

## VARIABILITY AND GENETIC PARAMETERS OF MOTHER PALM CHARACTERS IN COCONUT TYPES

Early selection work in coconut (*Cocos nucifera* L.) was primarily based on mother palm and nursery selection. Jack (1930) estimated that by mother palm selection alone, the first generation performance could be enhanced to the order of 25 to 35 per cent, irrespective of any knowledge or identity of the pollen parent. Selection of mother palm could be done only if there is genetic variation. The variability available in a population could be partitioned into heritable and non-heritable components, using the genetic parameters, phenotypic and genotypic coefficients of variation, heritability and genetic advance based on which selection can be effectively carried out. Hence, the present study was undertaken to examine the extent of variability produced by the three coconut types namely Komadan (three generations), West Coast Tall (WCT) and Natural Cross Dwarf (NCD) and thereby to estimate the genetic parameters of the mother palm characters.

The study was conducted in the Department of Plant Breeding and Genetics, College of Agriculture, Trivandrum to determine the extent of variability and to estimate the genetic parameters of the mother palm characters relating to the three Komadan generations, WCT and NCD as detailed in Table 1. Ten mother palms were randomly selected from each type after ascertaining the type identity and group uniformity through planting history and nut yield per tree per year from previous three-year records. Observations on mother palm characters recorded from each mother palm in the five types for one year were used for the analysis.

The five coconut types showed significant differences among themselves for five characters namely number of leaves, number of bunches and spadices, number of nuts per bunch, number of female flowers per bunch and number of nuts per palm per year (Table 1). Significant variability in mother palm characters in coconut was reported by Gopimony (1982), Nambiar and Govindan (1989) and Ramananthan (1989). The five mother palm characters studied revealed that the three Komadan generations expressed the maximum values for most of the characters.

The first, second and third generation Komadan had more number of leaves compared to WCT. This result is in agreement with the findings of Shylaraj (1982) where the Komadan palms were reported to have around 35 fronds per palm. Number of leaves present in a palm helps to assess the future yields by Liyanage (1964). Number of bunches and spadices were more in the three Komadan generations compared to WCT and NCD. The high number of bunches produced by the first, second and third generation Komadan was more than the average figure for regular bearers as pointed out by Thampan (1981) while WCT and NCD registered values lower than the average figure. The superiority of Komadan over WCT for number of nuts per bunch is in conformity with the findings of Gopimony (1982). With regard to number of female flowers per bunch, the three Komadan generations registered higher values compared to WCT and NCD, although the first generation Komadan was significantly superior to all other types. Liyanage (1991) suggested this

Table 1. Details of mother palms selected for the study

Sl. No	Type	Age	Source	Average yield of nuts per palm per year
1	K-I	65	Thottapuzhassery, Pathanamthitta District.	191
2	K-II	32	College of Agriculture, Vellayani, Thiruvananthapuram District	130
3	K-III	15	Different locations in Thiruvananthapuram District	150
4	WCT	30	College of Agriculture, Vellayani	103
5	NCD	30	RARS, Pilicode, Kasaragode District.	108

Table 2. Mean values of six mother palm characters

Type	No. of leaves	No. of bunches and spadices	No. of nuts per bunch	No. of female flowers per bunch	No. of nuts per palm per year
KI	32.60	14.50	13.40	45.15	192.20
KII	34.35	13.70	9.90	31.50	135.50
KIII	33.75	13.90	12.75	33.25	160.20
WCT	28.35	11.05	9.10	27.70	102.60
NCD	31.05	11.30	8.65	23.40	107.80
CD (0.05)	2.368	1.458	1.932	6.456	27.269

Table 3. Genetic parameters of mother palm characters

Sl. No	Characters	Phenotypic coefficients of variation, %	Genotypic coefficients of variation, %	Heritability %	Genetic advance of mean, %
1	Number of leaves	10.82	7.05	42.46	9.47
2	Number of bunches and spadices	17.09	11.59	45.98	16.18
3	No. of nuts per bunch	27.25	18.66	46.88	26.31
4	No. of female flowers per bunch	33.00	24.38	55.00	37.39
5	No. of nuts per palm per year	33.75	25.87	58.77	40.85

character as reliable and important for mother palm selection. The three Komadan generations were found to have a nut production potential of above 135 nuts per palm per year, which was significantly higher than that of WCT and NCD. This is in agreement with the findings of Gopimony (1982) where more than 99 per cent of Komadan palms gave more than 80 nuts per tree per year while the average yield of WCT was comparatively less. The first generation Komadan palms (KI) available at its centre of origin are very good yielders. From these palms, about 50 seed nuts were collected and the seedlings planted at the Instructional Farm, Vellayani, Trivandrum during 1956-58 period without any scientific selection (three-tier selection) procedure, which forms the second generation Komadan (KII). Hence, the palms in KI were better yielders compared to those in KII and KIII.

Studies on genetic parameters revealed that the phenotypic coefficient of variation was higher than the genotypic coefficient of varia-

tion for all the characters (Table 2) indicating the influence of environment on the genotype for the expression of the character. Medium to high phenotypic and genotypic coefficients of variation were observed for number of nuts per palm per year, number of female flowers per bunch and number of nuts per bunch. Similar results have been reported by Bourdeix *et al.* (1991) and Ovasuru *et al.* (1991). This shows that improvement through mother palm selection can be effective, provided there is considerable extent of genetic variability available. High heritability combined with moderate to high genetic advance was recorded for nut yield per palm per year and number of female flowers per bunch. This indicates the predominance of additive genes, which can be considered as a desirable feature for selection (Panse, 1957). The high heritability observed for nut yield in the present study is in accordance with the findings of Lakshmanachar (1959) and Meunier *et al.* (1984). Prepotency is comparable to GCA and GCA in turn is governed by additive gene

action, which is responsible for additive genetic variation (Welsh, 1981). Thus, high heritability estimates can be taken as a measure of prepotency of the palm with respect to the characters under consideration. Hence, the superiority shown in these characters by the

Komadani type is an indication of its genetic identity over WCT and NCD.

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