A Review of Oil Palm Fruit Plantation and Production under the Contract-Growers Scheme in Andhra Pradesh and Tamil Nadu States of India

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ABSTRACT

An assessment of the oil palm plantation management and fruit supply, under the Indian contract-growers scheme was conducted in this study. Data was collected from about 96 plantations on the age of plantation, size of plantation, cost of establishment, maintenance practices and cost , yield of fresh fruit bunches, profitability of the scheme for the farmers and so on. It was observed that most of the plantations (69.8%) are in the range of 6-10 years of age while the size of 1-5 ha dominates the sample (76%). Farmers are able to procure land and source fund for the establishment of plantations. Farmers also perform maintenance activities (irrigation, weeding and fertilizer application) satisfactorily, though incure considerable cost on the activities. Statistical analysis indicates that weeding and fertilizer applications have significant effect (at 99.9 and 90.0% levels respectively) on the total maintenance cost. Harvesting and haulage of fruits are well organized to ensure prompt processing of fresh fruit bunches for the mill to achieve the desired quality of palm oil. The farmers make profit from the scheme but some farmers are faced with the problems of pest infestation of the fruit, water stress and lack of fund. Farmers should be given continuous training on plantation management. There should be plan for the establishment of additional mills to cater for the expansion of the programme as more farmers are interested in the scheme.

Keywords: Oil palm, cultivation, contract-growers, fruit- supply, farmers' welfare, sustainability

1. INTRODUCTION

India has been reported to have the largest area under oil seed cultivation in the World but the irony is that the domestic production is not adequate to meet the minimal edible oil requirements of the population (Arumughan et al, 2000). The factors responsible for this include poor land conditions (the land used being marginal lands under rainfed situations) and the growing population. The demand for edible oil has been growing at the average rate of 5.0 % against the average growth rate of 2.0 % for oil seeds per annum during the last two decades (Chadha and Rethinam, 1991). There has also been perceptible upward trend in the per capital consumption of edible oil among the Indian population. The current per capital edible oil consumption is about 7 kg per annum. This is among the lowest in the world as against 35.0 to 40.0 kg per head per year in the Western countries (Arumughan et al, 200). Arumughan et al (2000) stated further that this is also far below the daily allowance of 20 kg/head/year recommended by the Indian Council of Medical Research (ICMR) equivalent to 15-20% of the dietary calories. A vast majority of the Indian population suffers from calorie deficiency. Owing to the cost of edible oil, its consumption is excluded from the daily menu of the economically disadvantaged and challenged population.

With increase in population growth and improvement in the purchasing power of the people, the demand for edible oil by the year 2010 is estimated at about 12 million as against the present demand of 8 millions. Based on the recommended daily allowance by the ICMR (20 kg/head/year) a three-fold increase in the edible oil supply to the order of 20 millions tons per year is expected, a task beyond the realm of attainment in the immediate future with the existing situation and facility (Arumughan et al, 2000).

India has been importing large quantities of oils from 1980s as production has stagnated or declined during the last two decades. This is because the growth of domestic oil production doesn't commensurate with corresponding population growth. Considering the future demands already highlighted a long term strategy for a comprehensive development of production and processing technologies need to be evolved to make India self-reliant in edible oils supply as in the case of cereals.It has been reported 1992) that the oil seeds production in India is highly susceptible to the vagaries of nature particularly the monsoon (Arumughan et al, 2000; Arumughan and Sundareson,1992). The shifting pattern of rainfall which is beyond the control of the farmers affects the production and productivity of oil crops drastically. Average low productivity of oil seeds grown in India could be traced primarily to the dependency on the monsoon. The oilseeds in India, which are annual or seasonal crops, are more susceptible to rainfall.

Shortage of edible oils assumed a crisis situation of perennial nature during the 1980s and this prompted government agencies to evolve long term and short term mechanisms to step up production and productivity of oil seeds in the country. Part of the efforts was the launching of

the Technology Mission on Oil Seeds by the Ministry of Agriculture of the Government of India in 1986 to address the problem (Rethinam, 1992). The major objective of the mission was to increase production through the improvement of productivity and providing better infrastructural facilities like irrigation. The introduction of high potential crops has been considered as a viable option to the conventional ones as a long-term measure to satisfy the increasing demand for edible oils. It is in this context that oil palm assumes significance.

In order for oil palm to play the needed role in vegetable oil production in India it has to be embraced by the farmers. Large scale introduction of this new crop calls for a detailed review of the Agricultural situation in the country and planning at micro and macro levels. Oil palm, being a perennial crop is all the more important at the farmer's level for decision making since it occupies the land for 35 to 45 years. It also involves capital expenditure of a higher order as compared to other crops such as rice, especially during the first 4 years when farmer does not get any returns. Indian agriculture is basically in the hands of small and marginal farmers and oil palm development depends primarily on them, as the Land Ceiling Acts do not permit private companies to acquire large areas for development of oil palm estates. Furthermore, since the oil palm has to replace the existing crops, the economic returns should substantially be attractive for the farmers when compared to other crops. Therefore efficient contract farming will have to be practiced.

Baumann (2000) reported that contract farming refers to a system where a central processing or exporting unit purchases the harvests of independent farmers and the terms of the purchase are arranged in advance through contracts. The terms of the contract vary and usually specify how much produce the contractor will buy and what price they will pay for it. The contractor frequently provides credit inputs and technical advice. Contracting is fundamentally a way of allocating risk between producer and contractor; the former takes the risk of production and the latter the risk of marketing. In practice, there is considerable interdependence between the two parties, the nature of which is subject to much debate as the review of the literature and the case studies will explore. The allocation of risk is specified in the contract which can vary widely; some agree to trade a certain volume of production; in others the contract specifies price (which can be market price; average price over a period of time, difference between a basic price and market price etc.) but not amount.

Ellman (1986) and Glover and Kusterer (1990) stated types of contract farming as outgrowers scheme, nucleus estate –outgrowers and multipartite schemes. In out growers scheme, the farmers are provided with production and marketing services on their land. This connotes generally government scheme with a public enterprises where crops are purchased from framers by government or as a joint venture with a private firm. Nucleus estate –outgrowers scheme is the type where a core estate and factory is established and farmers in the surrounding area grow crops on part of their land, which they sell to the factory for processing. The Multipartite arrangements involve several actors.

Plantation management is very important in oil palm cultivation as it determines the profitability of the business. The useful life of a plantation has two main phases. The first phase is the early period during which the growing trees are not yet productive and this last for lasts for 2-4 years depending on soil and climatic conditions (Tropical Agriculturalist, 1998). The second phase is the productive period which lasts for 20-30 years. Certain maintenance activities are required during the two phases. Such activities include weeding, pest control, fertilizer application, disease prevention and treatment and pruning (Duke, 1983, Tropical Agriculturalist, 1998; Hartley, 1988). For immature plantation, ring weeding either by chemical or manual method, is done nine times during the first year of the plantation. In large plantation where manual labour is scarce, the most commonly used method of combating invasion of weeds such as *pueraria* is to apply contact or systemic herbicides in a ring round the outer edge of the weeded area during the second and third years.

Monitoring of the young trees to detect pest and disease problems is important. This can be achieved by routine survey of the whole plantation. Fertilizers application depends on the age of the trees. When plants are young it is best to apply fertilizer in two, three or four separate dressings. The elements usually applied are nitrogen, phosphorus, potassium and magnesium. The quantity applied varies from soil to soil.

Pruning is the operation of removal of unwanted palm trees leaves. Such leaves are those that are left at the base of the crown after harvesting. These leaves in the long run impede harvesting and they can even make it impossible in tall trees by masking the ripe bunches. The degree of pruning depends on the age of trees.

The main objective in managing a plantation is to obtain maximum quantity of high quality oil at lowest possible cost. In order to achieve this, all bunches, together with loose fruits must be harvested at optimum maturity, collected and taken to the processing plant as quickly as possible. The number of bunches harvested from each tree ranges from 4 - 20 per year. Efficient harvesting requires an accurate forecast of yields. The optimum point at which to harvest is a trade off which must be struck in such a way that the bunch has maximum number of loose fruits and acceptable level of acidity. Factors influencing maturation of fruits include climate, age of tree and genotype, and the interval between harvesting and processing among others. To ensure a high quality harvest, two or four harvesting operations should be allowed in a month especially when production is at a level of 800kg/ha or more.

The agricultural situation of Indian is in contrast with those in the major oil palm growing countries like Malaysia and Indonesia where large scale cultivation by the professionally managed enterprises have undertaken both cultivation/raising and processing of oil palm as

integrated project because of the unique process requirements for oil palm fruits. Under the Indian conditions, the plantation sector would have to be essentially delinked from the processing sector as practiced in the production and processing of sugarcane. Palm fruit in its natural form is not saleable unless it undergoes processing to convert it to palm oil. The cultivation and processing of palm fruit in India therefore takes the form of that for sugarcane such that a large number of farmers produce palm fruit and depend on a central processing unit located within their the area Since the farmers are to supply fresh fruit bunches produced from their farms for processing at such processing unit, the selection of size and location of such processing centre must be carefully planned to ensure that the processing unit matches the size of the plantations (all put together) and it is within the reach of the farmers. This becomes necessary since oil palm fruits are highly perishable requiring processing within 24 hours after harvest. Development of oil palm processing facilities therefore needs special attention considering the socio-economic and agricultural situations of India and constraints associated with them.

Nevertheless, the factors in favour of oil palm cultivation outweigh the constraints. Growing domestic demand for edible oil would create a steady market and the market potential is very high. Higher domestic prices for edible oils coupled with the high productivity of oil palm provide the singular brighter outlook for the crop.

The Government of India through the Technology Mission, provides subsidy towards planting materials and cultivation to the extent of Rs.12500/ha out of the total cost of Rs. 38000/ha during the first 4 years of plantation development. A net return of Rs. 41000/ha is considered quite attractive to encourage oil palm development. The crop is not fastidious and is comparatively free from diseases. The fact that the cultivation is less labour intensive coupled with lower maintenance cost put it at another advantage.

The India Oil palm Act was enacted to assist in the production of high quality palm oil in large quantity. Under this Act, interested farmers are compelled to cultivate oil palm and supply the fresh fruit bunches to privately owned mill (recognized by the Government of India). No farmer is allowed to process oil palm fruit. The Indian Council of Agricultural Research through its breeding and agronomy programmes on oil palm has identified about 5700000 hectares of land suitable for oil palm cultivation in India (Arumughan et al, 2000; Rethinam, 1992).In order to bring this hectarage of land under oil palm cultivation thousands of small scale farmers were encouraged with financial support and extension services. Also potential areas for oil palm mill were identified and located to private companies, cooperative federations and related establishments. A substantial hectarage of land is now full cultivation of oil palm and intercropped with crops such as banana and cocoa in some cases. The Farmers in different states of India are now in full business of the cultivation of oil palm under the contract- grower's scheme and linked with different mills. Collection centres are located at strategic points for easy collection of harvested fruits and subsequent haulage to the mill. This study assesses the capability of the oil palm farmers to support palm oil mills in terms of production and supply of fresh fruit bunches under the Indian oil palm contract growers' scheme (guided by the India oil palm policy)

2. METHODOLOGY

Information was collected mainly by the use of well-structured questionnaires. Data on basic information of the plantations in terms of age, size and ownership were collected. Others include maintenance of plantations, harvesting, haulage and marketing of palm fruits, and profitability of the oil palm cultivation in relation to other native crops. Observations were also made on the field while records of supply of fruits by some plantations were obtained from the mills. Data were collected from plantations in two states of India i.e. Andhra Pradesh and Tamil Nadu. The two states were picked based on the fact that the scheme has been operating there for some years. A total of 100 plantations were visited out which complete information was gathered from 96 plantations. The data were statistically analysed using the statistical package (SPSS, 1993).

3. RESULTS AND DISCUSSION

3.1 Basic Information

Table 1 shows the distribution of the plantation size within the sample area. It could be observed that majority of the plantations fall into the range of 1-5 ha (76.8%) followed by 6-10 ha (12.6%). Very few of the plantations are in the range of less than 1 ha and greater than 10ha (5.2%). The implication is that the farmers are in the small-scale category based on the land tenure system. However, farmers having small size of land (less than 1 ha) also have the opportunity to partake in the contract grower's scheme.

With regards to ownership of the farm, all the plantations except one are privately owned. Furthermore about 62.5% of the farmer acquired the land for the plantation by inheritance while the rest purchased the land. This is also an indication that there is availability of land for large proportion of the farmers within the scale considered. Hence this guarantees the sustainability of the system in terms of availability of land.

Table 2 shows the distribution of the age of the plantations. Majority of the plantation (69.8%) were in the range of 6-10 years while very few (8.3%) are within the range of 1-5 years. However, a considerable percentage (21.9%) is above 10 years old. It can also be inferred that

Table 1. Distribution of plantation size

Size of plantation (ha)	Percentage
<1	5.2
1-5	76.0

6-10	12.5
>10	5.2

Table 2. Distribution of Age of plantation

Age (yrs)	Percentage
1-5	8.3
6-10	69.8
>10	21.9

most of the plantations are still in the young stage. Information gathered from the farmers and observations on the field indicates that tenera variety of oil palm dominates the whole plantations.

3.2 Cost of Establishment of Plantations

About 62.5% of the farmers spent more than Rs 30, 000 to establish the plantations. Those in the ranges of Rs.1-10, 11-20 and 21-20,000 are 15.6, 9.4 and 12.5 % respectively (Table 3). This covers the cost of seedlings, land (where applicable), tillage operations, planting and post planting operations. A closer look at Table 3 reveals that 20% of those within the size <1 ha falls within the cost of Rs.11-20 thousand while 60% falls within Rs.21-30 thousand. About 9.4 and 12 % of plantation with size 1-5 ha respectively fall within those cost ranges. However, about 8.3 % and 0 % of the 6-10 ha are within 11-20 thousand and 21-30 thousand ranges. None of those with size >10 ha are within these two cost ranges. About 20 5, 60.8 %, 75 % and 100 % of all the plantations with size <1, 1-5 , 6-10 and >10 ha respectively incurred greater than Rs. 30,000.00. Thus cost of plantation establishment also depends on the size of plantation. The larger the size of the plantation, the higher the cost of establishment. The effect of the plantation size on cost of establishment was observed to be significant at 95%.

Field observation indicates that the cost of plantation establishment also depend on location which influences easy access to land and labour availability. Accessibility to land differs from one location to another. Location also affects availability of labour. This may explain while we have plantations with size 1-5 ha and 6-10ha in the range of Rs. 1-10 thousand.

Table 3: Cost of establishment of plantation

Size of Plantation (ha)		Cost of Establishment (Rs '000)				Total
		1-10	11-20	21-30	>30	
<1	% within size	-	20.0	60.0	20.0	100.0
	% within cost	-	11.1	25.0	1.7	5.3
1-5	% within size	17.6	9.4	12.2	60.8	100.0
	% within cost	86.7	77.8	75.0	75.0	76.8
6-10	% within size	16.7	8.3	-	75.0	100.0
	% within cost	13.3%	11.1%		15.0	12.6
>10	% within size	-	-	-	100.0	100.0
	% within cost	-	-	-	8.3	5.3
Total	% within size	15.6	9.4	12.5	62.5	100.0
	% within cost	100.0	100.0	100.0	100.0	100.0

3.3 Routine Plantation Maintenance

The maintenance activities considered in the study include irrigation, fertilizer application and weeding. Table 4 shows the distribution schedule of maintenance by the plantations by the farmers. Very few of the farmers perform irrigation fortnightly, monthly and quarterly (i.e 7.3, 4.2 and 1.0% respectively). Majority of the farmers however performs irrigation weekly and daily (87.5%). This is because the annual rainfall of most of the areas is much less than that required for smooth growth of oil palm trees. The water requirement of oil palm is very high, needing about 1800mm of rainfall well distributed over the entire year (Tropical Agriculturalist, 1998). The annual rainfall of most of the areas of study is less than 1200 mm. Majority of the farmers perform fertilizer application quarterly (74.7%) while some (16.8%) perform its monthly and very few (4.2 and 1.1% respectively) perform it fortnightly and biannually. In terms of weeding, about 67.0% of the farmers perform weeding quarterly while 9.6, 6.4 and 13.8% perform this operation fortnightly, monthly and biannually respectively. It was observed on the field that the frequency of weeding depends on the age of the trees. With the trees getting to six

years, they are already having fronds forming canopy over the weeds and this reduces the frequency of weeding. The frequency of weeding decreases with increase in age of the trees. Observation on the field indicates that most of the plantations were clean. This indicated that the farmers perform weeding operation as required.

Table 4. Plantation maintenance activities and schedule adopted by farmers

	Irrigation	Fertilizer application	Weeding	Micro-application
Fortnightly	7.3	4.2	9.6	1.2
Monthly	4.2	16.8	6.4	1.2
Quarterly	1.0	74.7	67.0	18.1
Annually	-	1.1	13.8	34.9
Weekly and daily	87.5	3.2	3.2	44.6
Total	100	100	100	100

About 74.7% of the farmers also perform fertilizer application quarterly. This is an indication that most of the trees are already developing. A close observation of the age distribution of the plantations reveals that most of the trees are in the range of 6-10 years. However a considerable percentage of the farmers (16.8%) perform this operation monthly while 4.2% and 1.1% perform it fortnightly and annually respectively. About 3.2% do not perform it at all (others). Further interactions with some of the farmers indicate that most of them lack the sound knowledge on application of fertilizer particularly the time interval. Also observation on the plantations indicates that some farmers apply excess fertilizer and this affects the trees. There is the need for proper monitoring of the farmers in this regards. Samples of oil palm tree leaves should be taken for foliar analysis as recommended by Tropical Agriculturalist (1998).

Most of the maintenance activities are done manually. About 99% of the farmers use manual labour for the farm operations. While 1% use mechanized system. This is expected since most of the farms are small scale. Tillage operations and weeding were the only operations done mechanically. It is however easy to get labour for the farms as about 88.5% of the farmers find it easy to get labour for the farm operations. Table 5 shows the maintenance cost for the plantations. About 60.2% of the farmers spend more than Rs 20, 000 on maintenance activities

while 11.8 and 10.8% spend in the range of Rs 1-5 and 16-20, 000 respectively. Fertilizer application was observed to take a lion share of the total maintenance cost. This is in agreement with the findings of Tan (1988) and Nazeeb (1997) where the total agricultural costs of fresh fruit bunch production accounts for about 24% in most of the plantations surveyed. Fertilizer application is therefore important in the cultivation of oil palm in India just like in Malaysia (Abdul Raof et al, 1999). A cross-tabulation of effect of fertilizer application on maintenance cost indicates that it is significant at 90% level using chi-square test. Weeding was also observed to be significant at 99.99%. The effect of irrigation was not significant.

Table 5: Maintenance cost of the plantations

Size		Cost of Maintenance					Total
		1-5	6-10	11-15	16-20	>20	
<1	% within size	-	20.0	20.0		60.0	100.0
	% within cost	-	14.3	11.1		5.4	5.4
1-5	% within size	15.3	7.0	11.1	9.7	56.9	100.0
	% within cost	100.0	71.4	88.9	70.0	73.2	77.2
6-10	% within size	-	8.3	-	25.0	66.7	100.0
	% within cost	-	14.3	-	30.0	14.3	13.0
>10	% within size	-	-	-	-	100.0	100.0
	% within cost	-	-	-	-	7.1	4.3
Total	% within size	11.8	7.5	9.7	10.8	60.2	100.0
	% within cost	100.0	100.0	100.0	100.0	100.0	100.0

The effect of plantation size on maintenance cost could be observed in Table 5. Substantial percentage of those with size <1 ha, and those with size 1-5 ha are below the lower cost bracket (i.e 6-10 and 11-15 thousand) while those with size 6-10 ha and >10 ha have their cost in the range of >20 thousand. A closer look at the column of the >20 thousand cost reveals that 100% of those with size >10 ha are in this range while 66.7%, 56.9% and 60% of those with sizes 6-10 ha, 1-5 ha and <1 ha respectively fall within the range. This is and indication that the cost of maintenance also depends on size of plantation to some extent.

3.4 Sources of Funds

Majority of the farmers obtained fund to establish the plantation from personal savings and subsidy from the government (67.7 and 61.5% respectively in Table 6). The subsidy from the government was in form of oil palm seedling and little fund for fertilizer procurement. However a considerable percentage of the farmers (36.5%) either used bank loan solely or as additional fund for establishing the plantation. The fact that a large percentage of the farmers could source fund on their own is an indication of the sustainability of the programme.

Table 6: Source of fund for plantation establishment

Source of fund	Percentage (frequency)
Self-financing (personal savings)	67.7
Subsidy from Government	61.5
Co-operative loan	1.0
Bank loan	36.5

3.5 Harvesting and Haulage of Palm Fruits

Table 7shows the percentage distribution of the palm fruit harvesting schedule. About 42.7 % of the farmers harvest their fruits every two weeks (fortnightly) while 2.1% each harvest fruits bimonthly and quarterly respectively. These three harvest periods are scheduled by the mills which the farmers service

Table 7. Harvesting schedule of palm fruit by the farmers

Schedule	Percentage
Fortnightly	42.7
Monthly	2.00
Bimonthly	2.1
Quarterly	2.1
According to fruit ripening (three weeks and weekly)	53.1
Total	100.00

Considerable percentage (53. 1%) harvest fruits according to fruits ripening. Thus weekly and three weeks harvesting fall into this category. The recommendation by the processing unit is that farmers should harvest their fruits fortnightly; however frequency of harvest depends on the age and size of plantation. A big plantation will require more frequent harvesting than a small plantation. Therefore it is not wide off the mark to observe big plantations harvesting weekly and small plantations harvesting in three (or more) weeks interval. Harvesting will then depend more on ripening of fruit as observed on the plantations. The mills are currently trying to cater for this since they process fruit everyday during the seasons. Proper schedule of processing should be made to meet this. There is the need for this adjustment because observations on the farms indicate that there is some level of fruit deterioration due to delay in harvesting particularly in the categories of scheduled fortnightly and quarterly harvesters.

Table 8 shows the distribution of the quantity of bunches realised by the farmers per harvest. A large percentage of the total plantations (83%) realize 1-5 tonnes of ffb per harvest while about 13.8% and 2.1% realize 6-10 tonnes and more than 20 tonnes respectively. Harvest depends on size of plantation, age of trees and maintenance. The larger the size of the plantation, the higher the quantity of harvest. The effect of plantation size on quantity of ffb harvested was observed to be significant at 99.99%. Furthermore the older the trees, the higher the quantity of ffb produced (within the sample considered in the study). The effect of age of plantation on yield of ffb was observed to be significant at 99.0%. In general well maintained plantations yield more fruits. Statistical analysis of the data indicates that fertilizer application has significant effect (95.0%) on the yield of fresh fruit bunches..

Table 8: Quantity of bunches to realized per harvest

Quantity (tons)		Size (ha)				Total
		<1	1-5	6-10	>10	
1-5	% within Quantity	5.1	84.6	9.0	1.3	100.0
	% within size	80.0	91.7	58.3	20.0	83.0
6-10	% within Quantity	7.7	30.8	38.5	23.1	100.0
	% within size	20.0	5.6	41.7	60.0	13.8
11-15	% within Quantity	-	-	-	100.0	100.0
	% within size	-	-	-	20.0	1.1
>20	% within Quantity	-	100.0	-	-	100.0
	% within size	-	2.8	-	-	2.1

Total	% within Quantity	5.3	76.6	12.8	5.3	100.0
	% within size	100.0	100.0	100.0	100.0	100.0

Price offered for bunches varies from one state to another. In Tamil Nadu state, Rs 2,500 is offered per ton of bunch while it is Rs 3,800 in Andhra Pradesh. The price is however uniform in all the plantations within each state.

Table 9 shows the profit made by the farmers on sales of ffb. It could be observed that majority of the farmers (70.7%) make more than Rs 20, 000 per year on sales of ffb. Very few farmers make profit below this value

Table 9. Distribution of profit per year made in sales of fresh fruit bunches

Range of Profit	Percentage
1-5	7.6
6-10	8.7
11-15	7.6
16-20	5.4
>20	70.7
Total	100

The farmers who intercropped crops such as banana and cocoa with the oil palm make additional profit. In general, the farmers are satisfied with the level of profit made (even the oil palm farmers in Andhra Pradesh who had the price per ton of ffb slashed).

Table 10 shows the distributions of the distance of plantations from the processing centre (Mill). 67.7% of the plantations are less than 30km from the mill while those between 31-50 km is 21.9 % and greater those than 50km is 11.5%.

Table 10. Distances of plantations from mill

Distance (km)	Percentage

<30	66.7
31-50	21.9
>50	11.50
Total	100.00

The fact that more of the plantations are close to the mill enables the farmer to transport the fruits to the mill easily as soon as the ffbs are harvested. Collection centres are located at strategic places where the plantations are for away from the mill. The farmers concerned move the ffb to the collection centre while the mill conveys the ffb from there to the mill.

Where the mill is more than 30km distance the processing company pays for the transportation of the ffb in excess of the 30km in Tamil Nadu state while in Andhra Pradesh state, farmers are paid for the transportation even for less than 30km. This may probably be the reason while the price per ton of ffb was reduced as stated earlier. Haulage of ffb to the mill takes place immediately after harvesting and so close to 70% of the farmers gets the ffb to the mill within a few hours while it takes a day for about 30% of the farmers to haul the ffb to the processing centre. This also correlates with the distribution of the distance of the plantations from the mill.
Majority of the farmers (94%) are satisfied with the contract-growers scheme and are ready to continue with it. However the farmers face some problems. Bird menace constitutes the major problem faced by the farmers. Some birds destroy the ripe fresh fruits and this reduces the quality of the ffb harvested. Other problems include water stress in some areas, finance (for taking care of theplantation) and non-availability of labour in very few cases.

Most of the farmers add one crop or the other to the oil palm Table 11 shows the distribution of other crops grows by the farmers. Most of the farmers add one crop or the other to the oil palm. Intercropping of oil palm with other crops has been investigated by researchers (Mohd Noor, 2001; Lee et al, 2005). Planting of timber trees viz: Laran (*Neolamarckia cadama* or *Anthocephalus chinensis*)

Table 11. Distribution of other crops grown by the farmers

Crop	Percentage (frequency)
Rice	75.0
Sugarcane	20.0

Coconut	23.8
Cocoa	1.3
Banana	1.3
Conton	3.8
Maize	2.6
Orange	1.3
Groundnut	1.3

and Binuang (*Octomeles sumatrana*) with oil palm have been observed to be successful (Lee et al, 2005). This is possible because the trees can be trimmed to support grow and hence allows for attention to oil palm trees. The planting of cocoa (another cash crop) with oil palm trees are found in some plantations in India (Owolarafe, 2005). There may be the need to revisit this type of intercropping since there may be problems in harvesting the two crops simultaneously and the mechanisation of the maintenance of the two crops will also be impaired. However about 90% of the farmers make more profit in oil palm cultivation than the other crops. This explains the reasons why more farmers are interested in the scheme as observed during the study. The fact that the farmers make profit and have improvement in income is in agreement with the reviews of major contract farming projects as reported by Glover and Ghee (1992) and Glover and Kusterer (1990). The farming system in India for oil palm cultivation is closer to the nucleus estate outgrower scheme. The scheme is organized to meet the requirements of contract farming as specified by CDC (1989). Farmers are provided with technical and managerial support through sound extension services network. The farmers are also paid regularly like a civil servant according to an agreed formula. In addition the company attached to the farmers attaches more importance to the welfare of the farmers. Thus the farmers are committed to the scheme and encourage more farmers to join the scheme.

This is different with what operates in some parts of Nigeria where contract farming is practiced with oil palm. The Rinsonpalm Nucleus Estate in Nigeria does not enter into production contracts with outgrowers but instead arranges with middlemen who buys from the farmers and supply the mill (Tiffen and Mortimore, 1990). Though this avoids the need to disturb the traditional land tenure, there is the danger in variation of fruit supply in terms of species and quality.

4. CONCLUSION

An assessment of plantations under the contract-growers scheme in India was done in this study. Most of the plantations visited are small scale adapted to the landholdings of Indian Agricultural System. Most of the farmers also inherited the land (though few farmers purchased the land) used for developing the plantations.
The farmers supply fruits only to the mill in which they are attached under the scheme and not to any other mill. Thus the section of the "Oil Palm Act" relating to this is strictly adhered to. This ensures uniformity of fruit supply to the processing units and prompt processing.
Farmers should be however be trained regularly on proper maintenance of plantation as well as on new techniques in plantation management. The maintenance activities should be carried out at the right time. The extension workers need to put in more efforts in guiding and monitoring the farmers. Adequate techniques for scaring birds should be introduced to the farmers. Farmers in areas with high degree of water stress should be assisted with irrigation facilities. With all the these problems properly addressed, the sustainability of the scheme will be guaranteed.

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6. REFERENCES

Arumughan, C. and Sundaresan, A. (1992): Processing Technology: Proceedings of a conference on oil palm production and technology, Central Plantation Crops Research Institute (Indian Council of Agricultural Research), Kerala India ,May, 1992, 81-90

Arumughan, C. Sundaresan, A. and Vijay Nair, G. (2000). Project report on estabishment of 2.5 ton ffb.hr palm oil mill at Sattari Goa, Agro-Processing & Natural Products Department, Regional Research Laboaratory, Trivandrum, 1-22

Baumann, P. (2000):Equity and Efficiency in Contract Farming Schemes-
The experience of agricultural tree crops. Working Paper prepared for Overseas Development Institute (ODI). Working Paper No 139.

Chadha, K.L. and Rethinam, P (1991): Oil palm cultivation in India- Reports, recommendations and achievements. Indian Oil Palm Journal, 1 (3): 29-35.

Duke, J.A. (1983): *Elaeis guineensis Jacq*. Hand book of energy crops. www. Hort.prdue.edu/newcrop/duke_energy/ Elaeis_guineensis.html

CDC (1989): *Review of Smallholder Agricultural Program: Final Report*, Vols. 1 and 2. London: Commonwealth Development Corporation.

Ellman, A. (1986): 'Nucleus estates and smallholder outgrower schemes Report No. 105 Overseas Development Administration, UK, December, 1986.

Glover, D. and Kusterer, K. (1990): *Small Farmers, Big Business: Contract Farming and RuralDevelopment*, London: Macmillan.

Glover, D. and Lim Teck Ghee (1992): *Contract Farming in Southeast Asia: Three Country Case Studies*, Kuala Lumpur: University of Malaya.

Hartley C.W.S. (1988) The oil palm, UK, 3rd Edition Longman Group Publisher

Lee Y.F.; Chia, F.R.; Anuar, M.; Ong, R.C. and Ajik, M. (2005): The use of Laran and Binuang for forest plantations and intercropping with oil palm. Sepilok Bulletin, vol 3, p 1-12.

Mohd Noor, A. G. (2001): Experience of agro-forestry under estate condition. Paper presented in the National Seminar on agro-forestry, 24 -26th April 2001, Century Melaka Hotel, Melaka.

Nazeeb, M. (1997): Agronomic practices to remain competitive in the oil palm industry. The Planter, 73 (859): 533 – 553.

Owolarafe, O.K. (2005). Mechanics of Palm Oil Extraction. Report of CSIR/ TWAS Postgraduate Fellowship, Regional Research Laboratory, Thirunavathanpuram, India.

Rethinam, P (1992): History of oil palm cultivation and potential in India. Proceedings of the conference on oil palm production and technology, Kasaragod, Kerala, India, p 7-11.

Tan, B.T. (1988): Cost of palm oil production in major producing countries. In proceedings of Institute of Malaysia, Kuala 1987 International Oil Palm conrefence- Agriculture (halm et al eds.). Palm Oil Research Lumpur, 39-70.

Tiffen, M. and Mortimore, M. (1990) :*Theory and Practice in Plantation Agriculture: An EconomicReview*, London: Overseas Development Institute.

SPSS (1993): Statistical package for social sciences v 11.0, Chicago.

Tropical Agriculturalist (1998): The Oil Palm. Macmillan Educational Publisher Ltd. London and Basingstoke.