

# Developing Oil Palm Hybrids in West Bengal

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The supply of edible oil in India during the past 25 years has increased at the rate of 2 per cent, while the demand has grown at the rate of 5 per cent per annum (Rethinam, 1992). During 1988-89 there was demand for 6.95m tonnes of vegetable oils in India as against the supply of 5.49 tonnes, out of which 1.99m tonnes was imported. Edible oil producing crops of India like groundnut, rapeseed, sunflower and coconut produce around one tonne oil per hectare and most often the potential yields are never reached. To bridge the gap between demand and supply of edible oil in India, efforts are under way to improve the production and productivity of the existing oil producing crops and also to introduce new oil crops. Oil palm (*Elaeis guineensis* Jacq.) has a high potential to produce oil and can reach more than five tonnes of oil per hectare under most favourable conditions. Oil palm cultivation in Kerala gave as much as 4.6 tonnes oil per hectare. Its performance under other agroclimatic conditions of the country is being studied. As a part of this study, experiment is under way at the Central Plantation Crops Research Institute, Research Centre, Mohitnagar, Jalpaiguri district, West Bengal. In this paper the initial growth and development of eight different Dura x Pisifera combinations grown at this centre are discussed.

## Materials and Methods:

Eight Dura x Pisifera (DxP) combinations produced at CPCRI, RC, Palode were planted in 1988 at the Central Plantation Crops Research Institute (ICAR), Research Centre, Mohitnagar, Jalpaiguri district, West Bengal. Jalpaiguri is situated between 26°16' - 27°N latitude and 88°25' - 89°53'E longitude with an elevation of 91.3m above mean sea level. The soil type is sandy loam with 1.2 per cent organic carbon in 0-100 cm depth, 46Kg per ha available phosphorus and 250Kg per ha available potassium. The soil pH is between 4.5 and 5.0.

The eight hybrid combinations were planted in a randomized block design, with four replications having four palms per plot. One and half years old seedlings were planted at 9x9m

spacing in pits (50cm) and levelled. The fertilizer schedule consisted of 400g N, 200g P<sub>2</sub>O<sub>3</sub> and 400g K<sub>2</sub>O per palm during the first year. During the second year the rates were doubled and during third year it was increased



three times. One half of the recommended dose was applied in April and the other half during September. Nitrogen was applied in the form of urea, phosphorus as single super phos

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phate and potassium as muriate of potash. Borax at the rate of 50g per palm per year was applied to prevent boron deficiency. Basin irrigations were given at fortnight intervals during winter months. Weeds were controlled by hand weeding as and when required. No plant protection measure was needed as there was no serious pest or disease problem except boron deficiency.

Growth observations like plant height, girth at collar and number of leaves were recorded at three months interval. Data on flowering was also noted once flowering commenced and inflorescences

were removed upto the end of third year. Statistical analysis of the data was carried out.

**Results:**

**Climate**

The climate of Jalpaiguri district is characterised by a long rainy season starting from middle of April to the end of September with a total rainfall of about 2500 to 3000mm. The monthly mean maximum temperature varies between 24° and 32°C, while the monthly mean minimum temperature varies between 7° and 25°C. The potential evapotranspiration exceeds precipitation during the months

distributed; the mean maximum temperature is about 29°-32° and mean minimum temperature is 22°-24°C (Hartley, 1967). Thus the climate at Jalpaiguri fits the requirements of oil palm except for the mean minimum temperature and moisture deficit during winter months.

**Crop Growth**

The growth, expressed as height, and number of leaves, of all the hybrids showed a linear development (Table 1). The height of different hybrids varied between 3.78 and 4.14m 32 months after planting (Table 2). The hybrid combination 34 x 1 was shorter than combinations 3 x 5, 41 x 5, 128x 283 and 128 x 1. There was no significant difference in girth at collar of different hybrids and it varied between 138.8 and 148.5cm. Similar to height the combination 34 x 1 had the lowest girth of 138.8cm, while combination 128 x 283 had the maximum girth of 148.5cm.

Number of leaves produced during 32 months from planting ranged from 49.3 of combination 128 x 283 to 53.7 of 41 x 5 hybrid combination (Table 1 and 2). Although there was no significant difference in number of leaves among the different hybrids, when they were tested as a group, orthogonal comparisons showed that the hybrid combinations 41 x 5 and 271 x 266 had significantly more number of leaves as compared to 128 x 266 had significantly more number of leaves as compared to 128 x 283 combination. Since number of leaves is an indirect measure of number of bunches produced (Hartley, 1967), hybrid combinations 41 x 5 and 271 x 266 may perform better than the hybrid combination 128 x 283 at this locality.

There was a significant difference in number of palms flowered after 20 months after planting. In

**TABLE 1:**

Hybrid	Regression equation	r
<b>1. Height (m):</b>		
128x283	Y = 47.17 + 10.378 X	0.972 **
26x98	Y = 32.30 + 10.492 X	0.976 **
11x1	Y = 37.28 + 11.342 X	0.975 **
41x5	Y = 37.28 + 11.342 X	0.975 **
271x266	Y = 43.18 + 10.518 X	0.978 **
34x1	Y = 43.04 + 9.817 X	0.976 **
3x5	Y = 47.65 + 10.906 X	0.975 **
128x1	Y = 41.92 + 10.869 X	0.975 **
<b>2. Girth (cm):</b>		
128x283	Y = -4.76 + 4.182 X	0.962 **
26x98	Y = -4.87 + 4.278 X	0.974 **
11x1	Y = -5.52 + 4.119 X	0.963 **
41x5	Y = -3.34 + 4.141 X	0.962 **
271x266	Y = -5.11 + 4.332 X	0.973 **
34x1	Y = -5.36 + 4.116 X	0.974 **
3x5	Y = -4.41 + 4.107 X	0.970 **
128x1	Y = -6.20 + 4.374 X	0.971 **
<b>3. Leaf Nos.:</b>		
128x283	Y = 5.22 + 1.188 X	0.960 **
26x98	Y = 6.53 + 1.230 X	0.969 **
11x1	Y = 4.42 + 1.310 X	0.982 **
41x5	Y = 5.09 + 1.335 X	0.972 **
271x266	Y = 5.71 + 1.265 X	0.962 **
34x1	Y = 5.11 + 1.271 X	0.964 **
3x5	Y = 5.76 + 1.210 X	0.957 **
128x1	Y = 5.32 + 1.228 X	0.966 **

\*\* Significant at 0.01 probability

Growth expressions of different oil palm hybrids at Mohitnagar

hybrid combinations 3 x 5 and 128 x 283 only 1.8 and 8.9 per cent of palms flowered, respectively, while all other combinations had more than 45 per cent of the palms flowered. At the age of 32 months after planting, however, no significant difference was noticed in the number of palms flowered among the different hybrids. There was no significant difference in number of male inflorescences per palm produced by different hybrids at the age of 32 months after planting and it varied between 1.2 for 128 x 283 and 2.4 for 26 x 98 combination. The hybrid combinations 34 x 1, 11 x 1, 26 x 98 and 3 x 5 had more number of female inflorescences per palm than the remaining hybrid combinations.

**Seasonal Variation:**

The growth of the palms was significantly affected by the seasons. Maximum growth was observed during the period June to August while least growth was observed during December to February. During the period June to August the palms grew by 70.4cm in height, 20.3cm in girth and produced 5.3 leaves. The respective figures for the period of December to February were 3.3cm, 6.3cm and 2.3 leaves. The

**TABLE 2**

Hybrid (DxP)	Height m	Girth cm	Leaf nos	Palms flowered per cent	Inflorescence	
					Male	Female
1. 128x283	4.02	148.5	49.3	8.86	1.2	0.7
2. 26x98	3.99	145.9	51.6	49.2	2.4	1.8
3. 11x1	3.91	143.7	50.7	67.5	1.9	2.1
4. 41x5	4.10	146.7	53.7	45.5	1.5	1.1
5. 271x266	3.89	146.9	52.5	45.0	2.2	1.7
6. 34x1	3.78	138.8	51.7	45.0	1.5	2.5
7. 3x5	4.14	144.5	50.9	1.8	1.7	1.8
8. 128x1	4.02	148.1	50.1	48.8	1.9	1.5
LSD 0.05	0.21	NS	NS	35.10	NS	1.0
(CV %)	3.55	5.10	3.05	32.74	11.88	61.05

Orthogonal comparisons:  
 128x283 vs 41x5 - sig. - - -  
 128x283 vs 271x266 sig. - - -

All the growth parameters presented represent growth at 32 weeks after planting, except palms flowered, which was taken 20 weeks after planting.

Ns - not significant at 0.05 probability. Sig. significant at 0.05 probability

*Growth of different oil palm hybrids at Mohitnagar (1988-1991)*

other two periods, March to May and September to November, resulted in intermediary growth. These growth increments were strongly correlated with the mean minimum temperatures during the respective periods and are represented by the linear regression equations present in Table 3. For every degree increase in mean minimum temperature the height of the palms increased by 3.55cm,

girth by 1.05 cm and leaf number by 0.22 leaves.

Seasonal effect on leaf production was reported from West Africa (Corley and Grey, 1976). Under West African conditions leaflet opening is delayed, although the leaves continue to elongate and accumulate at the "spear" stage. On the commencement of rains, a flush of leaf opening occurs, followed by a return to the normal rate of opening. They however, reported that only small difference appeared in total annual production between West Africa and the more favourable environment of S.E. Asia.

**TABLE: 3**

Growth Character	Regression equation	r
1. Height (m)	$Y = -39.73 + 4.286 X$	0.919 **
2. Girth (cm)	$Y = - 2.62 + 0.881 X$	0.864 **
3. Leaf (Nos)	$Y = - 0.71 + 0.211 X$	0.795 **

*Effect of mean minimum temperature on growth of oil palm at Mohitnagar (1988-1991)*

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