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IDENTIFICATION OF PREPOTENT WEST COAST TALL PALMS BASED ON PROGENY PERFORMANCE

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SUMMARY

A study of seedling characters and yield attributes of 43 open pollinated progenies of eight high yielding palms of West Coast Tall planted in 1953 has shown that the progenies of three palms are high yielding and that they are superior in spathe production and female flower production to others indicating that they are prepotents. The possibility of identifying such prepotent palms in the nursery is indicated. The progenies of such palms will help to increase the production of future plantations. Efforts to spot out more number of such palms are under way for further breeding work.

INTRODUCTION

The two important stages at which selection is practised in coconuts are at the mother palm and seedling level. In India selection of regularly yielding mother palms, yielding on an average eighty or more nuts per year (Menon and Pandalai, 1958) followed by selection of vigorous seedlings from their progeny are the usual methods followed in producing the quality planting material in coconut. But different opinions regarding the relative efficacy of mother palm selection and seedling selection have been expressed by some workers. Smith (1933) has stressed the need for seed selection as well as study of nursery results in view of the fact that certain palms persistently yield nuts of low germination and poor growth characteristics. Dwyer (1938) is of the opinion that some palms tend to produce much stronger seedlings than others. Haldane (1958) felt as a result of the findings in Ceylon reported by Pieris (1937) and others, the parent selection may be more efficient in one population and seedling selection in another. Harland (1957) has stated that all high yielding mother palms do not produce high yielding progenies and that individuals could be identified on the basis of progeny performance. He has stated that from a study of sufficiently high number of progenies from open pollinated mothers it should be possible to arrange them in order of yield and pick out mothers which in spite of having been indiscriminately pollinated by miscellaneous males are sufficiently possessed of dominant yield genes that their progeny are also high yielding.

He has compared the situation in coconut with that in cocoa where his experiments in open pollinated cocoa trees have shown that they differ in their power of transmitting high yield to their progenies. Though the genetical basis of prepctency is not clearly understood, Liyanage (1972) opined that it could be due to general combining ability. Charles (1961) evaluated that potentiality of mother palm selection and produced experimental evidence to indicate that the technique is ineffective probably because of low heritability of yield. He has recommended progeny testing as the most reliable method of detecting prepotent palms. Ninan and Pankajakshan (1961) studied the seedling characters of the open pollinated progenies and hybrids of some high yielders of West Coast Tall variety and came to the conclusion that on the basis of seedling performance it is possible to isolate high yielders which yield superior progenies from those showing inferior progeny performance.

Follow up studies of seedlings have since been made to find out how far the superior progeny performance of the open pollinated seedlings in the nursery is maintained in later years. In this paper open pollinated progenies of eight high yielding palms of the West Coast Tall variety have been studied for their seedling characters and yield performance and the results discussed with particular reference to prepotency in coconuts.

MATERIALS AND METHODS

Selected progenies raised from open pollinated nuts of eight high yielders of the West Coast Tall variety were planted in East Block (sandy loam soil) of this Institute in 1953 for a study of their performance. Data on the following characters of the forty three progenies of these high yielding palms were gathered. (1) Total number of leaves at the time of planting. (2) Girth at collar of the seedling. (3) Height of the seedling. (4) Time taken for the first flowering. (5) Number of leaves produced till 1961 since germination. (6) Number of functioning leaves in 1967. (7) Number of inflorescences produced during the five year period 1970 to 1974. (8) Number of female flowers produced during 1970 to 1974, and (9) Yield of nuts during 1970 to 1974. The number of seedlings studied in each palm varied between 4 and 10. All the seedlings were one year old at the time of planting and had received the same treatment throughout.

RESULTS AND DISCUSSION

In Table 1 are presented data on number of leaves, girth at collar and height of the seedlings at the time of planting, time taken for first flowering, mean number of leaves produced till 1961 since germination and mean number of functioning leaves on the crown in 1967. The data indicate the variations in the characters in the eight families studied. In the seedling characters studied the mean number of leaves varied from 7.0 to 8.4. The variation in the girth at collar of the seedling was from 14.3 cm to 16.7 cm and in the height of seedling from 134.3 cm to 174.4 cm. The time taken for initial flowering varied from 84.8 months (39.2.1.245) to 131.4 (29 N.312). The mean number of leaves produced till 1961 since germination indicate that families 27 N.367, 39.2.1.245, 29 S.346 and 39.2.1.205 have produced more than 70 leaves indicating their superiority in growth over others. Among the different growth characters of the seedling indicating vigour, production of leaf is the most important one. Even in adult palms it has been reported that number of leaves are significantly and positively correlated to early flowering and high yield (Patel, 1938). He has also reported that trees with a large number of leaves commence their reproductive phase earlier than trees having a lower number of leaves. In this study, progenies of families 39.2.1.245, 27 N.367, 392.1.205 and 29 S.346 have produced more leaves and also have more functioning leaves on their crown. They are also found to be early bearing when compared to other families.

The yield attributes of palms like number of spathes, female flower production and yield of nuts are given in Table 2. The F test indicated that for these characters, the differences between families are significant.

The range in yield of nuts and percentage of progenies yielding more than 80 nuts per palm per annum are also given. The data indicate that progenies of families 27 N.367, 29 S.346 and 39.2.1.205 are high yielding when compared to those of others. In family 27 N/367 the mean yield is 102 nuts and eighty per cent of the progenies yield more than 80 nuts. In family 29 S/346 the mean yield is 94 nuts and all the progenies yield more than 80 nuts per palm while in family 39.2.1/205 the mean yield is 85 nuts and seventy five per cent of the progenies yield more than 80 nuts per palm. In family 39.2.1/245 the leaf production as well as the spathe production are high when compared to others. The mean number of functioning leaves also is very high.

It could be seen from Table 3 that families 29 N/367, 29 S/346 and 39.2.1/205 are better than the other five families for the yield of nuts and yield attributes occupying first, second or third position, in most of the cases, when ranked. Thus based on the progeny performance these three palms can definitely be considered as prepotent palms. Such prepotent palms can be spotted out in the nursery by their progeny performance is indicated by the fact that the two families 29 S.346 and 39.2.1.205 are among the palms which were found to yield the best progenies among the 37 palms studied by Ninan and Pankajakshan (1961). The success of mother palm selection lies in the identification of such prepotent palms among the high yielders which can be identified by a study of progeny performance even in the nursery. The seedlings of such selected palms only will be able to raise the yield of coconut plantation and such vigorous selection of mother palm will go a long way to increase the production of future coconut plantations in the country. No doubt a very large number of palms will have to be screened to identify sufficient number of prepotent palms for further breeding work. It is with this objective that about 4,000 seedlings from 190 families of West Coast Tall are being studied in different locations to identify prepotent palms among them.

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Table 4

Correlation coefficients (phenotypic) among seedling and adult palm characters

Characters	Number of leaves	Girth at collar	Height	Time taken for flowering	Flowering leaf axil	Number of spathes	Number of female flowers
Seedling							
Time taken for germination	-0.4447**	-0.2411	-0.2077	-0.2794	-0.2533	0.1471	0.0194
Number of leaves	..	0.3959**	0.0379	-0.1358	-0.1044	0.0941	0.2214
Girth at collar	..	..	0.0489	-0.2123	-0.2044	0.0609	0.2282
Height	..	..	..	0.4200**	0.3098*	0.0795	0.1402
Adult palm							
Time taken for flowering	..	..	..	..	0.7958**	-0.1728	-0.2227
Flowering leaf axil	..	..	..	..	..	0.0765	0.0664
Number of spathes	..	..	..	..	..	..	0.6533**

* Significant at P = 0.05

** Significant at P = 0.01

Table 2

Phenotypic and genotypic correlation of certain characters with yield

Characters	Phenotypic correlation	Genotypic correlation
Seedling		
Time taken for germination	+ 0.0447	+ 0.170
Number of leaves	+ 0.2632	+ 0.528**
Girth at collar	+ 0.3565*	+ 0.410*
Height	+ 0.0173	+ 0.208
Adult Palm		
Time taken for flowering	- 0.4316**	- 0.471**
Flowering leaf axil	- 0.1244	- 0.130
Spathe production	+ 0.5856**	+ 0.689**
Female flowers	+ 0.7251**	+ 0.933**

* Significant at P = 0.05

** Significant at P = 0.01