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REPORT OF THE BOTANIST

1 PROGENY TRIALS.

The three coconut progeny trials at Marandawila, Bandirippuwa and Walpita were maintained during the year. The Marandawila trial planted in 1934 consists of the unselected progeny of nine high-yielding mother palms and the accumulated data have been used to determine some genetic parameters. In the Bandirippuwa trial planted in 1959, unselected progenies of 125 selected high-yielding palms are being tested in the form of a Cubic Lattice, and since it has been grown as an under-plantation, the general growth of palms is rather poor, and only a few palms are in flower. The Walpita trial planted in 1948 and 1949 is in the form of two Cubic Lattices A and B, and progenies of 125 unselected palms are tested in each Lattice. The main purpose of these progeny trials is to isolate palms of high-breeding value.

The analysis of four years yield data-weight of husked-nuts of both Lattices of the Walpita trial has been completed and it has been possible to classify the 223 seed parents used for this experiment according to their breeding values. The mean weight of adjusted husked-nuts per progeny during the four-year period (age of palms 13 to 16 years) has varied between 133.3 lb. and 25.8 lb. per year, and that indicates the extent of variation relative to breeding values present between the seed parents.

The general mean for Lattice A progenies was 79.6 lb. husked-nut weight per year and that for Lattice B 82.4 lb. per year, and these figures are rather low, largely due to the adverse environment in which the progenies have been grown. 13 percent of the parents of Lattice A progenies, and 16 percent of the parents of Lattice B progenies, have given a progeny yield 20 percent more than the respective population means. Selected palms out of this lot are being used for breeding purposes. The best 5 percent of the parents of Lattice A according to their phenotypic values are indicated below:—

SEED PARENT		*PROGENY*	
No.	*Wt. of husked-nut per year* * *lb.*	*Wt. of husked-nuts per progeny per year* † *lb.*	*Breeding value*
55	174.3	108.9	58.6
85	173.7	96.1	33.0
222	158.4	73.0	- 13.2
179	150.5	104.7	50.2
145	150.4	70.3	- 18.6

* age of palms 16 to 19 years.
† age of palms 13 to 16 years.

In the above table the breeding value has been taken as twice the deviation of the progeny mean from the population mean. Although all the five parents were of high phenotypic value, only three of them are of good genetic value. The yield of the parents and progenies are not directly comparable due to their differences in age and as they have been grown in separate environments. The variation in yield of progeny between the parents is the important factor.

There were a number of families with high progeny means, purely due to the presence of two to three very high-yielding progenies within each family. Since family size is small (9 and 6 progenies per seed parent in Lattices A and B respectively) these few high-yielding individuals could inflate the family means, even if the other progenies are of average performance only. After elimination of these and other parents whose high phenotypic value appeared to be due to non additive genetic effects, it was possible to identify only nine parents out of 223 tested that are good for breeding purposes. These nine palms are being used for pollen collection, and a number of other palms amongst the pool tested are being used as female parents in controlled pollination work.

2 HYBRIDISATION BETWEEN VARIETIES AND FORMS.

In pursuance of the breeding programme, besides the progeny trials referred to above, the following trials are in progress: (*a*) study the effect of inbreeding *typica* palms, (*b*) isolation of male transmitters and (*c*) study of heterosis in varietal crosses. Most of the field trials have been planted after 1961 except under (*c*), and yield data are not available still.

A field trial was planted in November, 1962 to study the growth and relative yields of the three types of seedlings indicated below; design is randomised blocks with 12 replications and 12 palms per plot.

A — F_1 of *typica* × *pumila*.
B — F_1 of *typica* × *typica* where the male parent has been clasified provisionally as prepotent.
C — Open-pollinated progenies of *typica* palms.

Number of new leaves produced per plant per year was scored. Analysis of variance of the total number of leaves produced since transplanting to November, 1965, *i.e.* age of palms 3 years, showed that the differences between treatments were significant ($P = 0.01$) and the three treatments could be placed in the following order of merit.

Treatment	*Total no. of leaves produced per plant during 3 years.*
A F_1 of *typica* × *pumila*	27.22 ± 0.56
B F_1 of *typica* × *typica*	24.31 ± 0.56
C *typica* open pollinated	23.55 ± 0.56

Treatment A was significantly better than treatments B and C, the difference between the latter two treatments being not significant with respect to leaf production during the first three years of growth. Since rate of leaf production demonstrates vegetative vigour, the first genetion palms of *typica* × *pumila* could be considered to be more vigorous vegetatively during their juvenile condition than the palms of the other two types.

Typica × *typica*. The programme on production of commercial seed by hand pollination of selected female parents with pollen of palms of high-breeding value was continued at five stations. The setting of female flowers was exceptionally low, due to the prolonged drought experienced during the year. 9630 hand pollinated nuts arising from the pollinations of the previous year were harvested. 3424 pollen samples from the Pollen Bank were supplied to ten private estates who are carrying out their own controlled pollination programmes; this quantity of pollen would have been sufficient to pollinate 10,000 inflorescences.

An experiment was carried out to ascertain whether any useful correlation between a nut-character and the breeding value of the respective palm could be established. Nine palms of high—, average—, and low-breeding values (with three palms in each group) were used as the male parents in crossing five palms taken at random for each male. The nuts were harvested during the 52nd week after pollination and the following characters of each nut were scored; weight of husked-nuts, endosperm, shell and embryo. Similar data of the open-pollinated nuts of the same female parents were recorded. As is usual with experiments of this type only a few nuts per cross were obtained. An analysis of variance for the four characters showed that the only significant variance was due to between females within males (significant at P = 0.1 percent), variances between families and between males being not significant. Comparision of data between pollinated and open-pollinated nuts within the same male group did not, show any marked differences in the four characters listed above, in relation to the known breeding values. The male parents used for this experiment, belonged to different phenotypic groups relative to yield of copra. Although negative results have been obtained from this experiment, it is proposed to repeat the same experiment in a slightly modified way.

3 NURSERY.

At the request of the F.A.O., an experiment was carried out to study the effect of a seed-fumigant on germination of seed coconuts and on the quality of seedlings. The seed was treated prior to planting with Hcn gas at the following levels. Fumigation was carried out at normal atmospheric pressure without temperature control.

Treatment A — 1.25 lb. Hon/1000 cu. ft. applied for 2½ hours
,, B — 2.50 ,, ,, ,,
,, C — 5.00 ,, ,, ,,
,, D — Control

The treated seed-nuts were planted in the nursery in a randomised block lay-out with 25 nuts per plot and six replications. All the seed-nuts were collected from 30 seed parents of the *typica* variety.

The following data were collected: (*a*) date of sprouting of each seed-nut, (*b*) height of seedling at four-weekly intervals and (*c*) classification of seedlings on a basis of vigour.

PERCENTAGE SPROUTING AND QUALITY OF SEEDLINGS

Treatment	*Percentage of seed-nuts sprouting-weeks from date of planting.*				*Percentage good seedlings*
	8	**16**	**20**	**24**	
A	nil	40	45	45	34
B	nil	43	48	51	33
C	nil	42	48	49	33
D (control)	43	90	92	94	76

Analysis of variance after appropriate transformation of data showed that the differences bewteen treatments with respect to percentage germinations at the end of 24 weeks were significant ($P = 0.01$). Seednuts in all the three types of fumigation showed significantly less germination than in the control, and the differences between the former treatments were not significant. Thus fumigation as indicated above has adversely affected the germination of seednuts. A detailed report will be published later.

4 SEED SUPPLY SCHEME.

Seednuts were collected from selected palms distributed on 20 estates and 2,590,480 nuts were supplied to the Planting Division for raising seedlings.

5 MITES ON COCONUT POLLEN.

The association of mites with coconut inflorescences has been reported earlier, and when present, are considered to be doubtfully injurious to coconut pollen (Annual Report of the Botanist, 1953). Recently, our attention was drawn to an isolated group of king coconut palms (variety *Aurantiaca*), which were reported to be producing barren nuts, inspite of a large number of female flowers produced. On examination, the inflorescences on these palms were found to be infested with pollen mites. Pollen viability was very low, with an unusually high proportion of 'dummy' grains (irregular in shape and devoid of cytoplasm)-23 to 41 percent. Very low pollen viability, coupled with scarcity of atmospheric pollen due to the spatial isolation of these palms (1 to 1½ miles from the nearest coconut plantation) may be responsible for the production of barren nuts. The pollen mites were identified as *Blattisociidae* near *Zercoseius* sp. by the U.S. Department of Agriculture.

6 MISCELLANEOUS.

Personnel. Dr. D.V. Liyanage, Botanist, assumed duties in April, 1965 after returning from overseas study leave.

Conferences. Dr. D.V. Liyanage was elected President of Section B of the Ceylon Association for the Advancement of Science for the year, 1965. The Presidential Address on "Plantation Tree Crops in the Tropics" was delivered at the Annual Sessions.

A paper on "Breeding, selection and propagation of coconut palms" by D.V. Liyanage and M.A.P.P. Manthriratne was presented at a symposium held at the 21st Annual Sessions of the C.A.A.S. in December, 1965.

Radio talks on "Planting Material in Coconuts" were broadcast over Radio Ceylon both in Sinhala and English.

Publications. Manthriratne, M.A.P.P., Coconut Pollen. Ceylon Coconut Quarterly Vol. 16, Nos. 3 and 4.

D. V. LIYANAGE,
Botanist, Coconut Research Institute.