category in relation to the projected models. Increase in net farm income per hectare in different categories of holdings is represented in Fig.4.

The overall increase in net farm income for all the 96 holdings put together is only 34 per cent. The response though low compared to the target, is encouraging in view of the fact that it could be achieved in spite of negative contribution by one of the main intercrops namely cocoa due to marketing difficulties. Cultivation of cocoa was taken up in 55 holdings and most of the cocoa growers lost interest due to the decline in cocoa prices and they neglected the crop. Similarly the strategy for unirrigated development proposed in the project report was one of diversifying the intercropping system by substituting high value crops like ginger, groundnut, vegetables etc. in the place of the traditional tapioca crop. But this objective has not been achieved. Tapioca continued to be the main intercrop in the field. Out of 29 unirrigated holdings under category I, in 25 cases tapioca found the major place in the intercropping system. The introduction of cocoa in 5 cases and dairying in 4 cases under unirrigated holdings did not in any way help in increasing the average net farm income, since the performance of both under unirrigated conditions was poor. Similarly the development programme contemplated for the 13 holdings under category II did not succeed due to operational constraints. The overall

level of use of organic manure for the intercrops was low. Likewise fertilizer dose adopted by the farmers for all crops was also low. The 4762 coconut seedlings planted in the holdings have not yet come into bearing. Viewing the increase of 34 per cent achieved in respect of average net farm income of holdings from this background, the result can be considered creditable.

6.3 Comparitive efficiency of different approaches followed in the project in increasing the net return from farmers holdings.

Irrigated as well as unirrigated development of coconut holdings were taken up under the project. Similarly intercropping and mixed farming were the two other approaches followed for increasing the farm income. A study of the relative efficiency of these measures in increasing the net return of coconut growers was proposed in view of its importance for policy prescriptions. For such a study there should be a concurrently operated control receiving all other treatments excepting the one under study. In the absence of provision for such control machanism, it is not feasible to study the real impact of each treatment. The position is further complicated by the fact that in many of the irrigated holdings intercropping with cocoa or banana had been combined with dairying. This makes it almost impossible to quantify the actual contribution by each individual measure to the net return. The only alternative

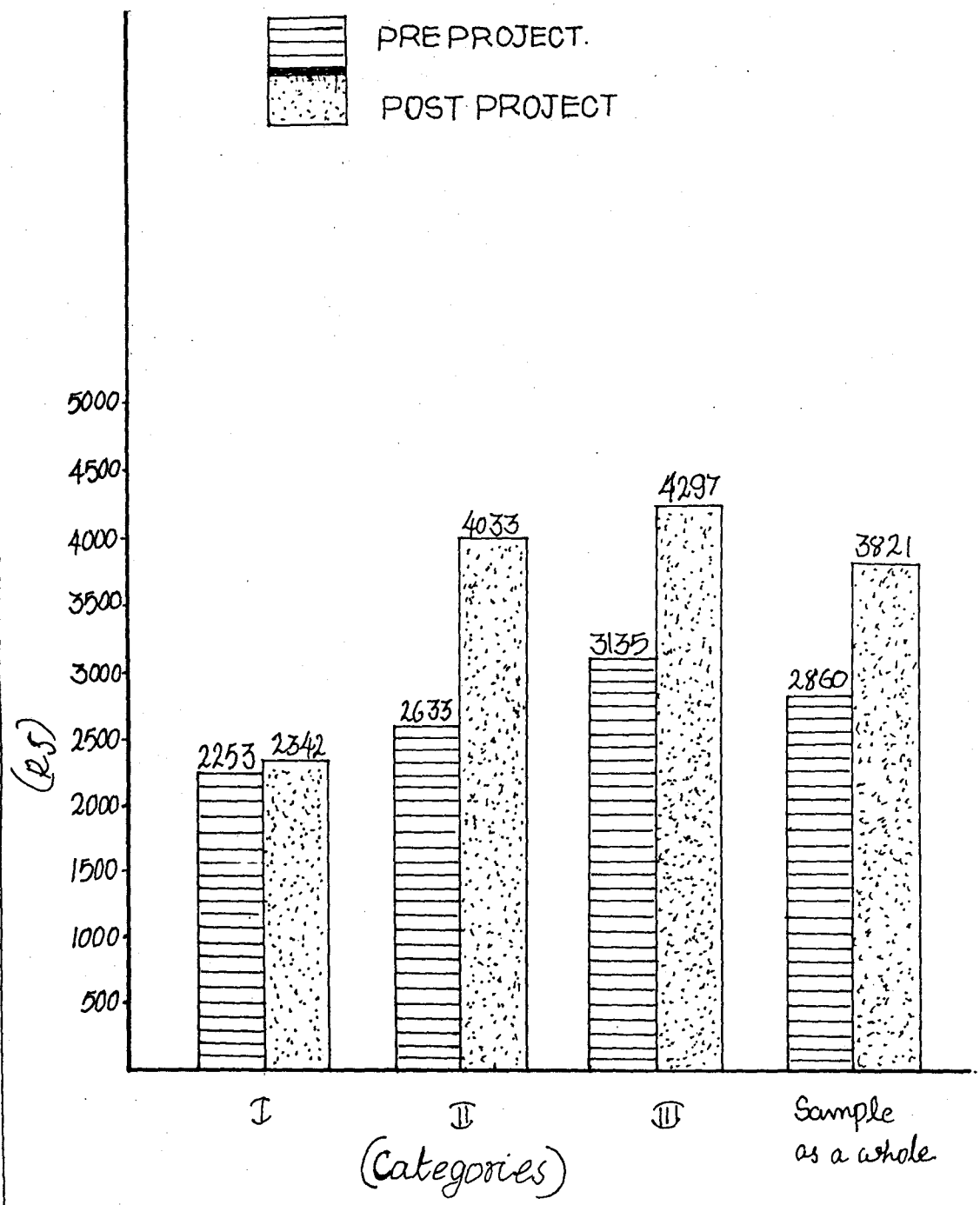


Figure. 4. Category-wise Pre and Post Project net farm Income Per hectare at Constant Prices.

to tackle the problem in this situation was to estimate the average cost of production and return of the different intercrops per hectare, based on the data furnished by the beneficiaries. Similarly a comparison of the overall increase in net farm income between the irrigated and unirrigated categories of holdings and the increase in average yield of different crops in these two groups would provide broad indication of the efficiency of irrigation in increasing the income of the grower. Such an attempt has been made.

A comparison of the post project productivity levels in unirrigated and irrigated holdings is made hereunder.

Sl. No.	Name of crop	Unit	Post project average yield in category I	Post project average yield in category III
1.	Coconut	Nuts/palm	30(100)	44(147)
2.	Fodder	kg/hectare	3461(100)	5605(162)
3.	Banana	kg/plant	6.31(100)	6.34(100.47)
4.	Cocoa	Rs./hectare	5 (100)	72(1440)
5.	Milk	Litres/day	5.96(100)	6.99(117)

(Figures in parantheses indicate percentage over category I)

The average net income per hectare in the unirrigated category was Rs.2342 while it was Rs.4297 for the irrigated category. An increase of 65 per cent in agricultural income has been obtained in the case of irrigated holdings over the unirrigated category.

Cost of cultivation of the different intercrops mainly cocoa, banana, and tapioca as well as mixed farming with dairying as the component along with the estimated receipts and returns per hectare are presented in Table 6.33 to 6.36. The average cash in flow and cash outflow have been worked out based on the actuals as reported by beneficiaries of the selected holdings. It can be seen from the tables that Banana had contributed most towards the net return from the holdings with a potential average net return of Rs.6015 per hectare per annum. The analysis also indicates that banana is profitable both under irrigated as well as unirrigated categories. This provides evidence for the general acceptance of banana in both the categories.

Mixed farming with fodder as an intercrop combined with dairying at 3 cows per hectare emerges as the next most profitable enterprise along with coconut. The average net return on this model worked out to Rs.2088 per hectare. It is interesting to note that the combination has resulted in negative returns under unirrigated condition. The results also indicate that dairying enterprise would be viable in

coconut holdings of more than 0.80 hectare size and only in irrigated holdings. Indiscriminate choice of the dairy component for the smaller holdings against the strategy suggested in the project report has pulled down the overall average return per hectare. However dairy component emerges as a promising enterprise next to banana in holdings of more than one hectare.

Tapioca with an average return of Rs.621 per hectare ranks third in the order of profitability. The performance of tapioca under irrigated condition (Category III) with a net return of Rs.269 per hectare is much below the average net return of Rs.612 and Rs.1144 per hectare estimated for category I and II. Irrigation did not appear to have any beneficial influence on yield of tapioca as an intercrop in coconut gardens.

Cocoa, the fourth intercrop dealt with in the analysis showed negative net return in all the categories at the existing yield and price levels. Comparison of cocoa, a perennial, with annual intercrops like banana and tapioca may not be scientific and meaningful since cocoa can generate income flows over years. But the fact that only 2005 out of 9522 number of seedlings of cocoa planted in the holdings survived at the end of 1982 presents a very gloomy picture about the future of cocoa. In many of the cases plantings made and established have been deliberately abandoned or

cut and removed. This shows that promotion of cocoa as an intercrop under the present conditions needs a fresh look in view of the marketing difficulties.

6.4 Impact of the programme on Scheduled Castes/ Scheduled Tribes beneficiaries

Till the end of 1980-81 only 12 beneficiaries belonging to the Scheduled Castes/Scheduled Tribes community had joined the programme. Financing under the project is based on mortgage of landed property for which absolute ownership right on the property is essential. Similarly holdings of 0.20 hectare and above were alone eligible under this project. Since majority of S.C./S.T. farmers possessonly bits of land and often they do not possess absolute right on the property they possess, they do not qualify for loan assistance under the project.

Out of 12 S.C./S.T. beneficiaries who joined the programme 2 farmers after availing the first instalment of sanctioned loan in 1980-81, failed to take up the development works till the end of the survey period. Further disbursement of loans to these beneficiaries has been withheld by the financing institution on the advice of the field extension staff. Analysis of the data pertaining to S.C./S.T. beneficiaries is therefore confined to 10 beneficiaries who participated in the programme.

Out of the 10 beneficiaries covered under the study 8 had other sources of income and agriculture formed only a subsidiary occupation. Four were government servants, one was a laundry man, and 3 were agricultural labourers. The pre project income from Agriculture was around Rs.824 per holding. The average size of holding was 0.67 hectare with a sparse density of 58 coconut palms par hectare. Tapioca was the only intercrop raised in coconut gardens. Many of the holdings coming under this category were traditional tapioca growing dry lands rather than coconut gardens. In two holdings not even a single coconut palm was seen during the survey.

The estimated requirement of funds for the 10 holdings as per the individual farm plan worked out to Rs.88435. The financing institutions have sanctioned an amount of Rs.86035 and the beneficiaries have invested an amount of Rs.69897. The percentage of utilization against sanctioned amount was only 81. The investment was only 79 per cent of the amount estimated. Shortfall in investment is mainly under coconut planting (43 per cent) cocoa (56 per cent) and fodder (63 per cent).

Out of 10 loans availed of by the the S.C./S.T. beneficiaries only 3 relate to irrigated development. Against the preference for irrigated development noticed among the beneficiaries of the project as a whole in general, majority

of the S.C./S.T. beneficiaries opted for unirrigated development. Though in 7 cases unirrigated development was contemplated as per the individual farm plans, provision for construction of well was seen included in 3 cases. This is against the norms prescribed in the unirrigated models included in the project report. Among the three irrigated holdings two were with cocoa as intercrop and one had cocoa and dairying. Primary Land Mortgage Banks appeared to be the most preferred financing institution for the S.C./S.T. beneficiaries also and 6 beneficiaries had their loans from this source.

The total cropped area before the adoption of the development programme under the 10 holdings was 6.32 hectares which increased to 11.75 hectares which means 86 per cent increase was registered in gross cropped area. Cropping intensity, which was low (94 per cent) during the pre project, has increased to 175 per cent after the development of the holdings. Biggest increase was under coconut (153 per cent) followed by tapioca (10 per cent). Cocoa, banana and fodder were new introductions to the holdings.

The density of coconut palms in the holdings covered under the study has increased from 60 per hectare to 151 per hectare. There was a gap of 14 per cent in attaining the targetted level of 175 palms per hectare. There were 22 uneconomic palms identified for replacement

as per the individual farm plans in respect of these holdings. The actual removal was only 19. Against 660 coconut seedlings programmed to be planted in the 10 holdings 630 seedlings were actually planted during the project period. There was a shortfall of 30 seedlings under this item. The seedlings planted were not seen maintained properly as could be found from the very low use of organic manure (11.82 kg per plant) and fertilizer application (0.46 kg per plant per year).

The pre and post project levels of input management covering organic manures, fertilizers and plant protection in the 10 holdings were compared. The average dose of organic manures used during the pre project level was 12.95 kg per palm and this has increased to 31.79 kg per palm (+145 per cent). None of the beneficiaries were using fertilisers before joining this development programme. The average dose of application adopted by the farmers at the post project level was also very low (0.44 kg per palm) and is not even 1/10th of the recommended dose of fertilizers under the project. Only 5 out of 10 farmers have applied fertilisers regularly and 3 have not applied any fertilizer at all during the project period. Application of fertilizers for coconut is yet to become an accepted practice among this category of coconut growers. Out of 6.7 hectares of net area covered by the

holdings 1.34 hectare get the benefit of irrigation. None of the beneficiaries under this category were adopting plant protection measures in their holdings.

The average yield of coconut in the holdings before the adoption of the programme was 23 nuts per palm and it has increased to 36 nuts per palm by the end of 1982-83, an increase of around 56 per cent. Out of the ten holdings three had completed 5 years of development, four holdings completed 4 years of development and three holdings 3 years of development. Since majority of the holdings are yet to complete at least 5 years of operation, the incremental benefit from the programme is yet to be stabilized.

Cocoa was the main intercrop recommended for the three irrigated holdings. Against 250 plants recommended in the farm plans, the actual planting of cocoa made was 300. Though the target has been exceeded in this respect, the planted seedlings are not maintained properly. The average dose of organic manures used for cocoa was only 5 kg par plant. None of the beneficiaries reported the application of fertilisers for this intercrop. It was in an abandoned condition at the time of the investigation and the crop has almost been lost.

Banana was recommended as an intercrop in four holdings with a target of 1050 plants. Against this the

beneficiaries have planted only 700 plants investing an amount of Rs.2685. The farmers could secure a return of Rs. 9300 by sale of bunches. The average return from banana worked out to Rs.4.65 per plant per annum which is very low. The low productivity of banana is attributable to the low level of use of organic manure (4.85 kg per plant). None of the S.C./S.T. beneficiaries were applying fertilizers to banana except a nominal dose of 100 gm per plant adopted by one of the beneficiaries.

Among the 10 S.C./S.T. beneficiaries only one has opted for the mixed farming model of development. He planted 0.40 hectare with hybrid napier fodder grass investing an amount of Rs.625. The manuring dose adopted for fodder cultivation was also low (1500 kg per year) and no fertilizer was applied to the crop. He purchased a swiss brown cow utilising the loan amount of Rs. 2500. The annual maintenance cost of the animal was Rs. 4250. The cow was in lactation for one year yielding 2040 litres valued at Rs. 4896. The net return from the dairy component (milk alone) was therefore Rs. 646. In addition an amount of Rs. 500 has also been reported to be received by way of sale of cowdung.

Tapioca continued to be the most popular intercrop during the post project period also. Against the earmarked area of 3.6 hectares for the crop as par the individual farm plans, actual area brought under the crop was 5.83 hectares.

The post project average yield of tapioca in the 10 holdings was 5584 kg per hectare. None of the S.C./S.T. farmers have reported application of fertilizers for tapioca.

The average gross farm income of the S.C./S.T. beneficiaries has increased from Rs. 1139 per holding to Rs.2487 per holding. In per hectare terms the increase was from Rs.1700 to Rs.3713. Comparing the increase in net income it was found that the rate of increase was not in proportion to the increase of gross farm income. The pre project net farm income which was only Rs.602 per holding has increased to Rs. 833 per holding. In per hectare terms the increase was from Rs. 899 to Rs.1244, an increase of 38 per cent over a period of 4 years.

6.5 Key constraints in improving coconut cultivation in the district in the light of the experience of this study

The coconut rehabilitation programme implemented by SAIU is expected to develop 5600 hectaresof coconut plantation spread over the 14 units functioning in the district. The effective area to be developed under this project thus works out to 7.59 per cent of the total area under the crop in the district. The expectation while launching the programme was that it would be possible to attain a coverage of the targetted effective area of 400 hectares from the total contiguous coconut area of 500 hectares available in each unit anticipating about 80 per cent participation. But such a response has not materialised even in a single unit

functioning in the district. This has resulted in extension of the area of operation of the units to the adjoining areas. Now the 14 package units cover almost all the local body units in the taluks of Neyyattinkara, Trivandrum and Chirayinkil and the coconut belt of Nedumangad taluk. The sample of 96 holdings selected at random for the present study therefore represents the predominant coconut growing tracts of the district. Results of this study would therefore apply to the cultivation aspects and connected problems of coconut growers in the district in general.

The important problems encountered during the operation of the programme vis-a-vis promoting coconut cultivation in Trivandrum district are summarised below.

(a) By and large the coconut growers in the district are not very keen and enthusiastic in joining the rehabilitation programme. The targeted area of 400 hectares of coconut could be attained only from an average total area of more than 3000 hectares rather than 500 hectares as visualized in the project.

(b) Majority of the coconut growing areas in Trivandrum district is under rainfed condition with little scope for bringing substantial area under irrigation. But comparatively low number of farmers (30 per cent) opted for unirrigated development.

(c) From the nature of the holdings that came into the fold of this development programme, it appears that the response to fresh planting of coconut is more than for rejuvenation of existing palms. The average stand of palms per hectare in the pre project period was only 125. This justifies the attitude of farmers to go in for gap filling on a large scale.

(d) Majority of the coconut growers are reluctant to cut and remove the uneconomic coconut palms from their holdings even after providing all facilities for replanting including credit. Against 388 uneconomic palms identified to be cut and removed in the 14 units, the actual removal was only 77. On an average about 3.31 per cent of the coconut palms in the holdings require cutting and removal for which the incentives provided in the scheme seems to be inadequate.

(e) There is a general antipathy among coconut growers to application of fertilizers to coconut palms as is evident from the fact that the average dose of fertiliser application per palm at the pre project level was only 0.22 kg of fertilizer mixture. Inspite of 3 to 4 years concerted effort and education this could be raised to a level of only 1.52 kg. Even with assured irrigation, fertilizer application of only 1.89 kg per palm could be achieved. Among the 96 farmers covered under the study as many as 28 (29 per cent) opined that they are not in favour of fertiliser application for coconut. They believe that application of fertilisers

to cocconut is detrimental to health, vigour and longivity of tha palms and chemical fertilizers adversely affect the long range yielding capacity of coconut palms.

(f) Irrigated development pre supposes availability of water. Advisory service on ground water availability and technical help in locating the sites for the well in the holdings appears to be totally inadequate. About 4 per cent failure of wells for want of proper site selection has been reported.

(g) In the case of failed wells no effort is seen made to provide an additional loan for trying another well. Beneficiaries who met with such operational difficulties are totally neglected. Neither the extension staff nor tha lending institutions appear to have any pre planned strategy to ameleorate the difficulties of the farmers in such cases.

(h) There was inordinate delay in the energisation of pumpsets by the Electricity Board. About 30 per cent of the beneficiaries reported delay of more than 6 months for getting their pumpsets energised. There were cases where energisation is pending for more than 2 years. The future of irrigated development of coconut therefore largely depends on tho arrangements for timely energisation of pumpsets. This is totally lacking at present. Even the state level co-ordination committee with representatives from Electricity Board failed to tackle the situation effectively.

(i) Only 6 per cent of the farmers felt the necessity for adoption of plant protection measures for coconut. This deserves serious attention while considering the fact that part of the district is already in the grip of the devastating coconut leaf rot disease.

(j) Farmers appear to be eager to introduce new intercrops advocated, but they are not so eager in their proper care and maintenance. The low level of technology adopted for the intercrops in general is indicative of this tendency. The underfed intercrops would compete with the main crop for its nutritional needs, which is detrimental to both crops. Neglect of the intercrops without proper care and maintenance seem to be the general pattern of majority of holdings. This tendency needs immediate correction.

(k) The prospects for promotion of cocoa as an intercrop in coconut gardens seem to be bleak in view of the acute marketing problems experienced by the growers. Only 18 per cent of the cocoa planted survived by the end of 1982-83 and the balance has been lost either due to neglect or deleberate removal by the farmers.

(l) Though banana emerged as the most profitable intercrop in coconut gardens under the project, its performance is not steady in holdings where the crop is continuously cultivated.

(m) It has been observed that while liberal subsidies were being provided by agencies like District Rural Development Agency, Department of Agriculture, Department of Animal Husbandry and Department of Dairying for development of irrigation and purchase of milch animals, the participants under the SADU scheme by and large are not benefited by such assistances. Out of 54 beneficiaries who have taken up irrigated development of coconut in their holdings only 21 persons were able to avail the subsidy assistance offered by DRDA and the Department of Agriculture.

(n) The State Government has announced an interest subsidy of 5 per cent for prompt repayment of agricultural loans taken from the co-operative institutions. Under the SADU programme Commercial banks are also operating side by side in all the package units. They do not offer any subsidy for prompt repayment of loans. The differential rate of interest payable for loans availed for the very same purpose from different sources make the loans from the commercial banks unattractive. This adversely affect the progress of implementation of the programme through nationalised banks. It would be desirable to extend the benefit of subsidy to the SADU loans availed through commercial banks also.

(o) The co-operation of the financing institutions especially primary land mortgage banks in the timely disbursal of credit for the programme seem to be inadequate. Twenty

out of 96 farmers covered under the study expressed dissatisfaction over the attitude of and treatment from the financing institutions. The primary land mortgage banks as well as the commercial banks were concurrently operating lending programme for coconut development from where the farmers were free to avail loans for similar purposes without much insistance on loan utilization and close supervision.

(p) The scale of finance adopted under the scheme is outdated. The wage rates assumed were Rs. 8 for men and Rs.6.50 for women for arriving at the labour cost in the project. This is against the present wage rate of Rs. 15 for men and Rs. 10 for women. This provides ample evidence for the low scales of financing provided under the scheme. The cost of input, labour, pumpsets and accessories, running expenses of pumpsets, construction cost for pumphouse and cattle shed etc have undergone substantial increase over the past four or five years. The rate of finance provided at the rate of Rs. 1000 per hectare for land development component is reported to be too meagre and does not even touch the fringe of the problem. Similarly limits of Rs.1000 for pumphouse and cattle shed prescribed as operational norms also need revision. The scale of crop finance also have to be revised realistically based on current prices. 45 beneficiaries have pointed out inadequacy of finance as one of the constraints faced by them.

(q) The scheme does not provide lending support for fencing or compound wall. In an intensive cropping programme it is inevitable to provide adequate protection for the crops from the stray cattle. Some beneficiaries pleaded for credit support for fencing and though they constitute only a few in number, this claim deserves due attention.

(r) Though over 85 per cent of the beneficiaries expressed satisfaction over the services and advice given by the extension staff under the SADU unit, a critical examination of the performance of the programme would reveal that the extension efforts are not channelled in the proper direction. Most of the time and energy of extension workers are seen devoted for arranging the required supplies such as credit, seeds and seedlings, fertilizers etc. In fact this forms an important constituent of the work load assigned to them. In the midst of so much target oriented physical activities competing for their time and attention, the extension staff seems to have failed in the vital role of transferring proper technology to the farmers. The low level of adoption of scientific manuring for coconut and other intercrops and plant protection corroborates this contention. The fact that around 20 farmers could manage to avail of the assistance under the schema without applying a pinch of fertilizers to their palms and statement that they do not believe in this practice, emphasises the need for properly reorienting the field staff in this direction. They should

be made to feel that they are not mere agents for distribution of credit and other inputs but should utilise these facilities as instruments for technological change.

(s) There were four instances in our sample where the farmers who took up dairy development as part of project suffered losses due to the death of animals. Only two of them had insured the animals. One farmer alone renewed the insurance. Thus only one got the benefit of insurance. The primary land mortgage banks are not keen on insuring milch animals bought out of loans.

(t) The loan component for irrigation and the loan component for crop production are seen operated in isolation. Crop finance meant for raising crops like fodder, cocoa etc. under irrigated condition were seen disbursed to the farmers before commissioning of irrigation system. Irrigation should precede planting of intercrops in such cases for proper establishment and better yield performance. Commissioning of irrigation should therefore have been made a pre condition for the disbursement of crop loans under the irrigated development.

(u) Though the individual development plan for each holding and the item-wise credit support had to be finalised in consultation with the beneficiary concerned, this is not seen followed strictly in some cases. Some of the beneficiaries were not even aware of the item-wise break up

of loan sanctioned to them, the details of loan already availed of and the balance pending payments in their accounts. None of the primary land mortgage banks in the district have so far intimated the loan repayment schedule in respect of the loans issued under the scheme. The beneficiaries are completely in the dark regarding their repayment obligation. Some of the beneficiaries have parallel loans availed from the very same primary bank under the ordinary lending programme for coconut development. The farmers in such cases are in a state of confusion regarding the commitment under each head.

The above points may create an impression that the project has misfired in many respects. It is to be mentioned that many of the points referred above pertain to exceptions, not generalities. The project has succeeded in introducing a new approach in coconut development viz. considering development of the coconut holding in its totality. An attempt has been made to deal with the problems of the coconut growers in general rather than dealing with the crop in particular. This is a new concept hither to unknown to the extension workers and lending institutions functioning in the state. Economic uplift of the coconut growers by augmenting farm income through whole farm development approach had been the basic objective of the project. On the whole the project has made a good beginning in this direction. The results of this study are to be

considered as the preliminary indication towards which the project is sailing. In spite of many operational constraints, the project has been successful in motivating the beneficiaries in the intensive use of the land for crop production and in improving the level of management of their holdings.

Summary

SUMMARY OF MAIN FINDINGS

Development of coconut assumes paramount importance in the economy of Kerala as it provides employment and livelihood for more than 30 per cent of the rural people and contributes 29.8 per cent of the agricultural income of the state. Small holders predominate the coconut farming sector and their economic uplift is feasible only through the development of their small holdings.

Among other things, the Kerala Agricultural Development Project implemented with World Bank assistance from 1977 onwards aimed at uplifting the economic level of the small and marginal coconut farmers in the state. It comprised of a programme for the rehabilitation of coconut including replanting of senile and unproductive palms in 30,000 hectares in Cannanore, Calicut, Malappuram and Trivandrum district. This programme aimed at attaining an optimum stand of 175 healthy and high yielding palms per hectare through a combination of selective thinning and replanting of uneconomic palms. Educating and encouraging farmers to adopt improved cultural practices, to cultivate suitable intercrops under irrigated and unirrigated conditions and to adopt mixed farming in potential areas were also envisaged under the project. A study was undertaken to investigate the overall impact of this programme in Trivandrum district in attaining these objectives and to

focus attention on the key constraints in improving coconut cultivation in the light of the experience of this project. The findings of this investigation are summarised hereunder.

The coconut rehabilitation programme under the Kerala Agricultural Development Project (KADP) in Trivandrum district was under implementation through the 14 package units selected for the purpose. It was anticipated that 400 hectares of effective area for rehabilitation would be forthcoming from a contiguous area of 500 hectares covered by each package unit assuming 80 per cent farmer participation. Investment by way of long term finance was provided by National Bank for Agricultural and Rural Development through Primary Land Mortgage Banks and selected Commercial Banks. Farm development and project financing were based on models incorporated as part of the project.

Intercropping with cocoa or mixed farming with dairying was recommended for the development of irrigated holdings (in 0.80 hectare out of 1 hectare) while intercropping with annual crops like pulses, ginger, vegetables and tapioca was projected under the unirrigated models. The project would support the investment required for land development, well/filter point with pumpsets, pumphouse, replanting of coconut trees purchase of cows, cattle shed, planting cost of fodder and planting and maintenance of cocoa for 3 years and for loss of income if any. The working finance required for the annual recurring operating cost had to be found from other sources.

Data were collected from a sample of 96 beneficiaries selected at random from the 14 package units functioning in the district through personal interview using a well structured schedule. For the purpose of analysis they were categorised into 3 groups namely unirrigated (Category I), irrigation contemplated but failed to obtain irrigation facilities (Category II) and irrigated (Category III). There were 29 in category I, 13 in category II and 54 in category III. Each group was further subdivided based on holding sizes as follows: (a) Below 0.40 hectare (b) 0.40 to 0.80 hectare and (c) above 0.80 hectare.

The impact of the scheme on S.C./S.T. beneficiaries who participated in the project was also investigated by covering all the twelve beneficiaries of this category coming under the purview of the scheme. Beneficiaries for the study were selected from those who had completed at least 3 years of participation in the project by the end of 1982-83. The results of the study are summarised below:

Analysis of the general economic condition of the participating farmers indicated that 51.03 per cent of the holdings were in the category of less than 0.80 hectare. This group possessed only 27.36 per cent of the area covered under the study. Among the beneficiaries who opted

for irrigated development, holdings of 0.80 hectare and above predominated (59.26 per cent), while bulk of the unirrigated holdings (65.89 per cent) were less than 0.8 hectare in size. Categorisation of the beneficiaries according to the pre project level of farm income revealed that 61 beneficiaries had a gross farm income of less than Rs. 3600 per annum, of this two had Rs.600 per annum, fifteen had Rs.600 to 1199, twenty eight had Rs. 2000 to 2399 and sixteen had Rs. 2400 to 3599 . About 49 per cent of the households depended on non agricultural pursuits for their main source of income of which Government service constituted the major share (34 per cent). Majority of the families (80 per cent) are relatively small in size with a membership of less than 7.

Only 36 out of 96 farmers were members of primary agricultural credit co-operatives even after the implementation of the programme. The cropping pattern followed at the pre project level was more or less of a mixed type involving a number of intercrops indiscriminately planted. Tapioca was the common intercrop in almost all holdings (85 per cent) and Banana ranked next in importance (21.8 per cent). The average stand of coconut was only 125 per hectare and it showed wide variation ranging from 30 to 300 palms in different size categories. Only 21.87 per cent of the holdings had an optimum stand of 150 to 200 per hectare and

62 per cent had below optimum density. Senile and unproductive palms accounted for only 3.31 per cent and the non yielding palms constituted 36 per cent of the total.

The impact of the scheme was investigated from 5 angles namely utilisation of loan, changes brought about in cropping pattern, improvements in input management, increase in production and productivity of crops and increase in farm income consequent to the implementation of the programme. Against the total investment of Rs.16.7 lakhs estimated for the development of the 96 holdings, the financing institutions have sanctioned an amount of Rs.13.41 lakhs. The actual investment made by the beneficiaries on this account worked out to Rs. 15.94 lakhs. Though the project has utilized the sanctioned loan in full, there is shortfall of Rs.2.76 lakhs in the contribution by the beneficiaries concerned. The percentage utilization of loans in the case of unirrigated category was low (50.18) compared to the irrigated category (122.43). Holding size wise analysis of utilisation of loan indicated that the percentage of utilization of loan increased with increase in the holding size. The overall average investment estimated, sanctioned and spent per hectare for the 96 holdings under study works out to Rs. 17923.05, Rs. 14393.67 and Rs. 14959.57 respectively. There was considerable shortfall in the utilization of loan in respect of cocoa (58 per cent) coconut gap filling/ replanting (41 per cent) purchase of cows (23 per cent)

and fodder development (17 per cent). An amount of Rs.32025 under purchase of cows and Rs. 38705 sanctioned for pumpsets are yet to be availed of by the beneficiaries.

The estimated requirement of working finance for the maintenance of adult coconut palms and annual crops and the cows, to be found from other sources, was estimated to be Rs. 16.97 lakhs. Against this the actual expenditure incurred by the beneficiaries towards this item worked out to Rs. 16.71 lakhs.

Among the lending institutions which channellised the NABARD funds, Primary Land Mortgage Bank was the most acceptable agency (61 per cent). Next in order of preference came Indian Overseas Bank (17 per cent) State Bank of Travancore (12 per cent) Bank of Baroda (4 per cent) and Union Bank of India (2 per cent). The special preference shown to the Land Mortgage Bank was attributable to the interest subsidy of 5 per cent offered by the State Government to the loanees of the co-operative sector for prompt repayment of the loans.

Analysis of the pre and post project cropping pattern in the selected holdings revealed that the cropping intensity has increased from 111.77 per cent to 189.87 per cent. The total cropped area has increased by 75.73 hectares (70 per cent). Biggest increase was in Banana (523 per cent) followed by coconut (40 per cent). The newly introduced crops of cocoa and fodder covered 31.05 hectares

and 26.60 hectares respectively. Area under tapioca declined by 24 per cent which is in consonance with the objective of the project. The average pre project density of coconut palms was 125 palms per hectare and it has increased to 176 palms per hectare mainly through gap filling. The percentage of bearing palms has registered an increase of 19.23 per cent over the pre project level.

On comparing the achievements in the adoption of cropping pattern with reference to the targets set as per the approved individual farm plans of the beneficiaries, it was seen that the project has by and large achieved the target set in this respect except for minor deviations. Against the projected gross cropped area of 163.09 hectares, the actual achievement was 176.94 hectares. Maximum achievement was under banana (119.3 per cent) followed by coconut (103.34) and cocoa (101.2 per cent). The increase in the area of tapioca (192.75 per cent) has to be viewed as a negative attribute of the project indicating the reluctance of the farming community to switch over to new crops replacing traditionally grown tapioca. The shortfall in area covered was mainly under fodder (18 per cent) and livestock to be purchased (36 per cent).

The aspects covered under the study for input management include irrigation, replanting of senile and uneconomic palms, use of organic manure and fertilizers

and plant protection. The project had been instrumental in providing irrigation facilities in 54 holdings extending over an area of 57.79 hectares. In 13 cases, though irrigated development was programmed, this goal could not be reached due to operational constraints. Among the 13 cases where the irrigation component has not been successful, 6 represent failure to obtain power connection as a result of inability to get electric lines extended over a distance of 1 to 5 kms. Four beneficiaries have purchased and installed pumpsets which are remaining idle for more than 2 years. Availability of power connection has obviously not been insisted while sanctioning loans for electrically operated pumpsets with respect to these 4 cases. In another 4 cases the failure of irrigation was due to failed wells. In these cases the development works are almost in an abandoned stage for want of supplementary finance for another trial for a new well or proper guidance to farmers about future course of action. The failure of the beneficiaries to complete the construction of well due to inadequacy of the sanctioned loan had been the cause for the unsuccessful attempt to provide irrigation facility. In yet another case it was the domestic problems of the beneficiary which acted as the constraint for the timely utilization of the irrigation potential created.

The project had been successful in providing irrigation for 62 per cent of the net area covered by the sample. Maximum benefit was for cocoa (81 per cent) followed

by fodder (67 per cent) and banana (58 per cent). Electrically operated pumpsets predominated the scene (49 out of 54 cases). The average cost of a pumpset with accessories worked out to Rs. 8717.68 and the average amount sanctioned was only Rs. 7751 per pumpset. The beneficiaries on an average have invested Rs. 1641 per pumpset towards installation charges against Rs. 828 sanctioned. In 12 out of 54 cases insufficiency of water during summer months for irrigation had been reported.

Against the replanting requirement of 20 uneconomic palms per hectare projected in the project, the intensity of senile and uneconomic palms as revealed by the study was only 3.6 palm per hectare. Though 388 palms were identified for removal and loan support was also provided the number of palms actually cut and removed was only 77. A total number of 4762 coconut seedlings were planted mainly by way of gap filling against the targeted number of 4790. The replanted seedlings however were not seen maintained properly as evident from the low level of organic manure used (6.6 kg to 22 kg) and fertilizer applied (0.1 kg to 0.36 kg). This may perhaps be the reason for the failure of the replanted seedlings to start to bearing.

With respect to organic manure use for coconut, the increase from 17 to 46 kg per palm is commendable which is against the post project projected use of only

30 kg per palm. But the use of organic manure for the intercrops is deplorably low especially for Banana (6 kg per plant) cocoa (3 kg per plant) and fodder (2.2 tonnes per hectare). In the case of tapioca the level of use has even declined from 3755 kg to 3698 kg per hectare.

The performance is almost similar in the case of fertilizer application also. In respect of coconut fertilizer application has increased from 0.22 kg to 1.52 kg per palm (59 per cent). Even this is low while considering the dose of 6 kg per palm recommended in the project report. The average fertilizer dose of 0.08 kg per cocoa plant 0.25 kg par banana plant 33 kg per hectare for fodder and 113 kg per hectare for tapioca as adopted by the farmers were also far inadequate. The tendency for raising intercrops without balanced and adequate fertilizer application noticed among the beneficiaries need immediate intervention to avert the possible future set backs to the main crop.

Only 6 out of 96 holdings covered under the survey have adopted plant protection measures. The general consensus among the coconut growers was that this was not a dire necessity.

The intensity of cultural practices has increased many fold. Biggest increase is in coconut (562 per cent). However the expenditure incurred for the intercrop appear to be low in respect of banana (paise 58 per plant) cocoa (31 paise per plant), fodder (Rs. 127 per hectare) and tapioca

(Rs. 551 per hectare). This is probably due to the practice of planting the intercrops in the season when coconut receives its annual intercultivation resulting in a net saving of the cost of land preparation for these intercrops.

Increase in production and productivity of the different crops at the pre and post project levels were also compared. All the crops except tapioca have registered substantial increase in total production. Banana, cocomut, and milk production registered increases at 677 per cent, 62.45 per cent and 15 per cent respectively over pre project levels. Production of tapioca has declined by 25.6 per cent which is in line with the project objective. On an analysis of the increase in productivity levels of all the crops, it was found that the increase in productivity was not in proportion to the rate of increase in total production. The increase in productivity of coconut was only 38 par cent over the productivity at the pre project level. The biggest increase is in the irrigated category (47 per cent) followed by unirrigated category (20 per cent). In absolute terms the productivity of coconut has increased from 25 nuts to 30 nuts per palm in the unirrigated holdings while the increase in irrigated holdings was from 30 to 44 nuts per palm. The overall increase in productivity attained was from 29 to 40 nuts for the 96 holdings put together. This is against the rate of 36 nuts for the unirrigated palms and 50 nuts per palm projected for the irrigated palms

during the 5th year of development in the project report. The performance of the palms also exhibited wide variation in yield rates in the different groups based on the year of completion of manuring and irrigation. The increase in productivity was highest in the palms which have completed 5 years (67 per cent) of the project while it was lower in the case of holdings completing 4 years (31 per cent) and 3 years (29 per cent) of development.

The post project average yield of crops such as cocoa (Rs. 59 per hectare) fodder (4525 kg per hectare), Banana (6.95 kg per plant), and tapioca (5055 kg per hectare) was also considerably low. The shortfall is glaring while considering the post investment yield levels projected for these crops namely cocoa (650 kg dried beans per hectare) fodder (30 tonnes per hectare) and tapioca (15 tonnes per hectare). Productivity of tapioca has even declined from 5161 kg to 5055 kg per hectare. The poor performance of the intercrops in general could be attributed to the low level of input use and poor management of these crops.

The average pre project gross income from the holdings increased from Rs.4478 to Rs.9224 at constant prices. In per hectare terms the increase is from Rs.4613 to Rs.9502. The percentage increase is 105. The per hectare average gross farm income varied from 5846 per hectare in unirrigated holdings to Rs.11093 per hectare in the irrigated group.

The increase in net farm income is not in proportion to the increase in gross farm income. It rose from Rs.2860 per hectare to Rs.3821 with a percentage increase of only 34 per cent. Post project income levels of Rs.5743, Rs. 5116 and Rs.3284 per hectare by the categories of less than 0.4 hectare holdings, less than 0.8 hectare holdings and above 0.8 hectare holdings indicate that the smaller holdings are more efficient in generation of income. The performance of the holdings was further analysed with reference to the year of completion of the development. This revealed that the increase in net farm income was maximum in the case of holdings which had completed 5 years of development (69 per cent) followed by holdings completing 4 years (32 par cent) and 3 years (20 par cent) respectively.

Against 51 per cent increase over the pre project income projected under the unirrigated category in the project report, the achievement was only 26 per cent. The rate of increase in average net farm income of irrigated holdings was only 37 per cent against the projected rate of 33 per cent for the irrigated models with cocoa and 154 per cent for irrigated models with mixed farming. The overall increase of 34 per cent achieved though apparently small, cannot be under estimated while considering the fact that it could be achieved inspite of

the negative impact of cocoa and the failure of achieving the target set for proper manuring and irrigation of the crops. The emerging situation inspites confidence for intensifying efforts with renewed vigour after correcting the deficiencies noted. The programme has proved its potential for generating additional net income inspite of several operational constraints.

Comparitive analysis of the efficiency of irrigation and the various intercrops/mixed farming in increasing the net return of growers was also made. The increase of 47 per cent in the average yield of coconut, 62 per cent in fodder, 0.47 per cent in banana, 134 per cent in cocoa and 17 per cent in milk was noticed under the irrigated holdings over the unirrigated holdings. This corroborates the view that by providing irrigation, the productivity of the crops can be raised substantially.

To determine the relative profitability of different intercrops the average annual net return from the intercrops was worked out. It indicated that Banana was the most profitable intercrop in coconut gardens under the agro-climatic conditions of Trivandrum district and at the prices which prevailed. The potential average annual net return per hectare based on the experience of this project works out to Rs.6015 per hectare. Mixed farming was successful only in holdings of above 0.8 hectare with irrigation. However the

average net return per annum even under this category was relatively low (Rs. 2990 per hectare) when compared to banana. Tapioca with an average return of Rs.621 per hectare ranked third in the order of profitability. Cocoa the fourth intercrop compared, showed negative returns in all the categories.

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Appendices

APPENDIX II

KERALA AGRICULTURAL DEVELOPMENT PROJECT

Project Co-ordination Committee Composition

1.	Agricultural Production Commissioner :	Chairman
2.	Finance Secretary	
3.	Dr. G.V. Ramanamurthy, Joint Commissioner (C.C.) Department of Agriculture, Ministry of Agriculture and Irrigation, New Delhi.	
4.	Managing Director, Agricultural Refinance and Development Corporation, Bombay.	
5.	Director, Central Plantation Crops Research Institute, Kasaragode.	
6.	Director of Agriculture	
7.	Registrar of Co-operative Societies	
8.	Director of Animal Husbandry	
9.	Project Officer, Rubber Processing Department, Rubber Board, Kottayam.	Member
10.	Managing Director, Plantation Corporation of Kerala.	
11.	Managing Director, Kerala Co-operative Central Land Mortgage Bank.	
12.	Director of Research, Kerala Agricultural University, Trichur.	
13.	Chief Engineer, Rural Electrification, Kerala State Electricity Board.	
14.	Managing Director, Kerala Livestock Development and Milk Marketing Board.	
15.	Milk Commissioner.	
16.	Managing Director, Kerala State Co-operative Bank.	
17.	General Manager, Kerala State Co-operative Rubber Marketing Federation Limited.	
18.	Director, Special Agricultural Development Unit.	Member-Secretary.

APPENDIX III

JOINT TECHNICAL COMMITTEE

Composition

1.	Vice-Chancellor, Kerala Agricultural University	(Chairman)
2.	Director, Central Plantation Crops Research Institute	
3.	Director of Agriculture	
4.	Director, Directorate of Coconut Development, Cochin.	
5.	Director, Directorate of Cashew Development, Cochin.	
6.	Director, Directorate of Arecanut & Spices Development, Calicut.	Member
7.	Nominee of the Indian Council of Agricultural Research, New Delhi.	
8.	Additional Secretary to Government KADP.	
9.	Director of Research, Kerala Agricultural University (Member - Secretary).	

APPENDIX IV

KERALA AGRICULTURAL DEVELOPMENT PROJECT

Small Holders' Farm Development

List of Units identified for Coconut Rehabilitation

Name of District	Name of Unit
1. Trivandrum	1. Cheruniyoor
	2. Manampoor
	3. Kizhuvallam
	4. Edakkode
	5. Kadinamkulam
	6. Mangalapuram
	7. Anayara
	8. Attippra
	9. Vattiyoorkavu
	10. Karakulam
	11. Karimkulam
	12. Poovar
	13. Balaramapuram
	14. Vempakal
	15. Azhur
2. Malappuram	16. Veliyamkode
	17. Eramangalam
	18. Thalakkadu
	19. Purathur
	20. Thanur
	21. Thanallur

Name of district	Name of Unit
	22. Purang
	23. Ponnani
	24. Kondotti
	25. Pulikkal
3. Kozhikode	26. Badagara I
	27. Badagara II
	28. Cherode I
	29. Cherode II
	30. Chelanur I
	31. Chelanur II
	32. Chelavur
	33. Kovoor
	34. Edacherry
	35. Purameri
	36. Cheruvannur
	37. Nedivattom
	38. Arikkulam
	39. Keezhariyur
	40. Edakulam
	41. Panthalayani
	42. Atholi I
	43. Atholi II
	44. Chathamangalam
	45. Chathamangalam (II) (Poolakodi)

Name of district	Name of Unit
	46. Naduvannur I
	47. Naduvannur II
	48. Ulleri I
	49. Ulleri II
	50. Thalakulathur
	51. Karannur
4. Cananore	52. Pappinisseri
	53. Kalliasseri
	54. Ancharakandy
	55. Koodaly
	56. Mattannur
	57. Panoor
	58. Kanniyannur
	59. Thrippangottur I
	60. Thrippangottur II
	61. Payyanur
	62. Karivallur
	63. Madai
	64. Kunhimangalam
	65. Chekli
	66. Karyad
	67. Kanhangad

Name of district	Name of Unit
	68. Ajanur
	69. Pallikara
	70. Udma
	71. Edakkad
	72. Azhikkode
	73. Marath
	74. Kolacheri
	75. Chirakkal

APPENDIX VIII

Questionnaireused for Collection of data from the Project participants.

IMPACT OF THE COCONUT REHABILITATION PROGRAMME IMPLEMENTED BY SADU IN TRIVANDRUM DISTRICT.

Code No. Date:

Questionnaire for Data Collection.

1.1 Name and address of beneficiary:

1.2 Location:

Village Panchayat.

SADU Unit

Block

Taluk

1.3 Religion/caste:

1.4 Occupation:

Main

Subsidiary

1.5 Whether member of co-operative Society: Yes/No

1.6 If yes, name of the co-operative Society.

1-7 Name of the market nearest to the farm.

1.8 Distance from the Farm to the market.

1.9 Transport facilities owned by the farmer, if any (specify)

7. Family details:

Sl. No.	Name of members of household	Age	Sex	Relation to beneficiary.	Education	Occupation		Unemployed		Annual income from			
						Main.	Subsidiary.	Student.	Non-student	Main occupation		Subsidiary occupation	
										Pre	Post	Pre	Post

3. Pre and post project land use pattern:

(in ha.)

	Pre project Year	Post project Year
3.1 Land owned		
Wetland		
Dryland		
Garden land		
3.2 Land leased in		
Wetland		
Dryland		
Garden land		
3.3 Land leased out:		
Wet land		
Dryland		
Gardenland		
3.4 No. of fragments operated:		
3.5 Cropping pattern:		
a) paddy:		
i) Virippu		
ii) Mundakan		
iii) Punja		
b) Coconut:		
c) Pulses:		
Pure		
Intercrop		
d) Tapioca:		
Pure		
Intercrop		
e) Cocoa		
Pure		
Intercrop		

f) Fodder:

Pure

Intercrop

g) Banana:

Pure

Intercrop

h) Vegetables:

Pure

Intercrop

i) Others (specify)

Pure

Intercrop

4. INVESTMENT AS ESTIMATED IN THE PROJECT AND ACTUALS

Sl. No.	Items	Pre-project	Project years						
			I	II	III	IV	V	VI	VII
1	2	3	4	5	6	7	8	9	10
		Year							
4.	CAPITAL INVESTMENT								
(a)	Land Development								
	(i) estimated								
	(ii) Loan sanctioned								
	(iii) Actually spent								
(b)	Irrigated								
	(i) Pumpset:								
	Estimated:								
	Loan sanctioned:								
	Actually spent:								
	(ii) Installation charges								
	Estimated:								
	Sanctioned:								
	Actually spent:								
	(iii) Well/Filter point:								
	Estimated:								
	Sanctioned:								
	Actually spent:								
(c)	Replanting of coconut								
	Estimated:								
	Loan sanctioned?								
	Actually spent:								

1	2	3	4	5	6	7	8	9	10

(d) Gas filling

Estimated:

Loan sanctioned:

Actually spent:

(e) Interpenning Cocks

Estimated:

Sanctioned:

Actually spent:

(f) Fodder

Estimated:

Sanctioned:

Actually spent:

(g) Dairying

(i) Cow

Estimated:

Sanctioned:

Actually spent:

(ii) Cattle shed

Estimated:

Sanctioned:

Actually spent:

(h) Others:

(specify)

Estimated:

Sanctioned:

Actually spent:

Total - (A)

Estimated:

Sanctioned:

Actually spent:

1	2	3	4	5	6	7	8	9	10

4.2 WORKING (OPERATIONAL) EXPENSES:

(a) Replanting of existing coconuts

Estimated:
Sanctioned:
Actually spent:

(b) Intercropping

(i) Cocoa

Estimated:
Sanctioned:
Actually spent:

(ii) Banana:

Estimated:
Sanctioned:
Actually spent:

(iii) Fodder:

Estimated:
Sanctioned:
Actually spent:

(iv) Dairying:

Estimated:
Sanctioned:
Actually spent:

(v) Irrigation

Estimated:
Sanctioned:
Actually spent:

1	2	3	4	5	6	7	8	9	10
	(vi) Others (Specify)								
	Estimated:								
	Sanctioned:								
	Actually spent:								
	Total of (b)								
	Estimated:								
	Sanctioned:								
	Actually spent:								
	Grand total of A and B								
	Estimated:								
	Sanctioned:								
	Actually spent:								

Name of Financing Institutions:

(5) DEVELOPMENT WORKS TAKEN UP UNDER THE PROJECT WITH YEARWISE AND ITEMWISE COST.

Sl. No.	Item (Specify years)	Pre project	I	II	III	IV	V	VI	VII
1	2	3	4	5	6	7	8	9	10
5.1	Replanting of coconut								
	(a) No. of trees in the garden.								
	(i) Yielding								
	(ii) Un yielding mature trees.								
	(iii) Senile and unproductive mature trees.								
	(b) No. of trees to be cut and removed as per plan.								
	(c) (i) No. of trees actually removed.								
	(ii) Cost of removed.								
5.2	Planting of Seedlings								
	(a) No. of seedlings existing.								
	(b) No. of seedlings replanted.								
	(c) (i) Gap filling								
	(ii) Cost (Input labour								

1	2	3	4	5	6	7	8	9	10

5.3 Maintenance of replanted seedlings.

(a) (i) Measurements of pits dug.

(ii) Cost

(b) (i) Insecticides added at the time (qty)of planting.

(ii) Cost

(c) (i) manures added at the time of planting (qty).

(ii) Cost | Input
| Labour

(d) (i) Inter cultivation after planting.

(Digging, Weeding etc).

(ii) Cost

(e) Manuring of seedlings.

(i) Nitrogenous (Qty.)

(ii) Phosphate (Qty.)

(iii) Potash (Qty.)

(iv) Ameliorants (Qty.)

(vi) Others (Specity)

(vii) Total cost of manuring.

Inputs

Labour

1	2	3	4	5	6	7	8	9	10

(f) Plant protection

(i) B.H.C. and Sand Mixture.

(ii) Bordeaux Mixture or equivalent chemical spraying.

Pre Monsoon

Post "

(iii) Others (Specify)

(iv) Total cost of plant protection

Labour

Inputs

5.4 Maintenance of mature trees.

(a) Inter cultivation

Cost

(b) Manuring

Nitrogenous (Qty).

Phosphatic (Qty.)

Potash "

Ameliorants "

Organic "

Others (Specify)

Cost of Manuring

Labour

Input

1	2	3	4	5	6	7	8	9	10
(c)	**Plant Protection**								
	(i) B.H.C. and Sand Mixture (Qty.)								
	(ii) Bordeaux Mixture or equivalent chemical spraying								
	Pre monsoon								
	Post "								
	(iii) Others (Specify)								
	(iv) Cost of P.P.								
	Labour								
	Input								
(d)	**Irrigation**								
	(i) Irrigable area (Hectares)								
	(ii) Irrgated "								
	(iii) Not irrigable								
	(iv) Method of Irrigation								
	Pot watering (Ha.)								
	Lift irrigation (Ha.)								
(e)	**Construction of well**								
	(i) Well/tank constructed or renovated.								
	(ii) Cost								
(f)	**Pumpset**								
	(i) Pumpset purchased								
	(ii) H.P. & Date of purchase								
	(iii) Cost								

1	2	3	4	5	6	7	8	9	10

(iv) Availability of water

Sufficient

Insufficient.

(v) Reasons for Insufficiency if any.

(i) Natural scarcity

(ii) Incomplete work

(iii) Failed work

(iv) Power cut

(v) Others (Specify)

(vi) If purchased but not installed reasons.

Want of construction of pumphouse.

Want of accessories

Want of finance

Others (Specify)

(vii) If installed, but not energised reasons.

Want of power connection

Others (Specify)

(viii) Date of commissioning of irrigation system.

(ix) Loan sanctioned but not availed (amount in Rs.)

(x) Reason for not availing the loan

1	2	3	4	5	6	7	8	9	10

(g) Frequency of irrigation

(i) Main Crop

In one week

No. of hours run for one irrigation

Months in which pumps works regularly. (Specify the months)

(ii) Intercrop (Cocoa)

Frequency in one week

No. of hours run for one irrigation

Months in which pump works regularly.

(iii) Intercrop (Banana)

Frequency in one week.

No. of hours run for one irrigation.

Months in which pump works regularly.

(iv) Did the installation satisfied the demands of irrigation.

Yes/No

(v) If No, Reason thereof:-

1	2	3	4	5	6	7	8	9	10

(h) Cost of Irrigation

Electricity charges

Fuel charges

Maintenance cost

Harvesting of coconuts:

No.

Cost

5.5 INTER CROPPING

(a) Cocoa

(i) Area earmarked as perplan.

(ii) Actually planted

(iii) No. of seedlings planted.

(iv) No. of seedlings survival.

(v) Cost of planting:

Input

Labour

(vi) Manuring of cocoa

(vii) Quantity of Organic (Qty.) manures applied.

(viii) Cost

(ix) Mulching of seedlings

Yes/No

1	2	3	4	5	6	7	8	9	10

(x) Cost — Labour / Input

(xi) Fertilizers applied

Qty.

Cost — Labour / Input

(xii) Plant protection done

Qty.

Cost — Labour / Input

(xiii) Harvesting cost

(b) <u>Fodder</u>

(i) Area earmarked for fodder cultivation as per plan.

(ii) Actually planted (Ha)

Inter planting

Boarder planting

(iii) <u>Variety (wise)</u>

Hybrid napier

Guinea Grass

Fodder legumes

Others

1	2	3	4	5	6	7	8	9	10
	(iv) Source of supply of seed materials								
	Departmental								
	Others								
	Cost of Fodder planting								
	Labour								
	Input								
	(v) Spacing given								
	(vi) Manuring of fodder								
	Organic manures								
	(Qty.)								
	Cost Labour								
	Input								
	Fertilizers								
	Cost								
	(vii) Harvesting								
	Cost								
	Sufficiency of fodder								
	(c) <u>Banana</u>								
	(i) Area earmarkedns per plan								

1	2	3	4	5	6	7	8	9	10
(ii)	Area actually planted								
	Nendran								
	Palayanthoden								
	Others (specify)								
(iii)	Cost of suckers and planting								
(iv)	Spacing given								
(v)	Organic manures applied								
	(Qty.)								
	Cost								
(vi)	Fertilisers applied								
	(Qty.)								
	Cost — Labour								
	Cost — Input								
(vii)	Incidence of disease								
	No. of plants — affected								
	No. of plants — replaced								
(viii)	Plant protection measures adopted.								
	Cost — Labour								
	Cost — Input								
(ix)	Inter cultivation								
	Cost								

1	2	3	4	5	6	7	8	9	10
(x)	Proping								
	Cost — Material								
	Cost — Labour								
(xi)	Irrigation								
	Cost								
(xii)	Harvesting (Cost)								
	Cost								
(xiii)	Other intererop (if any)								
	Specify								
	Cost — Labour								
	Cost — Input								
(xiv)	Loan sanctioned but not availed (amount in Rs.)								
(xv)	Reason for not availing the loan								

1	2	3	4	5	6	7	8	9	10
(d)	Dairying								
(i)	Cattle								
	No. of cattles owned before the programme								
	Breed (specify)								
	Purchase of cattle as envisaged in the plan.								
	Amount sanctioned								
	Actually purchased								
	Breed (specify)								
	Cost (Rs.)								
(ii)	Cattle shed								
	New/renovated								
	Amount of loan sanctioned								
	Cost of construction								
	Whether construction completed. Yes/No.								
	If not, reasons.								
(iii)	Maintenance of cattle								
	Concentrates								
	Straw								

1	2	3	4	5	6	7	8	9	10

Others

Cost

Labour

Materials

6. Yield

6.1 Coconut (No. of nuts)

(a) Mature palms

(b) Replanted seedlings

Rate at which sold

Sale proceeds

No. of Kadjans

Mature palms

Replanted seedlings

Rate at which sold

Sale proceeds

6.2 Intercrops

(a) Copra Yield (Kg)

Rate at which sold

Sale proceeds

1	2	3	4	5	6	7	8	9	10
(b)	Fodder								
	(i) Yield (kgs)								
	used for (kgs) own cattle								
	Farm price prevailing								
	Estimated value								
	(ii) Quantity sold (if any)								
	Sale proceeds								
(c)	Banana								
	(i) Yield (kgs)								
	Farm price								
	Sale proceeds								
	(ii) Suckers (nos)								
	Farm price								
	Sale proceeds								
(d)	Others - intercrops (if any)								
	(i) Output (kgs)								
	Farm price (Sh./kg)								

1	2	3	4	5	6	7	8	9	10

(ii) Sale proceeds

(e) Dairying

(i) Average daily milk yield (kgs)

Domestic use (Qty.)

(ii) Marketed (Qty)

Price of milk

No. of days in lactation in each year.

(f) Death of cows (No.)

Whether the cows have been insured.

Yes/No

If yes whether

Compensation received for the animals died.

Yes/No

If yes extent of compensation received

If not reasons

(g) Disposal of cows (Nos.)

1	2	3	4	5	6	7	8	9	10

Sale proceeds of cows

Reason for disposal

Replacement of cows if any (Nos).

(h) No. of calfs sold

Sale proceeds

No. of calfs maintained

Estimated value

7. <u>Repayment of loan</u>

7.1 Amount to be repaid as per plan.

7.2 Amount actually repaid

7.3 No. of instalments repaid

7.4 No. of instalments defaulted.

7.5 Reasons for default.

7.6 Balance amount due.

8. OPINION OF THE BENEFICIARY ABOUT THE PROJECT

8. (1) Do you live in the farm

(2) If not, the distance between the homestead and farm

(3) If it is far off, how the supervision of the farm is effected.

(i) Through members of family

(ii) Neighbours

(iii) Tenants

(iv) Others (specify)

(4) How much of your garden land is not under cultivation.

(5) How many more coconuts can be planted.

(6) If space is available why have you not planted more seedlings.

(a) Need space around my house

(b) Earmarked for other crop

(c) Lack of funds

(d) Labour not available

(e) Lack of water

(f) Others specify

(7) Are all the mature and yielding palms in your farm yield more than 15 nuts per annum now.

(8) Did you replace all the uneconomic palms yielding less than 15 nuts during the previous years.

(17) would you continue the practice during the post project years.

(18) Do you adopt plant protection measures for coconut now.

Yes/No

(19) Do you feel it necessary

Yes/No

(20) Would you continue the practice during the post project years.

Yes/No

(21) Are you satisfied with the present cropping pattern.

Yes/No

(22) Do you believe that the present inter cropping system is capable of generating additional income in a sustained way.

Yes/No

(23) Will you continue the cropping pattern during the post project years.

Yes/No

(24) If not which of the crop do you want to alter

(Specify) 1

(crop and area) 2

(25) Reason for alteration

(a) want of finance

(b) want of marketing facility

(c) Unremunerative prices

(d) others (specify)

(9) If not why?

(a) Want of finance

(b) Want of labour

(c) Others (specify)

(10) Do you think it is worthwhile to put fertilizers on young non bearing coconut trees.

Yes/No.

(11) Do you think that manuring of coconut would increase yield of coconuts.

(12) Will you continue the practice of manuring coconut during the post project years.

(13) Do you have access to irrigation in your garden land

Yes/No.

(14) If yes did you bring the entire coconut under irrigation under the project.

(15) If not why?

(a) want of finance

(b) want of labour

(c) do not believe in the efficiency of irrigation.

(d) feel that it is not worth the trouble.

(e) Others specify

(16) If the entire area has been covered under irrigation do you believe that the practice is capable of increasing the yield of coconut.

(17) would you continue the practice during the post project years.

(18) Do you adopt plant protection measures for coconut now.

Yes/No

(19) Do you feel it necessary

Yes/No

(20) Would you continue the practice during the post project years.

Yes/No

(21) Are you satisfied with the present cropping pattern.

Yes/No

(22) Do you believe that the present inter cropping system is capable of generating additional income in a sustained way.

Yes/No

(23) Will you continue the cropping pattern during the post project years.

Yes/No

(24) If not which of the crop do you want to alter

(Specify) 1

(crop and area) 2

(25) Reason for alteration

(a) want of finance

(b) want of marketing facility

(c) Unremunerative prices

(d) others (specify)

(26) For what purpose do you intend to allocate that area (specify)

(27) Are you satisfied in general about the project

Yes/No

(28) Do you feel any modification is necessary.

Yes/No

(29) If yes on what aspect (specify)

(30) Were you a member of the co-operative society/land mortgage bank previously

(31) Are you a member now

(32) Do you feel that the membership has helped you.

(33) Was the finance adequate and timely

Adequate/inadequate

Timely/Not

(34) Was there any difficulty in getting the required inputs

Yes/No

(35) If yes on which item

Seedlings

Fertilizers

P.P. chemicals

Others (specify)

(36) Was there any difficulty in getting the pumpsets energised

Yes/No

(37) If yes specify the same.

(38) Was the extension support adequate.

Yes/No

(39) Was there any difficulty in the marketing of products

Yes/No

(40) If yes specify the commodity

(41) Was there adequate co-operation and help from the financing institutions.

Yes/No

(42) If no what kind of problem was faced with.

(43) Did you receive any other Governmental support other than the project.

(a) Departmental subsidy

(b) IRDP subsidy

(c) Others (specify)

(44) Do you feel that the benefits already accrued can be attained even without the project.

Yes/No

IMPACT OF THE COCONUT REHABILITATION PROGRAMME OF 'SADU' IN TRIVANDRUM DISTRICT

By

LEKSHMI NARAYANAN NAIR N.

ABSTRACT OF A THESIS
Submitted in partial fulfilment of the
requirement for the degree of
MASTER OF SCIENCE IN AGRICULTURE
Faculty of Agriculture
Kerala Agricultural University

Department of Agricultural Economics
COLLEGE OF HORTICULTURE
Vellanikkara – Trichur
KERALA

1984

ABSTRACT

This study was conducted in 1983 to assess the impact of the Coconut Rehabilitation Programme implemented in Trivandrum District as part of the World Bank assisted, Kerala Agricultural Development Project. The specific objectives were to examine the extent of utilization of loans, the improvements in cropping pattern and farming practices, changes in yield rates and output and the increase in farm income generated by this programme. The relative efficiency of irrigation and the various intercrops in augmenting the net farm incomes of the participating farmers was compared and the major constraints in improving coconut farming in the district were also identified as a part of this study.

Data were collected from a sample of 96 participating farmers selected at random from the 14 Package Units functioning in the district under this project through personal interview using a well structured schedule. The main findings of the study are summarised below.

Majority of the holdings (51.03 per cent) were in the category of less than 0.80 hectare but they accounted for only 27.36 per cent of the area covered. Holdings of 0.80 hectare and above predominated (59.26 per cent) in the category of irrigated holdings. About 49 per cent of the households depended on non-agricultural pursuits for their

main source of income. Eighty per cent of the families were relatively small in size with a membership of less than 7.

The overall average investment estimated, sanctioned and spent per hectare for the 96 holdings under study worked out to Rs. 17923.05, Rs. 14393.67 and Rs. 14959.57 respectively. Though the overall performance in respect of loan utilization was satisfactory, there was shortfall in utilization of loans under Cocoa (58 per cent), Coconut gapfilling (41 per cent), purchase of Cows (23 per cent) and Fodder Development (17 per cent). The percentage of utilization of loansin the case of unirrigated category was low (50.18) compared to the irrigated category (122.43). Among the lending institutions through which the National Bank for Agriculture and Rural Development funds were channelised, Primary Co-operative Land Mortgage Bank was the most acceptable agency (61 per cent).

The cropping intensity of the sample increased from 111.77 per cent to 189.87 per cent consequent on the implementation of the programme. The area under coconut, banana, cocoa and fodder increased while that under tapioca decreased. The density of coconut palms increased from 125 palms per hectare to 176 palms. This is against the project objective of attaining an optimum stand of 175 healthy and high-yielding coconut palms. By and large the

target set for intercropping programme as per the individual farm production plans has been achieved. The target was exceeded in respect of banana (119.3 per cent) coconut (103.34 per cent) and cocoa (101.2 per cent). Tapioca continued to be the intercrop widely preferred by the coconut growers (192.75 per cent). Shortfall was mainly in the coverage of area under fodder (18 per cent) and livestock to be purchased (36 per cent).

The project has been instrumental in stepping up substantially the level of use of various inputs including irrigation. Fifty four holdings had the benefit of irrigation covering 62 per cent of the net area covered by the sample, while in 13 cases though irrigated development was contemplated, it had not been successful due to operational constraints such as failure to obtain electric connection, failure of wells etc. The average cost of a pumpset with accessories worked out to Rs. 8717.68 while the average amount sanctioned under the lending programme was only Rs. 7715 per pumpset. The intensity of senile and uneconomic palms as revealed by the study was only 3.6 palm per hectare against the projection of 20 palms per hectare assumed in the project report. Out of 388 palms identified for cutting and removal only 77 were actually removed. Though the target in respect of gap filling has been exceeded by planting 4790 seedlings against the target of 4762 seedlings, the maintenance of the seedlings was not upto the

standard. The increase in use of organic manure for coconut from 17 to 48 kg per palm is commendable. But the use of organic manure for the intercrops is deplorably low especially for banana (6 kg per plant) cocoa (3 kg per plant) fodder (2200 kg per hectare) and tapioca (3698 kg per hectare). Fertilizer application for coconut has increased from 0.22 kg to 1.52 kg per palm. The average fertilizer dose of 0.08 kg per cocoa plant 0.25 kg per banana plant, 33 kg per hectare for fodder and 113 kg per hectare for tapioca as adopted by the participants were also inadequate. Only 6 out of 96 holdings covered under the survey have adopted plant protection measures. The intensity of cultural practices has increased many fold with the biggest increase for coconut (562 per cent).

All the crops except tapioca have registered substantial increase in total production. Banana, coconut and milk production registered increases of 677 per cent, 62.45 per cent and 15 per cent respectively. Production of tapioca declined by 25.6 per cent. The increase in productivity of coconut was only 38 per cent over the productivity at the pre-project level. In absolute terms the productivity of coconut has increased from 25 nuts to 30 nuts per palm in the unirrigated holdings while the increase in irrigated holdings was from 30 nuts to 44 nuts per palm. The overall increase was from 29 to 40 nuts for the sample as a whole. The increase in yield was highest in the holdings which have

completed 5 years (67 per cent) of development followed by holdings completing 4 years (31 per cent) and 3 years (29 per cent). The post project average yield of intercrops such as cocoa (Rs. 59 per hectare) banana (6.95 kg per plant) fodder (4525 kg per hectare) and tapioca (5055 kg per hectare) was considerably low.

The average gross income per holding increased from Rs. 4478 to Rs. 9224. In per hectare terms the increase was from Rs. 4613 to Rs. 9502 (105 per cent). The average net farm income rose from Rs. 2860 to Rs. 3821 per hectare (34 per cent). The increase in net farm income was maximum in the case of holdings which had completed 5 years of development (69 per cent) followed by holdings completing 4 years (32 per cent) and 3 years (20 per cent).

An increase of 47 per cent in the average yield of coconut, 62 per cent in fodder, 0.47 per cent in banana, 134 per cent in cocoa and 17 per cent in milk was noticed under the irrigated holdings over the unirrigated holdings. Comparative analysis of the different intercrops indicated that banana is the most profitable intercrop in coconut gardens in Trivandrum district with a potential net return of Rs. 6015 per hectare. Mixed farming with dairying as one of the components, though successful in holdings of more than 0.8 hectare size, ranks only second in order of profitability, with a net income of Rs.2990 per hectare.

Tapioca with an average return of Rs. 621 per hectare ranks third in the order of profitability. Cocoa, the fourth intercrop compared showed negative returns at the yield and price levels prevailed.

Economic uplift of the coconut growers by augmenting farm income through whole farm development approach had been the basic objective of the project. On the whole the project has made a good beginning in this direction in spite of several operational constraints.