



ECONOMIC ANALYSIS OF OIL PALM PRODUCTION IN EAST GODAVARI DISTRICT OF ANDHRA PRADESH

A. SUDHEER VARMA, V. TULASI DAS, I. BHAVANI DEVI AND G. MOHAN NAIDU

Institute of Agribusiness Management, S.V Agricultural College, ANGRAU, Tirupati-517502, Chittoor Dt.
Andhra Pradesh, India

Date of Receipt: 9.7.2018

ABSTRACT

Date of Acceptance: 1.8.2018

The commercial cost of cultivation incurred to raise one hectare of oil palm during its life span of 25 years stood at Rs.2799460.24. The gross income realized by the oil palm orchardists, during its lifespan amounted to Rs. 3916960 per hectare. The respective net income received by the farmers stood at Rs.1117499.76. The net present value was as high as Rs. 386046 at 12 per cent and Rs.9889.73 at 28 per cent discount rates. The benefit- cost ratio was 1.04 even at higher discount rate of 28 per cent. The IRR was calculated at 29.30 per cent. All the measures indicated that oil palm cultivation is a profitable proposition.

KEY WORDS: Oil Palm, economic viability

INTRODUCTION

India holds a significant share in world oil seed production. It is second largest producer of groundnut after China and third largest producer of rapeseed after China and Canada. Of all the known oil yielding crops, oil palm ranks first which yield 4-6 tonnes of oil compared to less than 1 tonne/ hectare from other edible oil crops. Oil palm, like other vegetable oils, could be used to produce biodiesel. The demand for edible oil consumption is increasing by 5-5.5 per cent annually and to meet the growing demand we need 1 million tonne of additional output every year. To bridge this gap, India is importing 11-12 million tonnes of palm oil annually (Holla and Rajan, 1992).

Palm oil could satisfy the India's oil and fats demand without straining the earth's limited land and energy resources. Among states, Andhra Pradesh and Karnataka were found to possess the maximum area under oil palm cultivation with 145073 hectares and 34589 hectares respectively. In Andhra Pradesh, East Godavari is one of the important districts in oil palm cultivation. As it has considerable area under oil palm, it is felt necessary to probe into economic aspects of oil palm (Motilal, 1996).

MATERIALS AND METHODS

East Godavari district was purposively chosen for the study as it has considerable area of 26,522 hectares under oil palm. All the mandals in East Godavari district growing

*Corresponding author, E-mail:iabm.angrau@gmail.com

oil palm orchards were listed out and arranged in descending order of their area under oil palm cultivation and the top 2 mandals were selected purposively. Two villages from each mandal based on criterion of highest area under oil palm were purposively selected. The list of farmers in the selected villages was prepared and 40 farmers were randomly selected. Survey method was employed to collect the data from the oil palm growers. The primary data pertaining to the production aspects of oil palm were collected directly from the farmers with the help of a specially designed schedule by personal interview. The data Collected were subjected to conventional tabular analysis to workout costs and returns of oil palm production.

Discounted cash flow techniques were used to analyze the capital productivity of oil palm orchards. The following discounted measures were used in the analysis viz., Net Present Worth, Benefit Cost Ratio and Internal rate of Return.

NET PRESENT WORTH (NPW):

It is sometimes referred to as net present value. It is the present worth of the incremental net benefits or incremental cash flow stream. The selection criterion of the project depends on the positive value of the net present worth discounted at the opportunity cost of the capital (Srilatha, 2015).

$$\text{Net present worth} = \sum_{j=1}^n \frac{B_j - C_j}{(1+i)^j}$$

where B_j = Benefits in j^{th} year

C_j = Costs in j^{th} year

i = Discount rate

n = Number of years

BENEFIT COST RATIO (BCR)

This ratio compares the present worth of costs with present worth of benefits. The common procedure of selecting the project is to choose the project having the B.C. Ratio of more than one, discounted at opportunity cost of capital. This ratio was arrived by using the following formula (Kumar, 1992).

$$BCR = \frac{\sum_{j=1}^n \frac{B_j / (1+i)^j}{C_j / (1+i)^j}$$

Where B_j = Benefits in rupees in j^{th} year

C_j = Costs in rupees in j^{th} year

i = Discount rate

n = Number of years

INTERNAL RATE OF RETURN (IRR)

It represents the average earning capacity of an investment over the economic life period of the project. It is that discount rate which just makes the net present worth of cash flow equal to zero. Mathematically it can be represented as

Internal rate of Return =

Lower discount rate + Difference between higher and lower discount rates ×

$$\left\{ \frac{\text{NPW at lower discount rate}}{\text{Absolute difference between present worth of two discount rates}} \right\}$$

RESULTS & DISCUSSION

Oil palm is a perennial oil seed crop and once established, the crop can be economically cultivated for about 25 years. The gestation period of oil palm orchard is about 3 years. The economic yields are coming from 4th year onwards. Therefore the cost incurred in establishing the orchard during the pre-bearing period was considered as establishment cost. The establishment cost included the expenditure on land preparation, digging of pits, plant material and planting and other operations for the plantation together with land. The maintenance costs included the expenditure on manuring, fertilization, plant protection, weeding, watch and ward and harvesting.

COSTS OF OIL PALM ORCHARD

The per hectare costs incurred in establishing oil palm orchards during pre-bearing period (1-3 years) are presented in Table 1.

The total costs incurred during its pre-bearing period (1-3 years) stood at Rs.204914.24 of which Rs.110922.94 (54.13%) was variable costs and Rs.93991.3 (45.87%) fixed costs.

It can be seen that among the total costs the rental value of owned land formed the major item with Rs.62037.5 (30.28%) followed by human labour (23.04%), fertilizers (12.23%), manures (7.70%), interest on fixed capital (6.93%), machine labour (5.47%), depreciation (5.08%), annual share of establishment cost (2.85%), interest on working capital (1.92%), pesticides (1.61%), electricity charges (1.46%), land revenue (0.73%) and plant material (0.70%).

The total costs incurred to establish one hectare of oil palm during first year amounted to Rs.70072.12 out of which Rs.41340.92 (59%) was spent on variable resources and the remaining Rs.28731.2 (41.00%) pertained to fixed costs. Among the variable costs human labour took a lion's share with Rs.19248 which accounted for 27.47 per cent of the total costs incurred during 1st year of establishing oil palm. Oil palm cultivation is highly dependent on labour because there are some specialised operations like planting which can be done only by special teams. Next to human labour, machine labour was the second major item of variable costs constituting 11.42per cent of the total cost with an amount of Rs.8000 followed by manures (Rs.5050), fertilizers (Rs.4073.64), interest on working capital (Rs.1439.28), plant material

Economic analysis of oil palm production in East Godavari District of Andhra Pradesh

(Rs.1430), pesticides (Rs.1100) and electricity charges (1.43%). Among the fixed costs, the rental value of owned land occupied the first place with Rs.20026.2 (28.58%) followed by interest on fixed capital with Rs.4732.51 (6.75%), depreciation charges with Rs.3472.5 (4.96%) and land revenue (Rs.500).

The cost incurred to maintain one hectare of oil palm orchard during the remaining years of pre-bearing period stood at Rs.64389.88 and Rs.70452.24 during second and third years respectively. The respective total variable costs on an average during the above said years were Rs.32108.68 (49.86%) and Rs.37473.34 (53.19%). Among the variable costs again human labour turned out to be major item which worked out to Rs.13767 (21.38%) and Rs.14193 (20.14%) followed by fertilizers with Rs.8170 (12.69%) and 12813.4 (18.19%), manures with Rs.5320 (8.26%) and Rs.5410 (7.68%), machine labour with Rs.1600 (2.48%) and Rs.1600 (2.27%), interest on working capital with Rs.1151.69 (1.78%) and Rs.1356.94 (1.92%), pesticides with Rs.1100 (1.71%) and Rs.1100 (1.56%), electricity charges with Rs.1000 (1.56%) and Rs.1000 (1.42%) during 2nd and 3rd years respectively.

Among the fixed costs, rental value of owned land formed the major part accounting for 32.08 per cent and 30.31 per cent of the total costs respectively during second and third years. The interest on fixed capital, depreciation charges, annual share of establishment cost and land revenue formed other important items of fixed costs in the order.

The cost of cultivation oil palm per hectare from 4th to 25th year are presented in Table 2. From 8th year the yield of the tree is stabilized and also the costs to be incurred also remains constant. It is revealed from the table that the total cost per hectare increased from Rs.79972.13 in 4th year to Rs.120699.04 in 8th year and remained constant during the remaining period of life. The variable costs increased from Rs.43314.13 in 4th year to Rs.59674.64 during 8th to 25th year.

Among the variable costs, human labour was the major item occupying 17.68 -21.27 per cent of the total costs from 5th year to 8th -25th year. As oil palm is more labour dependent for specialised operations human labour occupies a lion's share. Fertilizer accounts for maximum share after human labour. As oil palm is a gross feeder, it needs a continuous and balanced supply

of nutrients from 4th year with a constant dose. Expenditure on machine labour was the next element after fertilizer. Many operations like transportation of manures, spraying of pesticides and transportation of fresh fruit bunches need machine labour. It increased from Rs.5032 in 4th year to Rs.9632 in 8th -25th year. Manures were the next major item of cost. It increased from Rs.6020 in 4th year to Rs.7560 in 8th -25th year. Similar trends were observed for interest on working capital, electricity charges and pesticides during bearing period. Among the fixed costs rental value of owned land took a lion's share and it remains constant from 5th year. This increase was due to increased yield of oil palm. Interest on fixed capital was 4.01 per cent followed by depreciation charges accounted for 2.94 per cent. Annual share of establishment cost accounted for 2.48 per cent and land revenue for 0.42 per cent of the total costs.

From the above discussion it can be concluded that 4th to 7th year was considered to be yield increasing period in the economic life of oil palm orchard demanding greater use of all inputs. The total costs incurred towards the cultivation of oil palm from 4th to 25th year worked out to Rs.2594546.38 per hectare of which variable costs amounted to Rs.1276375.98 (49.19%) and fixed costs amounted to Rs.1318170.4 (50.81%).

RETURNS FROM OIL PALM ORCHARD

The per hectare gross income, total costs and net income from intercrops and oil palm during pre-bearing period are presented in Table 3.

It is clear from the Table 3 that the gross income obtained from oil palm orchards during its pre-bearing period, amounted to Rs.79028.2 which was contributed by intercrops. It is clear from the table that the oil palm orchardists incurred Rs.228238.94 towards cost of cultivation during pre-bearing period out of which Rs.23324.7 were incurred to raise intercrops and Rs.204914.24 to establish one hectare of oil palm. The income received during pre-bearing period could not compensate the costs incurred during the same period resulting in the negative net return of Rs.149210.45.

The particulars of Table 4 indicate that there was an increase in yield from 5.17 tonnes (4th year) to 20.23 tonnes (7th year). Then there was stabilization in yield from 8th year with an average yield of 24.16 tonnes. The gross income also increased from Rs.41360 in 4th year to

ECONOMIC VIABILITY OF OIL PALM ORCHARD:

The costs and returns are not the perfect measures to assess the profitability from investment made on oil palm orchards. These costs and returns are not comparable with the returns from field crops that are grown in the area. Before making a choice on any enterprise, it becomes necessary to examine the economic feasibility of that enterprise. Several techniques are available for evaluating the economic viability of oil palm orchards. For this project evaluation techniques were employed. Net present worth, Benefit-cost ratio and internal rate of return were employed to examine the economic feasibility of investment on oil palm orchards. In the present study the costs and returns had been discounted at 12, 16, 20, 24 and 28 per cent to estimate net present worth. It was observed from Table 5 that the net present worth was high and ranged from Rs.386046 at 12 per cent to Rs. 9889.73 at 28 per cent discount rates. The high positive net present worth even at higher discount rates indicated the soundness of the investment made in oil palm orchards.

The benefit-cost ratios were 1.81, 1.58, 1.38, 1.20 and 1.04, at 12, 16, 20, 24 and 28 per cent indicating that the investment on oil palm cultivation was economically feasible. The internal rate of return was found to be 29.30 per cent which was much higher than the bank rate of interest on long term loans (14%) and hence the oil palm enterprise is highly profitable.

REFERENCES

- Holla, H.S and Rajan, N.S. 1992. Vegetable oil scenario prospects of palm oil in India. *Indian Oil Palm Journal*. 2: 4-12.
- Kumar, G.V.K. 1992. Economics of oil palm cultivation and its profitability in Bhadra area of Shimoga, Karnataka. *Indian Oil Palm Journal*, 2: 13-21.
- Motilal, V.S. 1996. Oil palm-Sunshine for bleak edible oil scenario, *National Bank News Review*. 12: 42-44.
- Srilatha, Ch. 2015. Economic aspects of oil palm production in Nellore district of Andhra Pradesh. *International Journal for Research in Emerging Science and Technology*, 5: 123-129

Economic analysis of oil palm production in East Godavari District of Andhra Pradesh

Table 1: Cost structure on oil palm orchards during pre-bearing period (1st to 3rd year)

					(Rs/ha)
S. No	Particulars	1 st year	2 nd year	3 rd year	Total
A	VARIABLE COSTS				
1	Human Labour	19248 (27.47)	13767 (21.38)	14193 (20.14)	47208 (23.04)
	Owned	2719.74 (3.88)	1924.63 (2.99)	1952.96 (2.77)	6597.33 (3.22)
	Hired	16528.26 (23.59)	11842.37 (18.39)	12240.04 (17.37)	40610.67 (19.82)
2	Machine Labour	8000 (11.42)	1600 (2.48)	1600 (2.27)	11200 (5.47)
	Owned	1200 (1.71)	240 (0.37)	240 (0.34)	1680 (0.83)
	Hired	6800 (9.71)	1360 (2.11)	1360 (1.93)	9520 (4.64)
3	Plant material cost	1430 (2.04)	-	-	1430 (0.70)
4	Manures	5050 (7.21)	5320 (8.26)	5410 (7.68)	15780 (7.70)
5	Fertilizers	4073.64 (5.81)	8170 (12.69)	12813.4 (18.19)	25057 (12.23)
6	Pesticides	1100 (1.57)	1100 (1.71)	1100 (1.56)	3300 (1.61)
7	Electricity charges	1000 (1.43)	1000 (1.56)	1000 (1.42)	3000 (1.46)
8	Interest on working capital	1439.28 (2.05)	1151.69 (1.78)	1356.94 (1.92)	3947.91 (1.92)
	Total variable costs	41340.92 (59)	32108.68 (49.86)	37473.34 (53.19)	110922.94 (54.13)
B.	FIXED COSTS				
1	Land revenue	500 (0.71)	500 (0.78)	500 (0.71)	1500 (0.73)
2	Rental value of owned land	20026.2 (28.58)	20656.8 (32.08)	21354.5 (30.31)	62037.5 (30.28)
3	Depreciation	3472.5 (4.96)	3472.5 (5.39)	3472.5 (4.93)	10417.5 (5.08)
4	Interest on fixed capital	4732.51 (6.75)	4732.51 (7.35)	4732.51 (6.72)	14197.5 (6.93)
5	Annual share of establishment cost	-	2919.39 (4.54)	2919.39 (4.14)	5838.78 (2.85)
	Total fixed costs	28731.2 (41.00)	32281.2 (50.14)	32978.9 (46.81)	93991.3 (45.87)
	Total costs(A+B)	70072.12	64389.88	70452.24	204914.24

Note: Figures in parentheses indicate per centages to total

Table 2: Cost structure on oil palm orchards during bearing period (4th to 25th year)
(Rs/ha)

S. No.	Particulars	4 th year	5 th year	6 th year	7 th year	8 th – 25 th year	Total
A VARIABLE COSTS							
1	Human Labour	16002 (20)	19497 (17.68)	21960 (19.21)	23655 (20.14)	25674 (21.27)	543246 (20.94)
	Owned	2344.29 (2.93)	2869.96 (2.60)	3307.18 (2.89)	3548.25 (3.02)	3753.54 (3.11)	79633.4 (3.07)
	Hired	13657.71 (17.07)	16627.04 (15.08)	18652.82 (16.32)	20106.75 (17.12)	21920.46 (18.16)	463612.6 (17.87)
2	Machine labour	5032 (6.29)	6800 (6.17)	7944 (6.95)	8840 (7.53)	9632 (7.98)	201992 (7.78)
	Owned	754.8 (0.94)	1020 (0.92)	1191.6 (1.04)	1326 (1.13)	1444.8 (1.20)	30298.8 (1.17)
	Hired	4277.2 (5.35)	5780 (5.25)	6752.4 (5.90)	7514 (6.40)	8187.2 (6.78)	171693.2 (6.61)
3	Manures	6020 (7.54)	6470 (5.87)	6780 (5.93)	7230 (6.15)	7560 (6.26)	162580 (6.27)
4	Fertilizers	12813.4 (16.02)	12813.4 (11.62)	12813.4 (11.22)	12813.4 (10.91)	12813.4 (10.62)	281894.8 (10.86)
5	Electricity charges	1000 (1.26)	1000 (0.90)	1000 (0.87)	1000 (0.85)	1000 (0.83)	22000 (0.85)
6	Pesticides	900 (1.12)	900 (0.82)	900 (0.79)	900 (0.77)	900 (0.75)	19800 (0.76)
7	Interest on working capital	1546.73 (1.93)	1743.62 (1.58)	1875.94 (1.64)	1982.57 (1.69)	2095.24 (1.73)	44863.18 (1.73)
	Total variable costs	43314.13 (54.16)	49224.02 (44.64)	53273.34 (46.61)	56420.97 (48.04)	59674.64 (49.44)	1276375.98 (49.19)
B. FIXED COSTS							
1	Land revenue	500 (0.62)	500 (0.46)	500 (0.44)	500 (0.43)	500 (0.41)	11000 (0.42)
2	Rental value of owned land	25033.6 (31.30)	49400 (44.81)	49400 (43.22)	49400 (42.06)	49400 (40.93)	1062433.6 (40.96)
3	Depreciation	3472.5 (4.34)	3472.5 (3.15)	3472.5 (3.04)	3472.5 (2.96)	3472.5 (2.88)	76395 (2.94)
4	Interest on fixed capital	4732.51 (5.93)	4732.51 (4.29)	4732.51 (4.14)	4732.51 (4.03)	4732.51 (3.92)	104115.22 (4.01)
5	Annual share of establishment cost	2919.39 (3.65)	2919.39 (2.65)	2919.39 (2.55)	2919.39 (2.48)	2919.39 (2.42)	64226.58 (2.48)
	Total Fixed costs	36658 (45.84)	61024.4 (55.36)	61024.4 (53.39)	61024.4 (51.96)	61024.4 (50.56)	1318170.4 (50.81)
	Total	79972.13 (100)	110248.4 2 (100)	114297.74 (100)	117445.37 (100)	120699.04 (100)	2594546.38 (100)

Note: Figures in parentheses indicate percentages to total

Economic analysis of oil palm production in East Godavari District of Andhra Pradesh

Table 3 : Returns from oil palm orchards during pre-bearing period (1st to 3rd year)

(Rs/ha)					
S. No.	Particulars	1 st year	2 nd year	3 rd year	Total
1	Gross income				
	Inter crops	25706.1	28498.4	24823.7	79028.2
	Oil palm	-	-	-	-
	Total	25706.1	28498.4	24823.7	79028.2
2	Total costs				
	Inter crops	7259.32	7674.51	8390.82	23324.7
	Oil palm	70072.12	64389.88	70452.24	204914.24
	Total	77331.44	72064.39	78843.06	228238.94
3	Net Income				
	Inter crops	18446.78	20823.89	16432.88	55703.55
	Oil palm	-70072.12	-64389.88	-70452.24	-204914
	Total	-51625.34	-43565.99	-54019.36	-149210.45

Table 4: Returns from oil palm orchards during bearing period (4th to 25th year)

S. No.	Particulars	4 th year	5 th year	6 th year	7 th year	8 th year- 25 th year	Total
1	Yield (in tonnes)	5.17	12.02	17.32	20.23	24.16	489.62
2	Gross income (Rs.)	41360	96160	138560	161840	193280	3916960
3	Total costs(Rs.)	79972	110248	114298	117445	120699	2594546
4	Net income (Rs.)	-38612	-14088	24262	44395	72581	1322414

Table 5: Estimates of economic viability of oil palm orchard

S. No	Particulars	12%	16%	20%	24%	28%
1.	Net present worth (Rs.)	386046	215399.9	113630.9	50428.2	9889.73
2.	Benefit cost ratio	1.81	1.58	1.38	1.20	1.04
3.	IRR	29.30				