A Note on Coconut Selection and Breeding.

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THE approach adopted by the Department of Agriculture, Stock and Fisheries of Papua and New Guinea to genetic improvement of coconuts has been reviewed in earlier publications (Charles 1959a, b, 1961). Briefly, it was felt that the case for selection of mother palms on the basis of their copra yield had been overstated, and available evidence indicated that such selection was largely ineffectual. Mother palms could only be reliably selected after progeny testing which would ensure that the parents were able to transmit high yield to their progenies. A different approach, considered more likely to bring early results of benefit to the Territory, was the comparison in " variety " trials of strains of palms growing in different localities in the Territory to determine whether any local strain was above average in yielding ability and could be recommended for general planting. Until such trials produced results, the recommendation was that seed nuts should be selected carefully for size and shape and seedlings subjected to careful selection in the nursery.

In 1957, a progeny testing trial was commenced in Papua and in 1958-59, a " variety " trial was planted at the Lowlands Agricultural Experiment Station, Keravat. Early performance of seedlings in both trials indicated that worthwhile differences between progenies and between strains probably existed. Unfortunately, both trials encountered severe difficulties in establishment and it was not possible in either of them to bring enough palms through to maturity to make valid comparisons of yielding ability. Details of these trials have been published in Annual Reports of the Department of Agriculture, Stock and Fisheries from 1959 to 1963.

It was decided in 1964, to commence a new " variety " trial at Kapogere Agricultural Station in Papua where, in the past, coconuts have been raised successfully without undue difficulty. The scope of this trial was to be broadened to include " varieties " from other countries as well as from Papua and New Guinea. Caution is necessary in introduction from overseas, since there are serious coconut diseases of unknown cause in several countries. Consequently no introductions were to be made unless an officer of the Department first inspected the palms in the locality of collection and found them free of serious disease.

In 1964, officers of the Department, with the assistance of local agriculturalists, collected seed nuts for this trial from Bougainville, New Ireland, New Britain, Madang, Karkar, Markham, and East Papua and, outside the Territory, from the New Hebrides, British Solomon Islands Protectorate, Singapore and Ceylon. Collections in Singapore and Ceylon were made in conjunction with the attendance of the Economic Botanist at the Second Session of the Food and Agricultural Organization Technical Working Party on Coconut Production, Protection and Processing held in Colombo in December, 1964.

At this meeting, aspects of selection and breeding were discussed and some new findings were reported, and some reappraisal of the Department's approach has resulted. Liyanage (1964) presented results of a progeny trial in Ceylon which showed convincingly that definite genetic improvement can be achieved by selection of mother palms on the basis of their yield. Comparing yields of progenies with yields of parents (the latter comprising 104 palms taken at random from a block of 292 palms) it was found that selection of the best 5 per cent. of parent palms, on the basis of four years' records of yields of husked nuts, would have given progenies yielding 15 per cent. above the average yield of all progenies.

Under Papua-New Guinea conditions, the requirement of four years' yield records for accurate selection of mother palms is a major practical limitation on the use of this method. Nevertheless, growers undertaking new planting might profitably commence recording yields of promising parent palms on their plantations. It would be beyond the resources of the Depart-

ment to attempt selection of sufficient mother palms to make a significant contribution to Territory seed requirements, but mother palm selection may be used in conjunction with other breeding methods for the establishment of seed gardens.

The desirability of establishing " variety " trials in main producing countries was stressed at the Colombo meeting by Charles (1964) who pointed out that detection of a local superior strain would make improved seed immediately available in quantity, at a substantially lower cost in money and time than required for most other methods of improvement. He also recommended inclusion of sufficient introduced strains to link trials in different countries. There was general agreement that detailed study is needed to differentiate the strains growing in different countries, and an international committee is to be set up to examine the subject. The basic problem is that all commercial strains of coconuts contain within them a wide range of variability and many of the commercial characters are subject to environmental influence. The proposed international exchange of information and planting material should ultimately be of benefit to Papua and New Guinea coconut producers.

REFERENCES.

CHARLES, A. E. (1959a) ; Coconut agronomy—1954-1958. *Papua and New Guinea agric. J.* 12 : 28-36.

CHARLES, A. E. (1959b) : Nursery selection of coconut seedlings. *Papua and New Guinea agric. J.* 12 : 116-118.

CHARLES, A. E. (1961) : Selection and breeding of the coconut palm. *Trop. Agriculture, Trin.,* 38 : 283-296.

CHARLES, A. E. (1964) : Varietal testing in coconuts. (paper presented at Second Session, F.A.O. Tech. Working Party on Coconut Production, Protection and Processing, Colombo, 1964).

LIYANAGE, D. V. (1964) : Mass selection and progeny testing in coconuts. (Paper presented at Second Session, F.A.O. Tech. Working Party on Coconut Production, Protection and Processing, Colombo, 1964.)