

## COMPARATIVE PERFORMANCE OF PROGENIES FROM CHOWGHAT DWARF ORANGE COCONUT

K SATYABALAN AND G VIJAYAKUMAR

*Central Plantation Crops Research Institute  
Kasaragod-670 124, Kerala*

### ABSTRACT

A comparative study was made of yield attributes and nut characters of the progenies of Chowghat Dwarf Orange, selected for seedling vigour from four different populations obtained by four different methods, viz. (1) unemasculated and open-pollinated, (2) unemasculated and selfed, (3) emasculated and hybridized with WCT, (4) emasculated and open-pollinated.

Data indicate that progenies from population (3) gave the highest cumulative yield as well as annual yield, closely followed by those from population (2) although this relationship was not maintained for the other yield attributes studied. The mean copra outturn as well as oil content was maximum in progenies from population (2) followed by those from (3).

### INTRODUCTION

In the West Coast of India there are two distinct types of dwarf coconuts namely the Chowghat Dwarf Orange (CDO) and Chowghat Dwarf Green (CDG). Both are early bearers and are planted mainly for ornamental purpose or for tender nuts. While the CDG is very highly self-pollinated in nature both self and cross-pollination are reported in CDO. According to Rao and Koyamu (1955) about 80% of the progenies of CDO and 95% of CDG breed true to type. About 20% of the off type progenies obtained from CDO are presumed to be natural hybrids (with West Coast Tall) which are easily identified in the nursery with reddish petiole colour with extra vigour in growth when compared with the pure dwarf orange seedlings. According to Ninan and Satyabalan (1964) controlled self-pollination of CDO also had yielded off types which resembled the natural off type progenies in the characteristic reddish petiole

colour and vigorous growth. They felt that these may be heterozygous segregates from CDO possibly with imposed hybridity. Similar off type progenies were also obtained from CDO the bunches of which were emasculated and left for open pollination. A small proportion or similar of type progenies were also obtained by controlled pollination of CDO with West Coast Tall pollen. Thus, off type progenies were obtained from CDO by (1) unemasculature and open pollination, (2) unemasculature and selfing, (3) emasculature and hybridisation and (4) emasculature and open pollination. In this paper an attempt has been made to study the comparative performance of the off type progenies.

#### MATERIALS AND METHODS

Seedlings selected for hybrids vigour from nurseries, each containing progenies of Chowghat Dwarf Orange obtained by four different methods, formed the material for this study. They were planted in 1966 in one block where the soil is laterite. They were maintained under rainfed condition and under normal dosage of fertilizers. Observations on yield attributes and nut characters were recorded as per the registers maintained in the Institute.

#### RESULTS AND DISCUSSION

The yield attributes like the mean number of inflorescences produced and number of female flowers and yield of nuts of the four groups of progenies during the years 1976-79 are presented in Table 1. The mean cumulative yield and the range of cumulative yield in each are also given in the Table. The data indicate that the progenies from artificially pollinated nuts have given high yield of 90 nuts. The mean cumulative yield of these progenies is 552.5 with a range of 399-762. The progenies obtained from selfed nuts of CDO have given a mean yield of 84.4 nuts with a mean cumulative yield of 524.2 nuts ranging from 381-650. The progenies obtained from emasculated bunches of CDO have given an yield of 77.4 nuts. The mean cumulative yield of this group is 474.9 with a range of 336-612. The progenies obtained from open pollinated nuts have given the low yield of 73.6 nuts. Its mean cumulative yield is 440.2 with a range 181-594.

Table 1. Yield of nuts, copra outturn and yield attributes of the four groups of progenies obtained from Chowghat Dwarf Orange (planted in 1966)

Material	No. of inflorescences	No. of female flowers	No. of nuts	Setting percentage	Mean Cumulative yield from the time of flowering	Range of quantitative yield	No. of palms
1. Progeny obtained from open pollinated nuts of CDO	8.6 (6.0 to 10.8)	214.6 (123.5 to 282.3)	73.6 (42.5 to 92.5)	34.4	440.2	181-594	10
2. Progeny obtained from selfed nuts of CDO.	10.1 (7.8 to 13.3)	257.4 (193.3 to 321.3)	84.4 (54.0 to 98.5)	32.7	524.2	381-650	9
3. Progeny obtained from bunches pollinated with pollen of high yielding WCT.	9.3 (5.8 to 12.0)	232.7 (168.8 to 276.8)	90.0 (65.0 to 107.5)	38.7	552.5	399-762	10
4. Progeny obtained from emasculated bunches of CDO	8.8 (7.5 to 10.0)	262.1 (190.8 to 366.5)	77.4 (63.8 to 92.3)	29.4	474.9	336-612	15

Table 2. Nut and copra characters of the four groups of progenies obtained from C.D.O.

	Wt. of fruit (g)	Wt. of H.N. in fruit (g)	% of H.N. in fruit	Wt. of kernel (g)	% of K in H.N.	Wt. of water (g)	% of water in H.N.	Wt. of shell (g)	% of shell in H.N.	Wt. of copra (g)	% of copra in H.N.	Oil content
1. Progeny from open pollinated nuts ..	962.3	637.8	66.3	323.9	50.8	157.9	24.7	156.0	24.5	182.1	28.5	68.6
2. Off types from selfed nuts ..	1027.0	668.1	65.0	363.7	54.4	153.6	23.0	150.8	22.6	202.4	30.2	67.5
3. Off types from pollinated bunches	959.4	596.9	62.2	312.8	52.4	130.7	21.9	153.4	25.7	186.3	31.2	68.2
4. Off types from emasculated bunches	1070.6	707.9	66.1	374.3	52.9	170.7	24.1	162.9	23.0	210.0	29.7	68.1

Nut and copra characters of the four groups of progenies are presented in Table 2. The data indicate that weights of fruit and weight of husked nut are high in the progenies of selfed nuts and in those from emasculated nuts than in the progenies from open pollinated and artificially pollinated nuts. Oil content ranged from 68 to 69% in the copra of different groups. Analysis of husked nut has indicated that weight of kernel and weight of copra are also high in the nuts of these two groups. The husk content is more (38%) in the nuts from progenies of artificially pollinated nuts than in the other three groups which ranged from 33 to 35%. The kernel content in the husked nut was low in the nuts from open pollinated group (51%) while it was high in these from selfed group (54%). Water content in the husked nut was low (22%) in those from artificially pollinated group whereas it was high (25%) in those from open pollinated group. The shell content was high (26%) in the husked nut from pollinated group while it was low (23%) in the husked nuts of selfed and emasculated group. The percentage of copra in husked nut was high (31%) in the husked nut of pollinated group while it varied from 29 to 30% in those from other groups.

In Table 3 are presented the mean annual yield of nuts, and the approximate average annual outturn of copra and oil of the groups of palms. The mean annual yield of nuts is high (above 80 nuts) in the groups from selfed and pollinated nuts and low (below 80 nuts) in the other two groups. Since the yield of nuts

Table 3. Annual yield of nuts, copra and oil.

Material	Mean annual yield of nuts (1976-79)	Average annual copra outturn (approx.)	Average oil outturn (approx.)
1. Progeny from open pollinated nuts ..	73.6	13.4 Kg.	9.2 Kg.
2. Off types from selfed nut	84.4	17.1 ..	11.5 ..
3. Off types from pollinated bunches ..	90.0	16.8 ..	11.4 ..
4. Off types from emasculated bunches ..	77.4	16.3 ..	11.1 ..

is high in these two groups the approximate annual outturn of copra is slightly more than in the palms raised from nuts of emasculated bunches. Among the four groups, those raised from open pollinated nuts have given low copra and oil outturn. Off types obtained from nuts of CDO which were selfed or pollinated with WCT pollen have given high yield of nuts. The progenies obtained from selfing may be segregants. Higher outturn of copra and oil is obtained from them, since they have given high yields. The progenies obtained from nuts of emasculated bunches are natural hybrids. The yield from these hybrids is less than 80 but the copra content per nut is high (210.0 g). Hence the copra and oil outturn are high.

The occurrence of off type progenies resembling hybrids thrown out when CDO is selfed has been reported by Ninan *et al.* (1964). The fact that CDO throws out hybrids like progenies under different types of breeding including selfing proves the heterozygous genetic nature concealed under phenotypic similarity. This heterozygosity could be the result of a gradual evolution of the dwarfs from ancestral wild types, due to a combined action of inbreeding and outcrossing. Under this circumstance CDO on selfing can give progeny superior to or equal to those obtained, when CDO is hybridised with West Coast Tall, assuming a normal meiosis. But the realisation of this trend into practical utility depends upon the assessment of the degree and nature of heterozygosity, obviously more by the latter. This at present is not possible. The fact that in traits like mean annual yield and mean cumulative yield, progeny obtained by hybridization is superior to those obtained by selfing of CDO proves that introduction of fresh variability into the system is better than manipulating the available variability.

#### REFERENCES

- HARLAND, S. C. 1957. *The Improvement of the Coconut Palm by Breeding and Selection*. Bull. No. 15 Coconut Research Institute, Ceylon.
- NINAN, C. A. AND SATYABALAN, K. 1964. A Study of Natural Self and Cross (Dwarf  $\times$  Tall) Progenies of Dwarf Coconuts of the West Coast of India and its Bearing on the Genetics of the Dwarfs and the Putative Hybridity of their Off type Progenies. *Caryologia* 17 : 77-91.
- RAO, M. B. S. AND KOYAMU, K. 1955. The Dwarf Coconuts. *Indian, Cocon. J.* 8 : 106-112.