



Productivity Potential and Profitability of oil Palm Cultivation (A Case Study of Krishna District, Andhra Pradesh)

KEYWORDS

Oil Palm, Fresh Fruit Bunches, Sensitivity Analysis, Net Present Value, Benefit - Cost ratio, Internal Rate of return

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ABSTRACT *Palm oil is the world's highest yielding oil crop, with an output 5–10 times greater per hectare than other leading vegetable oils. Combined with historically low prices, relative shelf stability, and reported nutritional benefits, palm oil leverages natural advantages that position it as a likely long-term staple of the global diet. Rapidly expanding population and changing consumption patterns, as well as increasing demand from the bio energy and oleo chemicals industries, have resulted in sustained high prices for crude palm oil. These market forces have driven enormous growth of the palm oil industry in recent decades. The present paper investigates the economic profitability and incentives for Oil Palm Cultivators to invest in oil palm in Krishna district of Andhra Pradesh. Data was obtained by conducting a questionnaire survey of 200 farmers who cultivate oil palm. The financial viability of oil palm cultivation for farmers was assessed by calculating three financial indicators NPV, BCR and IRR.*

INTRODUCTION

Agriculture is the backbone of Indian Economy and is central to all strategies of planned economic development in India. Oils and fats form an integral part of food, condiments, cosmetics, soaps and detergents, lubricants and laxatives besides having medicinal and therapeutic value. Thus these oilseed groups of crops occupy an important place in India's agricultural economy. The domestic demand for vegetable oils and fats has been rising at the rate of about 4 percent per annum whereas domestic output has been rising at just around 2 percent per annum only. This demand-supply gap has forced the government to resort to large-scale imports of edible oils. The rising import bill on this account has caused great alarm to the government. The growth and stability of India's food economy is, therefore, very much linked with the growth and stability of its economy. Among oilseeds, Oil Palm plays significant role to meet the vegetable oil requirements in India. Palm oil is considered as a "Miracle Oil" due to its diversity of uses for both food and non-food product. Palm oil has become the leading vegetable oil produced globally accounting for one quarter of global consumption and nearly 60% of international trade among vegetable oils. Over 85% of global palm oil is consumed as edible oil and in processed foods. Over 70% of global palm oil is consumed in Asia as staple cooking oil. Palm oil is also used in soaps, detergents, cosmetics, oleo chemicals, and lately as a feedstock for the production of biodiesel. In this context an attempt has been made to conduct financial assessment of Oil palm cultivation from the data gathered from the Oil Palm cultivators of Krishna District in Andhra Pradesh.

REVIEW OF CURRENT LITERATURE

Several studies have been made in the area of oil seed cultivation in India and abroad in general and palm oil cultivation in particular. Most of these studies are in the form of Committee Reports, Research Papers, Books, Journals, and Doctoral Theses.

Suseni Budidarsono, Arif Rahmanulloh, Muhammad Sofiyuddin (2013) in their study on 'Economic Assessment of Oil Palm Production' through the research found that oil palm plantations are attractive to investors. The growing worldwide

interest in bio-fuel as an alternative for fossil fuels will increase demand for its feed stock and lead to the expansion of oil palm plantation. Also oil palm processing units are attractive segment for investment. **Rethinam (2009)** in his study on "Recent Advances in oil palm – A Global perspective," felt that a 'Three Pronged Strategy' should be adopted in planning the research and development activities for the industry. He suggested measures like enhancing productivity, improving efficiency of ECO plantation, Capacity development and community development, crop insurance, strengthening the research infrastructure to satisfy the developmental need in order to meet the requirement of economically viable, environmentally sound and socially acceptable oil palm development. **Noor-mahayu, Khalid and Elsadig(2009)** in their study on "Financial Assessment of Oil Palm Cultivation on Peat land in Selangor, Malaysia" explores the social and economic basis of oil palm cultivation in Peat land. Also they found that oil Palm cultivation is a profitable investment so long as growth conditions, costs, selling price and interest rate do not fluctuate substantially. **Venkata Kumar, Ramana Rao, Padmaiah, Hegde (2009)** have conducted a study on productivity potentials and profitability of non-monetary, low-cost and cost-effective oil-seeds production technologies. **Rethenam (2008)** founder of Society for Promotion of Oil Palm Research and Development discussed in detail the membership of the society, privileges of members, subscription details and palm research and development. He expressed that Society for Promotion of Oil Palm Research and Development (SOPOPRAD) was formed to discuss common issues and also to get to know financial issues, technology transfer, programs identified and solutions found out in the cultivation of oil palm. **Chadha (2006)** committee in their report on "progress and potential of oil palm in India" found that during last 15 years, the industry had seen several ups and downs in the rate of area expansion, yield potential, price fixation and establishment of processing facilities in the states. **Ninar (1988)** in his book "Edible oil seeds growth, area responses and prospects in India" made a comprehensive study of the production of oil seeds and a systematic in-depth analysis of factors influencing their supply.

METHODOLOGY

This paper explores the social and economic basis of oil palm cultivation in Krishna district in the state of Andhra

Pradesh. Data were obtained by conducting a questionnaire survey of 200 farmers who cultivate oil palm in the Krishna District of Andhra Pradesh. Financial viability of oil palm cultivation for farmers was assessed by calculating three financial indicators (NPV, BCR and IRR). Greater annual returns can be achieved over 20–25 years than over shorter periods, especially of less than 10 years.

The primary data was collected from 200 farmers who are cultivating oil palm, using survey type research with a cross-sectional design. The survey involved completing a questionnaire covering financial aspects of oil palm cultivation (Appendix 1) during a face-to-face interview with each farmer. The social backgrounds of the farmers and their attitudes to oil palm cultivation were explored by empirical analysis and cross tabulation of questionnaire data.

In this study the financial return of Oil Palm is estimated by considering the financial aspects like farmer's income on Oil Palm and income on intercrop. This did not include any externalities. Financial performance is evaluated in terms of Net Present Value (NPV), Benefit-Cost Ratio (BCR) and Internal Rate of Return (IRR) over a period of 21 years. The costs of production taken into account are establishment cost, input cost and labour cost. Establishment costs are incurred during the first years of planting and include clearing and preparation of the land, cost of seedling and sowing. The input costs include fertilizer cost, cost of weedicides, pruning, mulching, harvesting, fencing etc. Labour cost incurred on fertilizing, pruning weeding mulching, harvesting, bunch loading etc.

OBJECTIVES

The current research paper has broad research objective of studying financial aspects of oil palm cultivation with special reference to Krishna District. The specific objectives include the following

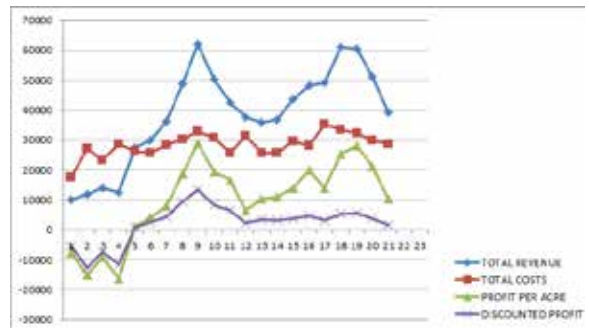
- To estimate return of Oil Palm
- To evaluate the financial performance of Oil Palm

ANALYSIS AND INTERPRETATION

The yield depends on the maturity of the Oil Palm. It will normally starts from fourth year onwards so that the first fruits are borne in the fourth year. The yield of oil palm can be affected by many factors like age of Oil Palm, unusual periods of drought, prolonged heavy rain etc. The profit level is influenced by planting density, yield and market price. The market price of this crop fluctuates; the FFB price has recently been increasing. When the survey was conducted the average market price was Rs.5600 per Tonne.

Other data required for the calculations are discount rate and the project life (Number of years for discounting). In attaching values to the inputs and outputs, constant prices are assumed. The discounted sum of total revenue (also known as the present value of benefit) and the discounted sum of total cost (Present value of cost) are calculated annually over 21 years using an interest rate of 9%.

Figure 1 Estimated total annual cost, annual revenue, profit and discounted profit in Indian currency (Rupees) per acre of Oil Palm Production by 200 farmers in Krishna District with market selling price of Rs. 5600/Tonne Fresh Fruit Bunches and long-term interest rate 9%.



The above fig. shows the pattern of annual cost and returns for Oil Palm production for 21 years and table no. gives a detailed cash flow. Costs are high in the first years because of establishment costs incurred in clearing, preparing the land and planting the Oil Palm plants. There is no revenue during the first three years because the Oil Palm trees starts producing Fresh Fruit Bunches from fourth year. In the fourth year also the revenue is negative due to low yield and high costs. But in the Oil Palm cultivation, even in the initial four years considerable revenue is obtained through the cultivation of intercrop. Revenue starts to climb steeply from fifth year and continues to increase annually until ninth year. In the following years, income begins to fluctuate but remains fairly stable until 19th year, after which it begins to decline due to the age of the (Over mature) trees.

Applying the interest rate of 9% the discounted sum of total revenue is Rs.296982/- and the present value of total costs is Rs.252047/-. By subtracting the present value of total costs from discounted sum of total revenue NPV is obtained for Oil Palm cultivation at Rs.44935/-. By calculating the ratio of these two values BCR of 1.17 is obtained. These values indicate that the overall profitability of the crop is low and to make oil palm cultivation an efficient investment either the price of Oil Palm Fresh Fruit Bunches have to be increased or the cost of cultivation has to be decreased.

The IRR obtained as 11.25 and it is only 2% more than the interest rate. Hence it is not much worthwhile investment.

Sensitivity Analysis

The financial indicators provide convenient indices for assessing financial performance, but the disadvantage is that all of them are static. In the real world factors that affect them vary. Particularly when these changes are in the pessimistic direction, the conclusions of the analysis in terms of viability of project will no longer hold. Therefore it is better to calculate the financial indicators using different values in order to explore how robust the financial performance of Oil Palm cultivation under changing market conditions. This process is known as sensitivity analysis and it enables to estimate the financial risks associated with such developments. The crucial factors that are likely to affect the financial indicators are as follows

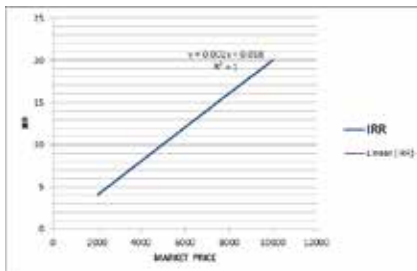
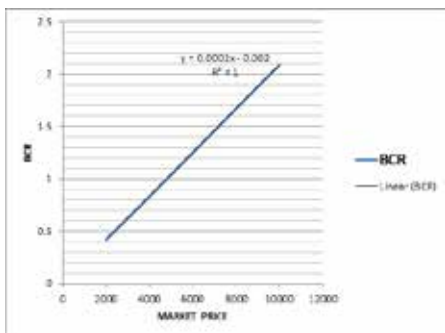
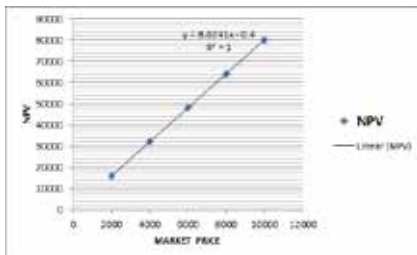
1. The market price of Oil Palm FFB, which effects the income derived from selling each year's crop.
2. The cost of material inputs and labour.
3. Different costs which are associated with sowing to harvesting.

This analysis involves evaluation of the financial indicators assuming defined percentage or absolute changes in the relevant inputs, considered. In this study the analysis is carried out by recalculating NPV>BCR and IRR for various assumed changes in the crucial factors listed above, for ex-

ample a 10 percent increase in some or the entire project costs. Comparing the resulting changes in the values of the financial indicators gives insights into how sensitive the project is to changes in each of the factors.

To examine the effect of risk factor over the cultivation of Oil Palm sensitivity analysis is used. In pessimistic direction the market revenue reduced by 10 percent, then the discounted total revenue declined from Rs.296982 to Rs.267285. But it did not change the discounted sum of cost Rs. 252047/-. Thus the net benefit of the farmer (NPV) is reduced from Rs. 44935/- to Rs.15238/-.The Benefit Cost Ratio correspondingly reduced from 1.17 to 1.06 and IRR falls from 11.25 to 9.6 just nearer to the minimum required rate of return.

In the second direction the fertilizer, harvesting and labour costs increased by 10 percent, increases the discounted total cost from Rs.252047 to Rs.264497, reducing the NPV from Rs.44935 to Rs.32485/-. If all costs are increased by 10%, the discounted total cost raises from Rs. 252047/- to Rs. 277890/-. NPV, BCR and IRR fell to 19092, 1.06 and 9.09 from 44935, 1.17 and 11.25 respectively. Thus the financial indicators are more sensitive to a 10% reduction in the market price of Fresh Fruit Bunches than to the same proportionate increase in costs.



Sensitivity analysis, showing how NPV, BCR and IRR vary with % change in absolute market price (Rs.5600/-). Trend lines are fitted where linear relationship exists.

The above scatter charts illustrates the sensitivity of the financial indicators to the actual market selling price of Fresh Fruit Bunches in Rs.5600. For NPV, the relation-

ships are linear. The intercept on the (negative) Y-axis corresponds to the total discounted cost of the project. Rs252047, which would be the project's NPV in the absence of income from sales.

FINANCIAL INDICATOR	STANDARD	10%REDUCTION IN REV-ENUE	10% INCREASE IN ALL COSTS	10% INCREASE IN FERTILIZERS, HARVESTING AND LABOUR
NPV(9%)	44935	15238	19092	32485
BCR	1.17	1.06	1.06	1.12
IRR	11.25	9.6	9.09	10.62

FINDINGS

The financial assessments indicate that oil palm cultivation is not commercially viable and a profitable investment for farmers in Krishna District. In the standard scenario adopted as the basis for the calculations of financial indicators, the NPV is well above zero and the BCR of 1.17 implies a substantial return per unit cost which is low due to the high maintenance costs of oil palm plantation. The IRR of 11.25 is just above the current market interest rate, and indicates a low rate of return. The financial indicators are more sensitive to a 10% reduction in the market price of Fresh Fruit Bunches than to the same proportionate increase in costs. So the market price should be fixed at least equivalent to the costs.

One of the main constraints on farming in Krishna district is the limited areas of land that individual farmers own, which means that most of them plant just one hectare. Given the income levels of many of the farmers interviewed, a particular drawback of oil palm cultivation would appear to be the extremely high establishment costs in the first year. This may be unattainable for some potential cultivators, especially when combined with the total lack of revenue during Years 1–3. Nonetheless, many do choose oil palm because it provides a slightly better income than fruit and vegetables.

On the other hand, even though farmers can get return in the form of intercrop in the non-revenue period, all the farmers are not investing on intercrops.

SUGGESTIONS

Thus, in order to enable cultivators to maximise their farming incomes, present work indicates a need for intervention by the government's Agricultural Department to set market prices in such a manner that they give return more than cost of cultivation for the farmers, and provide extension services to encourage intercropping.

Timely credit should be made available to the Oil Palm farmers through co-operatives and other financial institutions to enable them to use requisite inputs so as to increase production of oilseeds.

The financial indicators are more sensitive to the Market price of Fresh Fruit Bunches than the costs. So the market price should be fixed at least equivalent to the costs.

Easy access to Institutional finance should be provided to Oil Palm cultivators in order to prevent them from going for non- institutional sources which levy heavy charges.

CONCLUSION

The sustainability of oil palm cultivation is the need of the

hour for both farmer as well as processor and finally to the country. For this purpose, integrated management practices need to be developed by using the latest low cost technologies which will give sustainability to the oil palm industry as a whole.

LIMITATIONS OF THE STUDY AND SCOPE FOR FUTURE RESEARCH

There are certain limitations to the study. This study is confined itself basically to oil palm growers and excluded other oil seed cultivators. It is also confined to selected area of Andhra Pradesh i.e. Krishna District. Personal prejudices and biases of respondent may act as hindrance to the study. Non-response error has occurred in research process because a few respondents refused to give the information regarding the questions in brief because of their unwillingness. To overcome these limitations cited above care has been taken to make the responses more objective and accurate.

Since Palm Oil has several advantages and health protecting effects, necessary steps could be taken to enhance its production and consumption. Further studies can be helpful to increase the production and thereby make large quantities of this non-conventional oil available for human consumption. The present study focused on the financial problems of oil palm growers in Krishna district of Andhra Pradesh. These problems vary from one area to another area. Hence it can be said that there is scope for further research in other areas where the oil palm is cultivated. The present study is confined to the problems of Oil Palm growers. To increase the potential of our country in the oil sector, it is necessary to identify and resolve the problems of other Oil Seed growers. Similar studies can also be conducted in this regard.

ANNEXURE :

CASHFLOW PER ACRE OF PLANTATION OF 57 OIL PALM TREES WITH INTEREST RATE OF 9%

AGE OF OIL PALM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL
REVENUE FROM OIL PALM	0	0	0	7500	22400	26000	32000	44600	57400	46900	39200	33600	33600	33600	39200	43400	45700	56000	56000	47600	34550	699250
REVENUE FROM INTERCROP	10000	12000	14000	5000	5000	4000	4300	4200	4500	3500	3200	4100	2300	3200	4500	4700	3500	5000	4500	3500	4575	106975
TOTAL REVENUE	10000	12000	14000	12500	27400	30000	36300	48800	61900	50400	42400	37700	35900	36800	43700	48100	49200	61000	60500	51100	39125	808825
PRESENT VALUE OF TOT REVENUE @9%	9170	10104	10808	8830	17810	17880	19856	24498	28474	21269	16451	13421	11703	11003	12017	12121	11365	12932	11737	9096	6417	296982
COSTS																						
LAND PREPARATION	2715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2715
COST OF SEEDLINGS	570	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	570
TRANSPORT COST OF SEEDLINGS	574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	574
COST OF SOWING	821	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	821
FERTILIZERS	0	5000	3920	3920	3435	2530	4010	4166	6140	7000	4500	6750	5000	5000	5684	5635	6916	4000	4000	5500	4000	97106
WEEDICIDES	1300	7400	2300	4480	3780	2780	2830	3425	3265	2390	2600	3500	2550	2550	3050	4223	3830	1340	1300	2690	2925	64528
PRUNING	0	0	500	965	1795	1073	760	893	684	1012	570	1120	1140	1140	1040	1330	820	1425	1140	1250	1045	19702
MULCHING	0	0	500	965	1510	1157	661	475	712	1054	570	250	570	570	983	960	530	570	456	1183	1183	14859
HARVESTING FOR COLLECTING DROPPED FRUIT	0	0	0	0	273	330	170	367	150	118	100	750	100	100	400	467	270	600	500	275	575	5765
BUNCH LOADING	0	0	0	600	350	350	425	250	800	300	400	400	100	100	450	264	717	500	400	1600	550	8556
FENCING	2250	2000	2000	2250	2500	1650	2300	2000	2100	2000	2250	2250	2250	2250	2500	1850	2250	2250	2250	4000	2250	47000
GODOWN	3300	1000	4000	4000	4000	3750	3960	4000	5000	1000	3300	5000	3300	3300	2500	1000	6800	3300	3300	2250	3750	71810
PERMANENT LABOUR	6000	5800	4500	9000	5000	6000	7080	4350	5800	10000	5800	5000	6000	6000	5700	4000	5000	5000	12000	3000	4000	125040
HARVESTING TOOLS	0	0	0	300	1450	1600	1380	1875	1500	1500	600	2500	1000	1000	1940	1600	1870	3000	500	1100	1000	25715
COST OF INTERCROP	5000	6000	5500	1800	1500	1600	1400	1800	1700	1500	1400	1800	1200	1300	1500	1300	1800	1600	1500	1400	1200	43800
TOTAL COST	12850	27200	23220	28780	26383	25790	28422	30083	32976	30886	25590	31270	25610	25710	29497	28179	35345	35385	32346	29998	28736	592656
DISCOUNTED TOTAL COST @9%	14740	22902	18003	20376	17149	15371	15547	15102	15169	13034	9929	11132	8349	7687	8167	7553	8165	7544	6275	5340	4713	252047

PROFIT PER ACRE	-7530	-15200	-9200	-16280	1017	4210	7878	18717	28924	19514	16810	6430	10290	11090	14003	19921	13855	25415	28154	21102	10389	209509
ACCUMULATED PROFIT	-	-22730	-31930	-48210	-42983	-35105	-25105	-12536	32050	48860	55290	65580	76670	90673	110594	124449	149864	178018	199120	209509	1E+06	
DISCOUNTED PROFIT	-5570	-12798	-7195	-11526	661	2509	4309	9396	13305	8235	6522	2289	3354	3316	3850	4768	3200	5388	5462	3756	1704	44985
NPV = 44935																						
B/C G =	1.17																					
AGE OF OIL PALM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL
TOTAL REVENUE	10000	12000	14000	12500	27400	30000	36300	48800	61900	50400	42400	37700	35900	36800	43700	48100	49200	61000	60500	51100	39125	808825
DISCOUNTED REVENUE @15%	8700	9072	9212	7150	13618	12960	13649	15958	17580	12449	9116	7050	5852	5189	5375	5147	4576	4941	4235	3117	2074	177020
DISCOUNTED REVENUE @ 9%	9170	10104	10808	8850	17810	17880	19856	24498	28474	21269	16451	13421	11703	11003	12017	12121	11365	12932	11737	9096	6417	296982
SENSITIVITY ANALYSIS																						
1. REVENUE DECREASED																						
IRR =	11.25																					
AGE OF OIL PALM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL
TOTAL REVENUE	10000	12000	14000	12500	27400	30000	36300	48800	61900	50400	42400	37700	35900	36800	43700	48100	49200	61000	60500	51100	39125	808825
TOTAL REVENUE - 10%	9000	10800	12600	11250	24660	27000	32670	43920	55710	45360	38160	33930	32310	33120	39330	43290	44280	54900	54450	45990	35213	727948
DISCOUNTED REVENUE @9%	8253	9084	9727	7965	16029	16092	17870	22048	25627	19142	14806	12079	10533	9903	10816	10909	10229	11639	10563	8186	5775	267285
DISCOUNTED TOTAL COST @9%	14740	22902	18003	20376	17149	15371	15547	15102	15169	13034	9929	11132	8349	7687	8167	7553	8165	7544	6275	5340	4713	252047

TOTAL REVENUE - 10%	9000	10800	12600	11250	24660	27000	32670	43920	55710	45360	38160	33930	32310	33120	39330	43290	44280	54900	54450	45990	35213	727948
DISCOUNTED REVENUE @10%	8181	8921	9463	7684	15314	15228	16760	20511	23621	19509	13356	10824	9370	8711	9400	9437	8767	9882	8930	6852	4754	245475
NPV=	15238																					
BCR=	1.06																					
IRR=	9.6																					

SENSITIVITY ANALYSIS 2																						
II ALL COSTS INCREASED BY 10%																						
AGE OF OIL PALM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL
TOTAL COSTS	17350	27200	23220	28780	26383	23790	28422	30083	32976	30886	25590	31270	25610	25710	29697	28179	35345	33585	32346	29998	28736	597336
ALL COSTS INCREASED BY 10%	19283	29920	25542	31658	29021	28369	31264	33091	36274	33975	28149	34397	28171	28281	32667	30997	38879	36943	35581	32998	31610	657070
DISCOUNTED COST @9%	17682	25193	19718	22414	18864	16908	17101	16612	16686	14337	10922	12245	9184	8436	8983	7811	8981	7832	6903	5874	5184	277890
PRESENT VALUE OF TOT REVENUE @9%	9170	10104	10808	8850	17810	17880	19836	24498	28474	21269	16451	13421	11703	11003	12017	12121	11365	12932	11737	9096	6417	296982
NPV=	19092																					
BCR=	1.09																					
IRR=	9.09																					

SENSITIVITY ANALYSIS 3																						
III FEW COSTS INCREASED BY 10%(FERTILIZERS,HARVESTING AND LABOUR)																						
AGE OF OIL PALM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	TOTAL
FERTILIZERS	0	5000	3920	3820	3435	2530	4010	4166	6140	7000	4500	6750	5000	5000	5684	5635	6916	4000	4000	5500	4000	97106
HARVESTING	0	0	0	500	790	2750	3416	6482	5125	3012	3500	1930	2400	2400	3950	5550	4942	10000	5000	5750	6258	78775
LABOUR	6000	5800	4500	9000	5000	6000	7090	4350	5800	10000	5800	5000	6000	6000	5700	4000	5000	5000	12000	3000	4000	125040
TOTAL COSTS	6000	10800	8420	13420	9225	11280	14516	14998	17065	20012	13800	13700	13400	13400	15334	15185	16858	19000	21000	14250	14258	295921
COSTS + 10%	6600	11880	9262	14762	10147	12408	15968	16498	18771	22013	15180	15070	14740	14740	16867	16703	18544	20900	23100	15675	15684	325512
WEEDICIDES	1300	7400	2300	4480	3780	2780	2850	3425	3265	2390	2600	3500	2550	2550	3050	4223	3830	1340	1300	2690	2925	64528
PRUNING	0	0	500	965	1795	1073	760	893	684	1012	570	1120	1140	1040	1330	820	1425	1140	1250	1045	19702	
MULCHING	0	0	500	965	1510	1157	661	475	712	1054	570	250	570	570	983	960	530	570	456	1183	1183	14859
FOR COLLECTING DROPPED FRUIT	0	0	0	0	273	550	170	367	150	118	100	750	100	100	400	467	270	600	500	275	575	5765
BUNCH LOADING	0	0	0	600	350	350	425	250	800	300	400	400	100	100	450	264	717	500	400	1600	550	8556
FENCING	2250	2000	2000	2250	2500	1650	2300	2000	2100	2000	2250	2250	2250	2250	2500	1850	1850	2250	2250	4000	2250	47000
GODOWN	3300	1000	4000	4000	4000	3750	3960	4000	5000	1000	3300	5000	3300	3300	2500	1000	6800	3300	3300	2250	3750	71810

HARVESTING TOOLS	0	0	0	300	1450	1600	1380	1875	1500	1500	600	2500	1000	1000	1940	1600	1870	3000	500	1100	1000	28715
COST OF INTER-CROP	5000	6000	5500	1800	1500	1600	1400	1800	1700	1500	1400	1800	1200	1300	1500	1300	1800	1600	1500	1400	1200	43800
SUM OF INITIAL COST	4680																					4680
TOTAL COST AFTER MOD	23130	28280	24962	30122	27385	26918	29874	31583	34682	32887	26970	32640	26950	27650	31230	29697	37031	35485	34446	31423	30162	631927
DISCOUNTED COST @9%	21210	23812	18576	21326	17748	16043	15341	15855	15954	13878	10464	10641	8058	7439	7870	7484	8054	7523	6682	5593	4046	264497
PRESENT VALUE OF TOT REVENUE @9%	9170	10104	10808	8850	17810	17880	19856	24498	28474	21269	16451	13421	11703	11003	12017	12121	11365	12932	11737	9096	6417	296982
NPV=	32488																					
BCR=	1.12																					
IRR=	10.62																					

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