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RESEARCH NOTE

Comparative Performance of Oil Palm Hybrids on the Basis of Bunch Analysis at the Initial Stage of Yielding

Oil palm (*Elaeis guineensis* Jacq.) is the highest oil yielding crop per unit area of land, introduced in India under irrigated condition as small and marginal plantations.

The performance of oil palm can be assessed on the basis of oil producing capacity of the palm. The fresh fruit bunch (FFB) of oil palm is composed of stalk, spikelets and the fruits. "Bunch analysis" is stepwise and systematic measurement of the different components of FFB. The quality of a FFB, therefore, can be determined by the proportion of oil producing components of the bunch i.e. fruits to the bunch itself (Ojuederie, 1982). So far, in India, the assessment of the hybrids is made on the basis of bunch yield per palm (Pillai *et al.*, 1982; Pillai and Nampoothiri, 1996).

Bunch analyses of 11 hybrid combinations, planted during January 1996 at NRCOP, Pedavegi, Andhra Pradesh, were carried out to study the comparative performance at their initial stage of yielding and presented in this article.

The analysis was conducted during the peak FFB yielding season (April- June 2000) following the procedure of Hartley (1988). FFBs were harvested for analysis when the palms were in the second year of yielding. Fifteen bunches (three replications and five samples per replication) were analysed for all combinations. Total bunch weight, stalk weight and spikelets weight were measured and 5 kg of spikelets were separated from a single bunch. Fruits were separated from the spikelets and 500g fruits were sampled randomly. Mesocarp was separated from nuts by scraping and the nuts were dried for estimating kernel weight. Mesocarp oil content was determined by using SOXHTHERM (Gerhardt, GERMANY) after drying the scraped mesocarp. Randomised Complete Block Design was used for the experiment and statistical analysis was conducted by using

Table 1: Bunch analysis parameters of different hybrid combinations

Hybrid combination	Source	B.Wt (kg)	F.Wt (kg)	F/B (%)	M/F (%)	O/B (%)	K/B (%)	O/P (kg)	K/P (kg)	Y/P (kg)
Deli x Avros	ASD Costa Rica	9.04	5.97	66.48	76.23	22.80.	4.40	5.64	1.14	25.08
Deli x Ekona	ASD Costa Rica	8.26	5.61	67.41	81.49	24.56	4.06	3.25	0.55	13.24
Deli x Ghana	ASD Costa Rica	8.47	5.38	62.79	74.75	25.93	3.73	4.78	0.72	19.23
Deli x Lame	ASD Costa Rica	6.99	5.00	71.66.	64.27	22.30	7.18	10.50	3.70	49.16
65D x 111P	Palode	9.84	6.53	65.68	76.31	23.66	5.27	4.57	1.01	19.68
12D x 313	Palode	13.05	8.59	65.45	68.98	22.66	4.86	4.83	1.07	22.06
12D x 266	Palode	8.91	5.17	60.34	76.71	22.15	7.33	4.17	1.25	18.96
128D x 313	Palode	10.11	6.84	67.32	77.54	23.67	7.38	2.69	0.87	11.32
18C x 5201	Ivory Coast	8.06	5.35	66.47	69.42	23.04	9.06	12.05	4.54	52.95
9C x 1001	Ivory Coast	7.73	5.32	68.82	76.94	22.10	4.10	10.62	2.39	47.66
1M0069D x P	PNG	9.71	6.07	70.02	80.85	29.54	4.83	8.33	1.35	28.97
L.S.D at 5%		2.79	1.92	74.38	7.43	5.26	5.25	4.717	2.112	20.65

B: Bunch; F: Fruit; M: Mesocarp; O: Mesocarp oil; K: Kernel; P: Palm; Y: Yield

MSTATC, Version 2.1 software.

Maximum bunch weight (13.05kg) was observed in 12D x 313P combination from Palode, which was significantly different from all the other hybrid combinations (Table 1). Fruit weight per bunch (8.591kg) was also found highest in 12D x 313P combination, which was on par with 128D x 313P (6.841kg) and 1M-0069D x P (6.701kg). Mesocarp oil content on the basis bunch weight was the highest in 1M-0069D x P from Papua New Guinea (29.54%) which was on par with Deli x Ghana (25.93 %) and Deli x Ekona (24.56%). Another important parameter was kernel content on the basis of bunch weight which was found maximum in 18 C x 2501 (9.1%) from Ivory Coast.

The FFB yield per palm during the quarter was maximum (52.95kg) in 18C x 2501 combination from Ivory Coast which was on par with Deli x Lame combination (49.16kg.) and 9C x 1001 (47.66kg). It can be mentioned here that 18C x 2501 hybrid combination exhibited the highest FFB yield per palm for both the years of yielding (unpublished data). The highest level of mesocarp oil and kernel yield per palm were recorded in 18C x 2501. However, this was on par with the hybrid Deli x Lame and 9C x 1001.

Rajanaidu *et al.* (1986) reported the performance of inter-origin commercial D x P planting material in terms of bunch number, weight and oil yield. Early yield performance of clonal oil palm has been reported by Simon *et al.* (1998). Lubis *et al.* (1989) evaluated the performance of *E. oleifera* x *E. guineensis* interspecific hybrids. In all the cases bunch analysis was conducted to assess the performance of the palms. Although the hybrid combinations taken for the present study have been selected for superior yield in their respective location, variation in performance in terms of bunch analysis under irrigated condition suggests that selection is possible for superior performance. Studies will be continued for further evaluation and final selection of superior hybrids.

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RESEARCH NOTE

Effect of Age of Oil Palm Seedlings at Planting on Growth

Oil Palm (*Elaeis guineensis* Jacq.) belongs to the family Palmae and tribe Cocoineae. It has been recognized as one of the highest edible oil yielding crops yielding 4-6 t of oil/ha. For the maximum utilization of land to be planted, the time required for the palms from field planting to the productive stage should be worked out. At Malaysia, young palms are transplanted at any age from 6 to 18 months whereas the recommendation is that the transplanting into the field can be carried out at about nine months as the palms can be handled easily in the nursery and main field. Gunn and Sheldrick (1964) observed that 18 month old seedlings maintained a distinct advantage of maturity over 7-8 month old seedlings, although the latter group suffered lesser transplanting shock. Entrepreneurs involved in Oil Palm Development Programme in the different states of India are using seedlings, which are more than 12 months old due to the slow pace of the expansion programme in the area. The present study has been undertaken to study the effect of the different ages of seedlings at planting on the growth of Oil Palm. The main objective of the study is to ascertain the most appropriate age of oil palm seedling for planting out and its influence on growth under irrigated conditions.

The seedlings of various ages from the germinated seed stage were planted in the main field during the year 1998 in 9 x 9 x9 m triangular method. The treatments according to the seedling ages (months) at planting were : A = 9, B = 12, C = 15,D = 18, E = 21, F = 24.

The seedlings were raised in large polythene bags of 60 x 45cm by single stage nursery method. All the seedlings were healthy and established well. The trial was laid out with three replications having three palms per replication. The soil in the experimental area is virgin laterite. Fertilizer application was done as per the recommended dosage (1200g N: 600g P_2O_5: 1200g K_2O). Ablation was done in the first two years. Vegetative measurements and photosynthetic observations were carried out every year. Leaf area and frond dry weight measurements were estimated non-destructively as given by Corley *et al.* (1971). The photosynthetic rate and its associated parameters were done with the help of portable photosynthesis system (LCA - 4, ACD, U.K.). Leaf area, leaf dry weight, chlorophyll content, photosynthetic rate and associated parameters

Table 1: Morphological parameters in the different treatments

S.No	Treatment	Height (cm)		Stem diameter (cm)		Leaves/ month		Leaf Area* (Sq.m)	Leaf dry wt. (kg)
		Year I	Year II	Year I	Year II	Year I	Year II	Year II	Year II
1	A	3.42	5.04	1.24	2.16	1.33	2.31	6.21	1.94
2	B	3.01	4.74	1.15	2.02	1.33	2.44	5.70	2.22
3	C	2.94	4.40	1.21	2.16	1.44	2.53	5.45	2.15
4	D	2.88	4.06	1.08	1.97	1.33	2.44	5.75	2.00
5	E	2.42	3.70	0.79	1.93	1.22	2.38	4.69	1.86
6	F	2.17	3.29	0.77	1.64	1.11	2.27	4.55	1.94
LSD (P=0.05)		0.38	0.31	0.46	0.16	NS	NS	0.52	0.27

* Frond number 17

Table 2: Photosynthetic rate and associated parameters in the different treatments (two years after planting)

S.No	Treatment	Pn µmol/ sq.m/s	T mmol/ sq.m /s	Cs mol/s sq.m /s	Chl a µg/ g.fwt.	Chl b µg/ g.fwt.	Total chl µg/ g.fwt.
1	A	9.12	4.53	0.13	1.78	1.22	3.00
2	B	9.67	4.25	0.12	1.39	1.09	2.48
3	C	8.75	3.71	0.10	1.59	0.91	2.50
4	D	8.51	3.63	0.11	1.28	0.90	2.18
5	E	8.60	3.74	0.09	1.44	1.01	2.45
6	F	8.88	3.88	0.11	1.42	1.01	2.43
LSD (P=0.05)		0.41	0.37	NS	0.31	0.12	0.47

were estimated in frond number 17.

During the first year of planting, maximum plant height was observed in treatment A, which was significantly higher than the rest of the treatments. Treatment F recorded the significantly lowest height (Table 1). The treatments B, C, D, E recorded intermediary values. The plant height during the second year also showed the similar trend as that of the first year. Treatment A and treatment F recorded significantly higher and lower values of stem diameter respectively than the rest of the treatments during the first year. However, treatments A and C were on par with each other during the second year. Other treatments recorded lower values of stem diameter than those of A and C. The leaf production rate ranged from 1.11 to 1.44 and 2.27 to 2.53 respectively during the first and second year. The leaf production rate was higher in treatment C in both the years. Treatment F recorded the lowest rate of leaf production. The leaf area of frond number 17 during the second year ranged from 4.55 to 6.21 sq.m. Treatment A recorded the maximum leaf area followed by D and B. The lowest leaf area was observed in F, which did not differ significantly with that of E. The leaf dry weight in frond number 17 varied from 1.94 to 2.22kg during the second year. Maximum leaf dry weight was recorded in treatment B, which did not differ significantly with those of treatments C and D. Treatment E recorded the lowest weight which was on par with those of F and D.

The photosynthetic rates in the different treatments ranged from 8.51 to 9.67 µmol/sq.m/s during the second year (Table 2). Maximum photosynthetic rate was recorded in treatment B which was significantly higher than the rest of treatments. The lowest rate was in treatment D, which was on par with those of C, E and F. Treatment A recorded intermediary values. The transpiration rates amongst the different treatments varied from 3.63 to 4.53 µmol/sq.m/s during the second year. The lowest and highest values were observed respectively in treatments D and A. Treatments B, C, E and F recorded intermediary values. The stomatal conductance ranged from 0.09 to 0.13 mol/sq.m/s during the second year. The highest conductance was recorded in treatment A, which did not differ significantly with those of the rest of the treatments. Treatment E recorded the lowest conductance. The chlorophyll content was larger in treatment A followed by C and B.

Seedlings of all the treatments established well without transplanting shock and were devoid of any pest or disease incidence. The growth differences were evident at planting out among the different treatments. There was a distinct growth advantage for the three treatments - A, B and C over the rest. Treatments A, B and C were larger in size than that of the other treatments. The leaf area and leaf dry weight was also greater

in treatments A, B and C indicating faster establishment of these seedlings. The observations on growth were further supported by photosynthetic rates in these treatments. The initial setback in the growth of the seedlings in the treatments D, E and F may be due to the fact that these were in the polybags for a longer period of time. The above results appear to concur with those of Turner and Gillbanks (1974) where seedlings planted at 12-14 months age in the field establish better growth than those planted at more than 18 months. Further yield studies will help in establishing the best age of oil palm seedling at planting out in the main field.

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