

A GENETIC MARKER OF USE IN COCONUT SEED PRODUCTION

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The "Malayan Dwarf" coconut palm, which is resistant to Lethal Yellowing disease, occurs in three main colour forms, red or apricot, yellow or ivory and green. The history of this variety in Jamaica and some of the botanical characteristics have already been briefly described [3-5]. It is easier to be sure of the identity of the yellow and red fruited forms than of the green which is very much more variable.

It is important in seed production programmes to be able to guarantee the quality of seed and seedlings produced and in Jamaica there is currently an urgent need to avoid dilution of the "Malayan Dwarf" type of resistance in the commercial production of seed [6]. In addition, in experimental work, "Dwarf" × "Tall" hybrids, currently fashionable, are being tested for resistance to Lethal Yellowing disease. In order to better guarantee the quality of "Dwarf" material being distributed and hybrids being tested, research on colour inheritance particularly in red and yellow "Malayan Dwarf" palms and their hybrids with "Tall" was initiated. Some preliminary conclusions based on the results of natural and controlled pollinations are given below.

I. NATURAL POLLINATION

In the "Malayan Dwarf" palm, intra-spadix overlapping of male and female cycles occurs to varying degrees [1, 2 and 4] and this tends to result in self pollination. JACK and SANDS observed 96 %, 75 % and 69 % of open pollinated seed germinated true to type from yellow, red and green fruited palms respectively; in a second generation germinated seedlings from "reds" and "yellows" were completely true to type; less than 2 % of the "greens" were off-type for colour. In Jamaica, intra-spadix overlapping of red fruited palms is almost complete and self pollination is assisted in young palms by incomplete exposure of the female flowers. Petiole, inflorescence and fruit colours correspond closely and colour differences between forms are distinguishable at the nursery stage. Germinated seedlings from yellow fruited "Malayan Dwarf" palms from two seed sources gave the scorings in table 1.

In each seed source no more than 1/3 of the palms are of the yellow fruited form; the great majority

TABLE 1

Distribution of petiole colours in seedlings from open pollinated yellow fruited "Malayan Dwarf" palms.

Source	No. progenies	No. seeds planted	No. seedlings	No. seedlings true to type	% true to type
Holland St Thomas (1st harvest)	44	583	471	421	89.4
Holland St Thomas (2nd harvest)	35	322	268	240	89.6
Hermitage, Portland	18	136	104	83	79.8
Totals	97	1,041	843	744	88.3 %

are green fruited and there are occasional reds, obvious hybrids and "Talls":

Seedlings from red fruited palms also show a very high proportion with red rachis.

2. CONTROLLED POLLINATION

Experimental crosses between "Malayan Dwarf" (yellow and red fruited) and local and introduced

"Talls" (using pollen from West Africa) and reciprocals were scored for petiole colour at the nursery stage; the data is summarised in table 2.

With the "Dwarf" palm as female, the majority of seedlings had petioles within the colour range normally associated with true tall seedlings; this was checked in some instances using the Nickerson Colour Fan. No seedlings with yellow or red petioles occurred when the "Tall" parent was female. Incomplete emasculation is a more serious error in controlled

pollination with "Dwarf" as the female parent (due to intra-spadix overlapping of male and female cycles) and the small number of seedlings with yellow or red petioles when the cross was done in this direction is almost certainly due to contamination. Yellow and red fruited "Tall" palms are a rarity in Jamaica, unlike in some other territories (e. g. Solomon Islands, Fiji) and no yellow or red fruited "Tall" palms were used in the controlled pollinations discussed.

TABLE 2

Distribution of petiole colours in F₁'s.

Type of Cross.	No. progenies	No. seedlings	Petiole colours	
			No. "Tall" colour	No. "Dwarf" colour
"JT" × "MD"/Y ...	62	280	280	—
"SB" × "MD"/Y ...	6	16	16	—
"Tall" ** × "MD"/R.	6	10	19	—
"MD"/R × "Tall" ** ..	15	37	35	2
"MD"/Y × "JT"	34*	107	91	16
"MD"/Y × "SB"	13	44	41	3
"MD"/Y × "Exotic Tall"	8	21	18	3

* Two progenies with obvious outcrossing eliminated.

** "San Blas" and "Jamaica Tall" hybrids considered together.

"MD"/R = "Malayan Dwarf" (red fruited).

"MD"/Y = "Malayan Dwarf" (yellow fruited).

"JT" = "Jamaica Tall".

"SB" = "San Blas".

(1) In Jamaica seedlings are normally planted out into the field at the 3 or 4 leaf stage.

SUMMARY AND CONCLUSIONS

Under natural conditions, seed from both yellow and red fruited "Malayan Dwarf" parents, even in stands containing "greens" and "Talls", gives a high proportion of seedlings with yellow or red petiole colour respectively. In "Malayan Dwarf" × "Tall" hybrids produced by controlled pollination between selected individuals, the majority of seedlings had petiole colours characteristic of the "Tall" parent, and in the reciprocal cross no seedlings with yellow or red petioles were observed. The "Tall" colour is evidently dominant to that of the yellow and red colour of the "Malayan Dwarf" and the discrepancy observed in crosses with the "Dwarf" as female is likely to be due to contamination.

In the production of hybrid seed from mixed "Tall" and "Dwarf" stands in seed gardens, there is an inevitable delay in the necessary checking and emasculation of the female parent. Using yellow or red fruited "Malayan Dwarfs" as female parents, hybrids can be reselected in the nursery (1) on the basis of petiole colour, and apparent selfings can be eliminated. Alternatively, and this is particularly applicable in Jamaica where the resistance and other agronomic characteristics of the hybrid are not thoroughly tested, but represent a reasonable speculation, dual purpose seed gardens planted with "Tall" and yellow or red fruited "Malayan Dwarf" palms can be used as a source of quality "Dwarf" seed (without emasculation), or guaranteed hybrid seed (with emasculation), depending on which is required, by selection at the nursery stage.

Work on colour inheritance within the "Malayan Dwarf" variety and between varieties is continuing.

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