

Adoption of Oil Palm Package of Practices and Yield Obtained by the Farmers in Karnataka, India - A Survey

M. V. Prasad and P. Sampath Kumar

National Research Centre for Oil Palm, Pedavegi-534 450, A. P.

ABSTRACT

Oil Palm is a potential crop to meet the vegetable oil requirements in India, because of its highest productivity with more returns to the farmers than any other edible oil yielding crop. In Karnataka the area under oil palm cultivation is 4,464 ha, and there is a great scope to increase the area further. To know the adoption pattern and to enumerate various constraints in adopting the recommended package of practices, a survey was conducted among 102 respondents selected randomly. Majority of the oil palm growers were marginal (43 per cent) and small farmers. In Karnataka, introduction of oil palm (61 per cent) was done during the years 1993 to 1998. Most of the respondents (76 per cent) were practicing basin method of irrigation with fifteen days interval (30 per cent) to irrigate the palms. Fifty per cent of the farmers were applying farmyard manure. Most of the respondents were applying lower doses of nitrogen (56 per cent), higher doses of Phosphorus (per cent) and optimum level of potassium and majority of the farmers were not applying micronutrient fertilizers. Majority of the farmers (35 per cent) were applying fertilizers in 3 split doses. The major constraints perceived by respondents were lack of sufficient irrigation water and problems in harvesting of FFB. The major suggestions given by the respondents were to provide assured power supply, financial assistance from banks and increasing the subsidy for cultivation and in installation of drip system.

INTRODUCTION

In India there is a great need to increase the oil seed production, as it is the second largest in area and production, after food grains. As, we know increasing demand coupled with low production of oil seeds in the country has necessitated the import of vegetable oil, so as to meet the demands of ever growing population. Oil Palm gained a significant role in achieving this target, because of its highest productivity with more returns to the farmers than any other edible oil-yielding crop. In Karnataka the area under oil palm cultivation is 4,464 ha, against an estimated area of 2.5 Lakh hectares (Chadha, 2006), where in low productivity is the major draw back. In order to identify the adoption pattern and to enumerate the various constraints in adopting the recommended package of practices, a survey was conducted among the farmers from Karnataka who had attended various training programmes at National Research Centre for Oil Palm, Pedavegi, West Godavari District of Andhra Pradesh. The results of the study can give some indications to frame guidelines to physical, financial, technical and policy issues to be addressed by various agencies to increasing the Oil Palm production. The present study was conducted with the objective to find

out level of adoption of critical practices by the oil palm growers and their yields.

METHODOLOGY

Among 711 farmers attended the training programmes on oil palm cultivation during 2001- 07, a total of 102 farmers were selected randomly and subjected to open ended questionnaire. After having detailed discussion with subject matter specialists, various package of practices were taken as independent variables and yield as dependent variable. Simple frequency was calculated based on the variable measured (viz., size of farm holding, age of plantation, frequency of irrigation, type of manures applied, quantity of N, P, K, Mg, So_4 , Boron fertilizers and frequency of fertilizer application) by taking the highest and lowest score in that category. Yields obtained by farmers were categorized based on year of plantation and divided into three groups. Within the group the yields obtained by the farmers were categorized into six subgroups. Adoption gap was arrived from adoption index (by taking individual farmer total score of the practices adopted). Practice wise adoption index was arrived based on the total scores obtained by the farmer to the practice. Rate of adoption was arrived by

collecting the year of adoption of oil palm by the farmer. The data thus collected were tabulated, analyzed by using necessary statistical tools and interpreted.

RESULTS AND DISCUSSION

Farm Holding : The results of the present study indicated that majority of the farmers (43 per cent) were having a land holding of ≤ 1 ha (Table 1) followed by 31 per cent of the farmers were having 1-2 ha, 17 percent of them were having 2-4 ha and 9 percent of them were having ≥ 4 ha. It indicated that most of the oil palm growers were marginal and small farmers.

Year of Planting: It is understood from the Table 2

Table 1 : Distribution of respondents according to their size of farm holding

N = 102

Sl. No.	Farm Size (ha)	Frequency	
		Number	Percentage
1.	≤ 1	44	43
2.	1-2	32	31
3.	2-4	17	17
4.	≥ 4	9	9
	Total	102	100

that, in Karnataka oil palm was widely adopted (61%) during 1993 to 1998 and it can also be understood that, majority of the farmers in Karnataka were in early adoption category. Hence the services of innovators and early adopters can be utilised for farmer-to-farmer linkage and oil palm area expansion.

Method of Irrigation : Majority of the farmers (76 per cent) adopted basin method of irrigation followed by drip method (17 per cent) to irrigate the oil palm plantations (Table 3). This might be due to unawareness of the farmer about the advantages of the micro irrigation system. Hence awareness needs

N = 100

Sl. No.	Year of Planting	Frequency	
		Number	Percentage
1.	1987-1992	16	16
2.	1993-1998	61	61
3.	1999-2004	23	23
	Total	100	100

to be created among the oil palm growers for adopting micro irrigation.

Frequency of Irrigation by Basin method :

Table 3 : Distribution of respondents according to method of irrigation adopted

N= 96

Sl.No.	Method of Irrigation	Frequency	
		Number	Percentage
1.	Flooding	5	5
2.	Basin	73	76
3.	Drip	16	17
4.	Micro jet	2	2
	Total	96	100

The results (Table.3a) showed that majority of the respondents (76 per cent) adopted basin method of irrigation followed by drip method (17 per cent) to irrigate the oil palm plantations (Table 3a). This might be due to unawareness of the farmer about the advantages of the micro irrigation system. Hence awareness needs

N= 62

Sl. No.	Interval (in days)	Frequency	
		Number	Percentage
1.	d ³	3	5
2.	4	3	5
3.	5	1	2
4.	7	18	29
5.	10	16	25
6.	15	19	30
7.	20	1	2
8.	30	1	2
	Total	62	100

farmers (30 per cent) were irrigating at fifteen days interval followed by 29 per cent at weekly intervals. (Oil palm is having adventitious root system and penetrating to a depth ranging from 0.6m to 1m and spread over to a radius of 1.8 to 3 meters). Oil palm requires copious irrigation and the average water requirement is around 300-350 liters per day. Since majority of the farmers were following basin method of irrigation with an interval of seven to fifteen days, large quantities of water was impounded in the basins. This will result in the loss of huge quantities of water through deep percolation beyond the level of effective root zone, which is concentrated mostly in the superficial layers in addition to the leaching of majority of nutrients to

the lower layers (Prasad et. al. 2003). Hence it is required to create awareness on judicious use of water and increase the frequency of irrigation.

Type of organic manures applied : The results (Table 4) clearly indicated that 51% of the farmers were applying farmyard manure, suggesting that a large number of farmers are unaware of the advantage of applying the FYM, hence it is required to motivate oil palm growers about production of organic manure at farm level and its application in oil palm plantations to have sustainable and higher production.

Fertilizer management : Oil palm responds well to

Table 4 : Distribution of respondents according to type of organic manures applied

N= 102

Type of manure	Applied	
	Total	Frequency (%)
Farmyard Manure	52	51

applied chemical fertilizers like urea, single super phosphate and murate of potash. Oil palm requires 1200:600:1200 g NPK per Year for adult palms and 1/3rd, 2/3rd of the recommended dose is required to one year and two year old palms, respectively. The results (Table 5a, 5b and 5c) showed that, most of the farmers were not following the judicious fertilizer management practices. Since the fertilizer management is crucial in oil palm cultivation, it is required to educate the oil palm growers about it's significance in plant growth and yield.

Table 5a : Distribution of respondents according to fertilizer (Nitrogen) application

N= 75

Sl.No.	Category (g/ palm/ yr)	Frequency	
		Number	Percentage
1.	<400	3	4
2.	400-800	42	56
3.	800-1200	14	19
4.	> 1200	16	21
Total		75	100

Oil palm in the juvenile phase is more susceptible to secondary and micronutrient deficiencies, especially magnesium and boron (Table 5d & 5e). An adult oil palm requires 500 g of Magnesium Sulphate and 1/3rd, 2/3rd of the recommended dose of magnesium during first and second year of plantation. It also requires 50 g of boron per year in case of any deficiency. The

Table 5b. : Distribution of respondents according to fertilizer (Phosphorus) application

N= 76

Sl. No.	Category (g/ palm/ yr)	Frequency	
		Number	Percentage
1.	<200	18	24
2.	200-400	9	12
3.	400-600	20	26
4.	>600	29	38
Total		76	100

Table 5c. : Distribution of respondents according to fertilizer (Potassium) application

N= 71

Sl.No.	Category (g/ palm/ yr)	Frequency	
		Number	Percentage
1.	<400	3	4
2.	400-800	25	35
3.	800-1200	26	37
4.	> 1200	17	24
Total		71	100

Table 5d. : Distribution of respondents according to fertilizer (Magnesium Sulphate) application

N= 104

Sl.No.	Category (g/ palm/ yr)	Frequency	Percentage
1.	<250	13	12
2.	250-500	30	29
3.	>500	3	3
4.	Not Applied	58	56
Total		104	100

Table 5e : Distribution of respondents according to fertilizer (Boron) application

N= 104

Sl.No.	Category (g/ palm/ yr)	Frequency	Percentage
1.	<50	2	2
2.	50-100	12	11
3.	>100	5	5
4.	Not Applied	85	82
Total		104	100

results showed that only 44 and 18 per cent were applying the magnesium and boron fertilizers respectively and majority of the farmers were not applying both of them.

Frequency of fertilizer application: The results showed (Table 5f) that 35 per cent of the oil palm growers were applying the fertilizers in three split doses followed by 29 per cent of the persons were applying fertilizers in two split doses. Since there is ample scope for split application of fertilizers under irrigated condition, N and K fertilizer use efficiency can be improved by more split applications.

Yield: From the Table 6, it can be observed that, 46%

Table 5f : Frequency of fertilizer application

N= 104

Sl. No.	No. of splits per year	Frequency	
		Number	Percentage
1.	1	13	13
2.	2	29	29
3.	3	39	35
4.	4	22	22
5.	5	0	0
6.	6	1	1
	Total	104	100

of the farmers having 8-12 years age plantations were getting the yield <12.5 t/ha. Forty five percent of them were getting yield ranging between 12.5- 25 t/ha.

Majority of the farmers (52%) owning 13-17 years aged plantations were getting yield between 12.5-25 t/ha. As a whole, majority of the aged plantations (8-17 years) in Karnataka producing the yield levels between 12.5-25 t/ha. In young plantations (3-7 years), 83 per cent of the growers were producing the yields below 12.5 t/ha.

Correlation between Yield and adopted practices :

From Table 7a it can be indicated that irrigation, application of Phosphorus and Potassium fertilizers were showing significant effect on yield of oil palm. Application and quantity of manures, Nitrogen, Magnesium Sulphate and Boron fertilizers were not having any significant influence on yields of oil palm in Karnataka. The results from the Table 7b showed a positive and significant relation between age of the plantation and yield.

Table 7a : Correlation coefficient between adopted practices and yield

Sl.No	Independent variables	YIELD	
1	Irrigation	0.501605	*
2	Manure	0.150718	NS
3	Manure quantity	0.083769	NS
4	Magnesium Sulphate	0.191518	NS
5	Boron	0.198457	NS
6	No of splits	-0.03817	NS
7	Nitrogen	0.137125	NS
8	Phosphorus	0.289286	*
9	Potassium	0.508972	*

Table 6 : Distribution of Farmers based on Fresh Fruit Bunch yield

N= 82

Sl. No.	Year of Planting	Yield(t/ha)	Frequency	Percentage
1.	1989-1993(13-17 yrs)	<12.5	5	26
2.		12.5-25.0	10	53
3.		25.0-37.5	4	21
Total	19	100		
1.	1994-1998(8-12 yrs)	<12.5	26	46
2.		12.5-25.0	25	45
3.		25.0-37.5	4	7
4.		37.5-50.0	1	2
Total	56	100		
1.	1999-2003(3-7 yrs)	<12.5	6	83
2.		12.5-25.0	1	17
Total	7	100		

Table 7b : Correlation coefficient between age and yield.

Age group	Yield	
≤ 8YRS	0.349477	NS
>8YRS	0.385438	*

Practice wise adoption

Though the rate of adoption over the period (1989-2005) showed equal distribution (Fig.1), from the Table 7c. results indicated that adoption gap (>50%) exists in frequency of irrigation followed by boron application (46%), application of organic manure (45%), Phosphorous and Magnesium (40%), Nitrogen application (39%), Potassium application (35%) etc., The adoption gap can be reduced by creating awareness about the critical inputs required by the plant, their availability and judicious application to

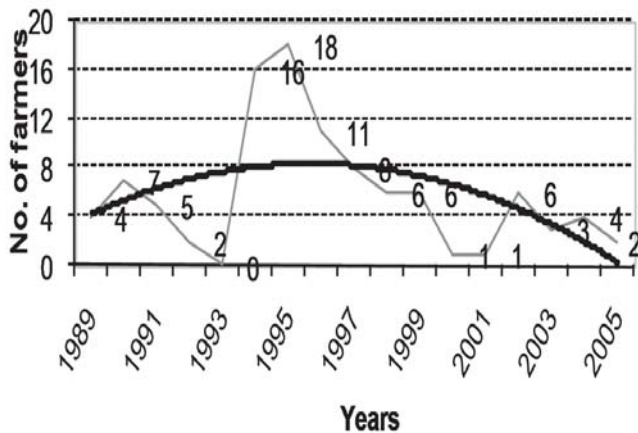


Fig. 1 : Rate of adoption of oil palm farmers in Karnataka

Table 7c : Practice wise adoption index and gap

Sl. No	Practice	Adoption Index (%)	Adoption Gap (%)
1	Method of irrigation	68	32
2	Frequency of irrigation	43	57
3	Organic manure	55	45
4	Nitrogen application	61	39
5	Phosphorus application	60	40
6	Potassium application	65	35
7	Magnesium application	60	40
8	Boron application	54	46
9	Frequency of fertilizer application	67	33

achieve higher yields. Developmental personnel may consider these above points and render required services to farmers to adopt critical practices to get higher yield.

Adoption gap: Results from the Table 7d reveals that 40 percent gap exists in adoption of practices by the farmers. This calls for an urgent need to adopt critical practices which contribute for higher and sustainable yields.

Table 7d : Adoption gap of oil palm farmers in Karnataka

Sl. No	Particulars		Percentage
1	Obtainable max. Score	22	—
2	Average score obtained	13.15	60
3	Average gap	8.85	40

CONCLUSIONS

- The area under oil palm steadily increased during the year 1993 to 1998. It is required to increase the productivity of the plantations.
- Majority of the farmers were following basin method of irrigation to irrigate the oil palm plantations. However, it is advised to switch over from basin irrigation to drip/ micro-jet irrigation for efficient utilization of water resources and it is advised to give frequent irrigations with less quantity of water in case of basin irrigation.
- Most of the farmers were not applying the recommended dose of chemical fertilizers and organic manures. Hence suggestions were made to apply fertilizers such as urea, single super phosphate and murate of potash @ 2.6, 3.75 and 2 kg ha⁻¹ respectively to meet the required quantity in 4 equal splits per year. Majority of the farmers were not applying the micronutrient fertilizer like Boron and Magnesium. Farmers were advised to apply Magnesium Sulphate @ 500g for all the palms every year and Boron @ 100 g/palm/year when the deficiency symptoms are noticed in the field.
- In order to make the farmers realize higher yields and more net returns, it is advised to apply the fertilizers based on leaf nutrient analysis and soil test values. Unbalanced application of major and micronutrients could be avoided by the judicial and rational application of fertilizers along with organic manures.

- One of the major adoption gap is the frequency of irrigation due to irregular power supply, which needed to be seriously looked into. There is a need to provide uninterrupted power supply to make best use of micro irrigation systems.

The results of the present study had clearly indicated the adoption gaps, gap between actual and potential yields and also helped to identify the priorities and gaps. This calls for an action plan to address the gaps and assist farmers in adoption of all recommended practices to achieve sustainable and potential yields. This requires support, cooperation and coordination of all the agencies involved in

oil palm development programme in Karnataka.

REFERENCES

- Chadha. K. L. 2006. *Progress and Potential of Oil Palm in India*. Report of the Committee to reassess fresh / potential areas of Oil Palm in India. Department of Agriculture & Co- operation, Govt. of India, New Delhi. 22 p.
- Prasad. M. V, Reddy. V. M, Rayapa Raju. D. G. S and Neelaveni, S. 2003. Adoption of management practices by farmers in relation to yield of oil palm in Andhra Pradesh, India-A survey. *International Journal of Oil Palm*, **3&4**: 69-73.