

## ESTIMATING PRODUCTION COSTS AND RETURNS FOR COCONUT IN KERALA\*

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### ABSTRACT

The cost of production of coconuts in Kerala has been estimated at Rs. 1.10/nut under 1982-'83 factor costs, but without taking the value of land into consideration. When a moderate price of Rs. 50,000 per hectare of land is added to the investment on coconuts, the production cost goes upto Rs. 1.94/nut. In view of the fact that the rate of appreciation of land is significantly higher than that of bank rates and the land market is out of normal economic ambit, there is no justification to include land value in the investment in present Kerala situation.

Considering the average production cost and farmgate price of coconut as Rs. 1.10 and Rs. 1.50/nut respectively, the net return works out to be Rs. 4200/ha. Further, since coconut is a small holder plantation crop atleast 75 per cent of labour required for various operations excluding harvesting could be expected from the farmer's family itself. Therefore the returns to family labour and investment per hectare of coconut garden comes to Rs. 5760/annum. The study thus reveals that coconut cultivation under good management is a profitable proposition in Kerala.

### INTRODUCTION

Coconut has been the mainstay of the people in Kerala and at present this state alone accounts for about two-thirds of the 1.1 million ha coconut area and 58 per cent of some 5800 million annual nut production in India. The productivity of this crop in Kerala has however, drastically gone down from 6783 nuts/ha during the Second Five year Plan period to 4837 nuts/ha at the end of Fifth Five year Plan due to the spread of root (wilt) disease and improper management of coconut crop (Das, 1983). An attempt has been made in this paper to find out an answer to the question—"Does coconut pay"?

### MATERIALS AND METHODS

As far as this study is concerned, a period of seven years (from planting the seedlings) has been considered as the pre-bearing period followed by another period of seven years as the early-bearing period. The economic life span of coconut plantation involving West Coast Tall variety in Kerala under good management is assumed to be 60 years. Due to these characteristic features, the estimation of the costs and returns in coconut needs special treatment which differ in many respects from that of seasonal and annual crops (Das, 1984).

For this study, the recommended spacing of 7.5 m × 7.5 m constituting

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a density of 175 palms/ha has been taken into account. The crop assumes to be a rainfed, subject to pot watering during the first three years from planting the seedlings and two to three life-saving summer irrigations each year, thereafter.

In order to determine the labour requirements for different operations, a consensus approach was taken, obtaining information from a few sources (Nelliath, 1981; Coconut Development Schemes of the Kerala State Co-operative Central Land Mortgage Bank; personal discussion with the scientists, Central Plantation Crops Research Institute, Kasaragod) as it was not possible to adopt 'time and motion' approach for the purpose.

However, a significant portion of the technical coefficients relating to the inputs and output was received from the field experiments on coconut carried out at CPCRI. Both the factor and product costs are based on the prevailing prices in Kerala during 1982-'83. For avoiding the influence of wide fluctuations in labour utilization and the yield among various farm situations, the labour input has been assessed at a higher level and the yields have been considered at moderate levels than their potential under given situation. The scope of this paper is limited to coconut cultivation as a solo crop.

## RESULTS AND DISCUSSION

### Resource use-Labour

Before estimating the cost, first the operation-wise and year-wise labour inputs were assessed. The operations included fencing; land clearing and peg

marking; pitting, planting and gap filling; shading and mulching; manuring, weeding; watering; and spraying plant protection chemicals. Considering 8 hour work as 1 man-day the labour input for the three years from preparing 1 ha of coconut garden comes to 257, 115 and 126 mandays for the first, second and third year, respectively. For the subsequent four years, the labour requirement remains as 87 mandays/year and from the eighth year onwards it remains as 104 mandays/year (Table I). Since harvesting of coconut is done by the specially skilled climbers and the wages paid to them are charged differently from that of general labour, the harvesting time is not shown in Table I; but the cost of this operation has been taken into account at the relevant place.

### Resource use-Capital

Next comes the assessment of the requirements of different material inputs such as seedlings; organic and inorganic manures; plant protection chemicals and contingencies for different years. A total of 200 seedlings were considered adequate for establishing 175 palms over a period of three years. The quantity of organic manures in the form of compost was limited to 25 Kg/palm or 4.4 tonnes/ha/year. The quantum of fertilizers was fixed as per the CPCRI's recommendation of 500 g N+320 g  $P_2O_5$ +1200 g  $K_2O$ /palm/annum from the third year onwards, limiting one-third and two-thirds of it for the first and second year, respectively (Muliya, Kailasam and Das, 1982). Accordingly the full dose of fertilizers per ha in the form of urea, superphosphate and muriate of potash comes

Table I. *Estimated labour requirements in coconut cultivation in different years (mandays/ha)*

Operation	Age of plantation in year				
	1	2	3	4-7 (per yr.)	8-60 (per yr.)
Fencing with local materials and repairs	70	8	8	8	8
Land clearing and peg marking	55	-	-	-	-
Digging pits	35	-	-	-	-
Planting and subsequent gap filling	8	2	1	-	-
Shading and mulching	15	11	6	-	-
Manuring including basin opening and closing	16	18	20	22	24
Weeding/forking	10	20	25	30	36
Irrigation (pot irrigation in summer months)	42	52	60	20	24
Spraying and other plant protection	3	4	6	7	12
Total	254	115	126	87	104

to 190 Kg, 350 Kg and 350 Kg respectively. In this study, the plant protection expenditure has been limited to prophylactic measures like application of BHC 5% for the control of rhinoceros beetle and spraying of bordeaux mixture twice a year. The requirement of these chemicals gradually increases from small quantity as the canopy size of the palms develops and from the eighth year onwards the estimated quantity of BHC 5% comes to 44 Kg/ha while copper sulphate and lime requirements

come to 17.5 Kg each/ha. A contingency of Rs. 200/year for the non-bearing period and Rs. 300/year for bearing period has been considered in order to meet any sort of emergency or unforeseen expenditure, besides depreciation and upkeep of deadstocks (Table II).

#### Total investment

After determining the various inputs associated with the cultivation of coconut, their costs were ascertained. In the next stage, the cost of bringing

Table II. *Material input requirements in coconut cultivation in different years per ha*

Description	Units	Age of plantation in year					
		1	2	3	4-5 (per yr.)	6-7 (per yr.)	8-60 (per yr.)
Seedlings	Numbers	175	18	7	-	-	-
Farm yard manure	Tonnes	4.4	4.4	4.4	4.4	4.4	4.4
<i>Fertilizers</i>							
Urea	Kg	63.5	127	190	190	190	190
Superphosphate	Kg	117	234	350	350	350	350
Muriate of potash	Kg	117	234	350	350	350	350
<i>Plant protection chemicals</i>							
BHC 5%	Kg	3.5	7	14	21	28	44
Copper sulphate	Kg	3.5	7	9	10.5	14	17
Lime	Kg	3.5	7	9	10.5	14	17

the plantation upto bearing stage was assessed by computing the expenditures on labour and material inputs including contingencies from the first year to seventh year. According to this study, the cost of bringing one hectare of coconut garden to bearing or the total establishment cost per ha comes to Rs. 35,300 (Table III).

#### Annual maintenance cost

The expenditures for the eighth year and onwards becomes the annual maintenance cost for the garden and as per this estimate, it comes to Rs. 5,500 (Table III). The harvesting cost at the rate of Re 1/palm/harvest for six harvests in a year has been charged to the annual maintenance cost beginning from eighth year and this comes to Rs. 1050/ha/year.

#### Estimated productivity

Though the yield per palm varies from year to year, the expected productivity pattern as per the experimental evidence, indicates that from fifteenth year of planting it stabilizes at an average of 60 nuts/palm throughout its economic life under good management. With this assumption the yield level of 10,500 nuts/ha for an adult garden has been worked out. This yield level appears to be little more than double the present average yield of coconut in Kerala as per the official statistics and therefore, the validity of this study may be seriously questioned. Here, one has to bear in mind that the average productivity of coconut ha for the state is estimated by dividing the total production of nuts in a given year with the total area under this crop

Table III. *Costs of investment and maintenance in coconut cultivation (Rs/ha)*

Item	Rate/unit	Investment cost (Initial 7 yrs. expd.)		Maintenance cost (Annual expd.)	
			%		%
Labour	20.00/man day	16,860	47.8	2,080	37.8
Materials for fencing shading and mulching	-	3,800	10.8	-	-
Seedling	6.00/Seedling	1,200	3.4	-	-
Farm yard manure	100.00/Tonne	3,080	8.6	440	8.0
Fertilizers:					
Urea	2.20/kg	2509	}	418	}
Superphosphate	1.10/kg	2311		385	
Muriate of potash	1.30/kg	2730		455	
Total fertilizer cost	-	7,550	21.4	1,258	22.9
BHC 5%	1.10/kg	134.75	}	48.40	}
Copper sulphate	17.00/kg	1164.50		297.50	
Lime	1.50/kg	102.75		26.25	
Total plant protection chemicals	-	1,402	4.0	372	6.8
Harvesting charges	1.00/palm/harvest	-	-	1,050	19.1
Contingencies	200.00/yr.	1,400	4.0	300	5.4
		35,292	100.0		
<b>Total</b>		<b>Say 35,300</b>		<b>5,500</b>	<b>100.0</b>

in that year without taking into consideration the distribution of pre-bearing, early bearing and senile palms in the population at that stage. Under that score, the official estimate is certainly an under-estimate (Das, 1984). Besides this, as stated earlier, a vast majority of the coconut gardens in Kerala are now left under gross neglect and quite a sizeable proportion of these are also in the grip of root (wilt) disease. As a result of these facts, the growth rates in productivity of coconuts in most of the districts of Kerala are now found to be negative (Das et al, 1982). This study however, examines the economic viability of coconut cultivation in Kerala under a given package which calls for greater resource mobilisation and thereby ensures higher level of productivity. The on-farm-experiments and out-reach-programmes of CPCRI in the root (wilt) tracts have also revealed that the productivity of root (wilt) palms could be raised by 26 to 30 per cent with proper management (Bavappa, 1973; Jayasankar and Radha, 1982).

#### Estimating cost of production

Cost of producing coconuts are made up of two major components, commonly designated as (1) establishment or overhead costs and (2) maintenance costs. The cost of bringing upto bearing one hectare of coconut garden and the annual cost of maintenance per hectare have already been indicated. For estimating the cost of production per nut the following considerations have been taken into account:

Investment on a coconut plantation as in the case of other investments is an asset that cannot be recycled. The return from the plantation during its yielding period should cover the entire investment plus a fair rate of interest (in this case 10 per cent) in addition to the annual maintenance cost in the bearing stage. The total investment, namely initial seven years expenditure and the compound interest thereon have been reduced to an annuity bearing 10 per cent interest. The annuity was calculated by using the formula:

$$A = \frac{P}{n \sum_{i=1}^n \frac{1}{(1+r)^i}}$$

Where A = annuity value;  
P = total investment;  
r = rate of interest and;  
n = life of the plantation.

The annuity value in this study comes to Rs. 6603/ha and it has been added to the annual maintenance charges to arrive at the total annual cost per hectare. Here, the total annual cost comes to Rs. 12103/ha. From this amount, the income from dry leaves and petioles have been deducted and the net cost is then divided by the average annual production of nuts during stabilized period (in this case 10,500 nuts) to arrive at the cost of production per nut. Accordingly, the cost of production comes to Rs. 1.10/nut under the given situation (Table IV).

It may be appropriate to note at this stage that the value of land was not taken into consideration as an item of

Table IV. *Estimated cost of production of coconut in Kerala (Rs/ha)*

Sl. No.	Particulars	Without land value	With land value @ Rs. 50,000/ha
1.	Investment during establishment of plantation upto bearing	35,300	85,300
2.	Compound interest on investment at 10% (1-7 yrs.)	20,512	67,948
3.	Total investment (Sl. no. 1+2)	55,812	1,53,248
4.	Annuity value (share of total investment to be adjusted over a period of 60 years)	6,603	15,393
5.	Annual maintenance cost	5,500	5,500
6.	Total cost/ha/yr (Sl. no. 4+5)	12,103	20,893
7.	Income from dry leaves and petioles/year	525	525
8.	Net cost of production of nuts/ha/year (Sl. no. 6-7)	11,578	20,368
9.	Average production of nuts/ha/year	10,500 nuts	
10.	Cost of production per nut (Sl. no. 8÷9)	1.10	1.94

the investment, since land is not a wasting asset, when proper nutrition is provided to land for its exploitation. Further, land value in Kerala is in unimaginably increasing trend whose rate of appreciation is beyond the limit of bank rate. Logistically, even if land is kept fallow, the return to investment on land will more than compensate its cost by the present rate of appreciation. Moreover, coconut in Kerala is by and large, a backyard crop of the small-holders where the main share of the investment, on land goes to house of the owner (as the land value is decided by the locational factors) even though the house occupies a small portion of the compound where coconut palms find place not only as a source of food and cash but also for aesthetic value.

However, considering the basic principle of business management if we include a modest land value of Rs. 50,000/ha to the investment and then re-estimate the figures, the annuity

value comes to Rs. 15,393 and the cost per nut goes upto Rs. 1.94 from the earlier estimate of Rs. 1.10 (Table IV). The production cost will further go up if higher land value will be considered for the purpose, for obvious reasons.

#### Estimating returns

For estimating the returns, the farm-gate price is more relevant than other prices. In the year 1982-83, the average farm-gate price for coconuts in Kerala was Rs. 1.50/nut. Considering this price and the production cost of Rs. 1.10, the net return from one hectare of coconut garden comes to Rs. 4200/year. However, since coconut is a small holder crop, at least 75 per cent of labour required for various operations in this crop is expected from the farmer's family source itself. The imputed value of family labour in that case comes to Rs. 1560 from the contribution of 78 mandays/year. In view of this, the estimated returns to investment and family labour in coconut gardens come

Table V. *Estimated returns from coconut cultivation (per ha/year)*

Sl. No.	Particulars	Rs. Ps.
1.	Farm-gate price of coconut/nut	1.50
2.	Cost of production/nut	1.10
3.	Net return/nut (Sl. no. 1-2)	0.40
4.	Net return on investment/ha (Sl. no. 3×10,500)	4,200.00
5.	Family labour income from coconut holding (for 78 mandays @ Rs. 20/day)	1,560.00
6.	Return to investment and family labour (Sl. no. 4+5)	5,760.00

to Rs. 5760/ha/year (Table V). Further, when we consider inter/mixed croppings in coconut gardens the returns become higher than that observed in the case of monoculture of coconut.

#### CONCLUSION

This study clearly brings out the fact that coconut cultivation under good management is a profitable proposition in Kerala. Since the scope of this paper is limited to monoculture of WCT variety of coconut, the full economic potential of this crop with hybrids as well as under inter/mixed cropping has not been expressed here. As it appears, owing to the economic pressure on land and for deriving maximum benefits from the available

resources, most of the coconut gardens in Kerala are now intercropped with annuals, semi-perennials and perennials. Under these situations, the cost of production of nuts are found to be lower and the returns from the coconut-based farming systems are higher than what has been observed in this study, provided the systems are planned scientifically.

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