

# Preliminary observations on the influence of pollen parent on copra content in coconuts (*Cocos nucifera* L.)

BY

C. A. NINAN, A. S. PANKAJAKSHAN AND V. RADHAKRISHNAN

Central Coconut Research Station, Kasaragod.

## INTRODUCTION

The endosperm of coconuts commercially known as copra is the most important economic product obtained from the coconut palm. Knowledge of the various factors affecting its quantity and quality, therefore, is very important in improvement work on this crop. It is now known that apart from other factors, endosperm characters are also influenced by the pollen parent. Though crop plants like maize have been extensively investigated from the latter point of view, such information is very inadequate in coconuts. Haldane (1958) in his valuable article entitled "Suggestions for Research on Coconuts" has observed that "it should be possible to compare the size, oil content, and perhaps other characters of the nuts borne on the same tree after using pollen from two different "male" parents. It would be worth using as one pollen parent a tree with poor oil yield to give as high a contrast as possible with one of the desired type". He has also indicated the possibility that "hybrid vigour may show in nuts derived by cross-pollination, since hybrid vigour in some species is largely due to increased seed weight. If so it is possible that a mixed plantation may produce a better crop than either of two breeds when grown alone".

Following the above suggestions of Prof. Haldane, and taking advantage of the availability of a large number of Indian and foreign breeds of coconuts in the Central Coconut Research Station, Kasaragod a study on copra content of nuts borne on a few trees after pollination with different varieties was taken up and preliminary results are reported in the present paper.

## MATERIALS AND METHODS

Two trials were conducted in 1960 and 1961 with trees belonging to the varieties *Laccadive small* and *Laccadive micro* as "females". The above varieties were selected in view of the very large number of female flowers on an inflorescence (Fig 1) and fairly good setting, enabling handling of sufficiently large numbers of female flowers under different crosses. In the 1960 trial

*Laccadive small* (Tree No. XI/41) was used as "female" for pollination with varieties *Kappadam*, *Gangabondam*, *Chowghat dwarf green*, male tree, *Tall x Dwarf* hybrid and *spicata*. Pollen from selected trees of the above varieties was used to pollinate equal numbers of randomly selected female flowers in each of five inflorescences available for pollination in the hybridisation season from January to May, and the *West Coast Tall* variety was used as control.

In the second trial, *Laccadive micro* (Tree No. O. C. 27) was used as "female" (Fig. 2). Selected palms belonging to varieties *Kappadam*, *Andaman giant*, *Cochin China*, *New Guinea*, *Chowghat dwarf green* and *Laccadive small* were used to pollinate equal numbers of female flowers in each of four bunches available for pollination in the season. Same numbers of female flowers in all the above bunches were selfed and left as controls. In both the trials, the female flowers were individually bagged and labelled. The nuts were harvested exactly after one year from the date of pollination and the copra was uniformly sun-dried and carefully weighed.

#### RESULTS AND DISCUSSION

Summary of results of the two trials are presented in Tables 1 and 2. Perusal of the above tables shows that the highest and lowest values of copra content per nut obtained by pollination with different varieties in both the trees are significantly different (at 1 per cent level). Copra content per nut obtained by pollination with *Kappadam* was consistently better in both trees and showed an increase of 23.5 gms. over *Spicata* and 22.6 gms. over *West Coast Tall* which showed the lowest values in the first and second trials respectively. Compared to the respective controls (*West Coast Tall*s), an increase of 9 gms. (8.2 per cent) in the first trial and 22.6 gms. (35.4 per cent) in the second trial was observed in the nuts obtained by pollination with *Kappadam*. Among other pollen parents, *Gangabondam* in the first trial and *Andaman giant* in the second trial gave equally good performance as *Kappadam*.

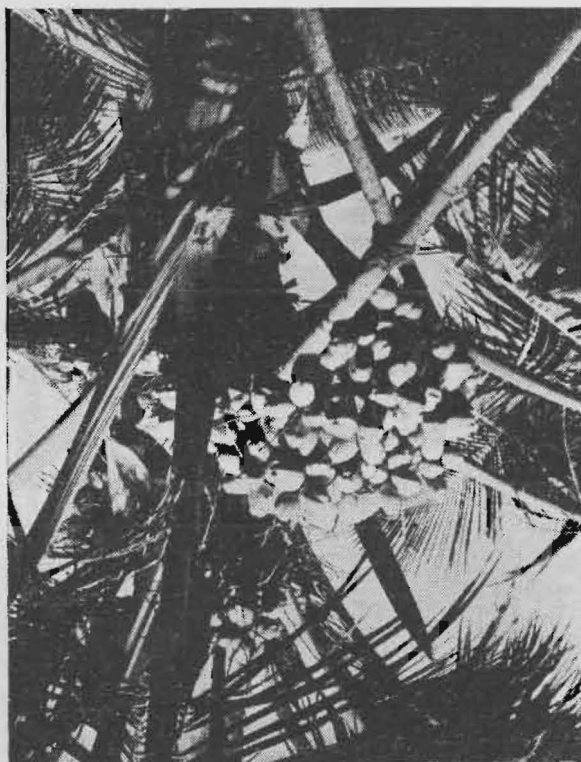
The above observations reveal for the first time that though copra content in coconuts is chiefly determined by the seed parent, among other factors, the pollinating male also exerts some influence. Among the different varieties used as pollen parents, *Kappadam*, which has given consistently better results, has the biggest nut size (Fig 3) and highest copra content per nut (275gms.) It is also seen from the second trial (Table 2) that nuts obtained by pollination with varieties having big sized nuts and high copra content in general show better copra content compared to those resulting from pollination of varieties with small nuts and poor copra content. However, in the first trial *Chowghat dwarf green* with the poorest copra content per nut (45 gms.) has given almost comparable performance as *Kappadam*.

Even though the present results would indicate that copra content of nuts borne on the same tree may be influenced to some extent by the copra

Fig. 1. A palm of *Locodive* small variety. Note the high setting.



Fig. 1. A palm of *Laccadive small variety*. Note the high setting.



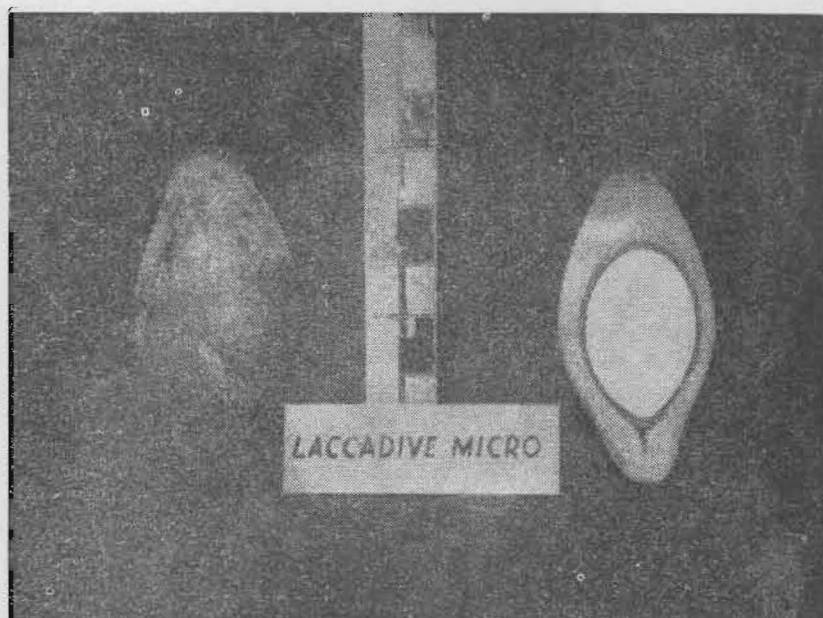


Fig. 2. Mature nuts of *Laccadive micro* variety. Note the thick kernel in the opened nut.

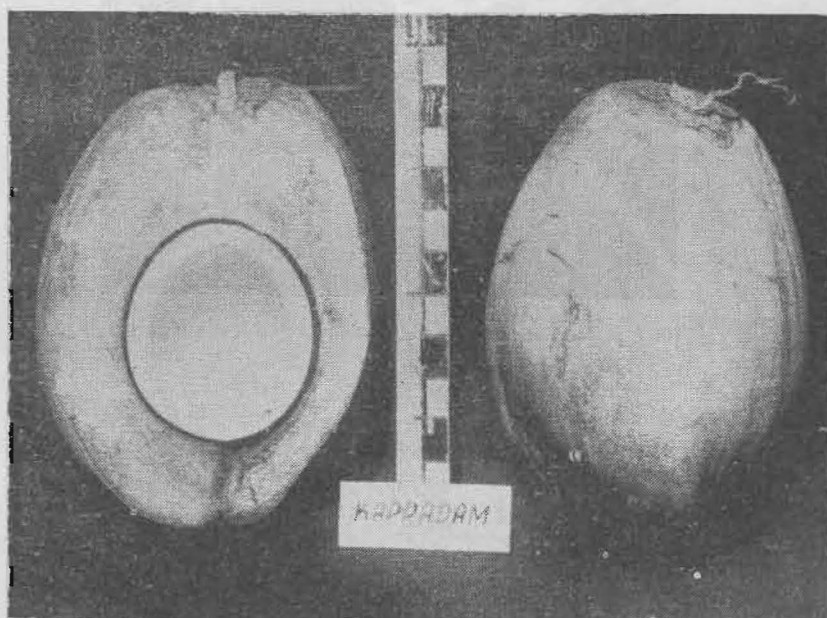


Fig. 3. Mature nuts of variety *Kappadam*.

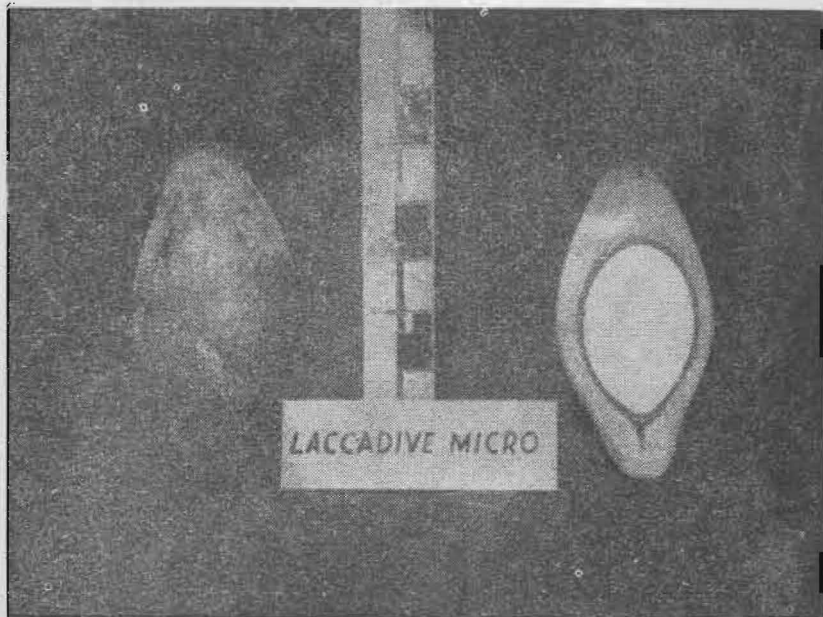


Fig. 2. Mature nuts of *Laccadive micro* variety. Note the thick kernel in the opened nut.

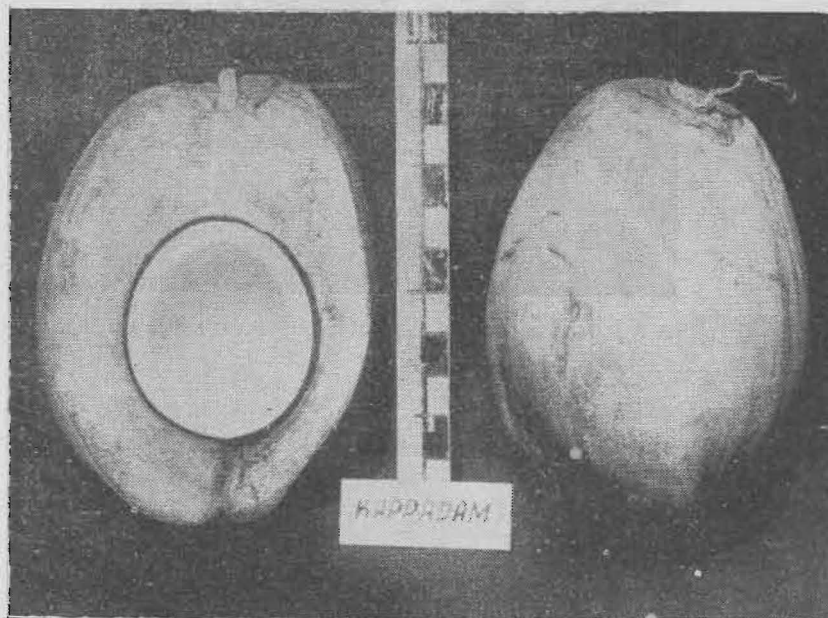


Fig. 3. Mature nuts of variety *Kappadam*.

content of the pollinating male, further evidence would be necessary to confirm whether copra content of the "male" *per se* has definite influence. It would thus appear that hybrid vigour may be one of the important factors contributing to increase in copra content of certain combinations, since it is already known that hybrid vigour in some species is largely due to increased seed weight (Haldane, loc. cit.).

Whatever might be the factors contributing to the differences in copra content of nuts borne on the same tree after pollination with different males, the fact that certain combinations show significant increase of copra per nut compared to others is of great importance in coconut improvement work. This shows that by interplanting such breeds as would give maximum copra content of nuts upon interbreeding, better crop yields could be realised without additional cost or labour. If as in the case of *Laccadive* and *Kappadam*, such varieties are economic themselves (Ninan *et al*, loc. cit.) or happen to be high combiners like *Laccadive* and *Gangabondam* (Ninan and Pandalai, 1961), their interplanting could be more economic and could further be exploited for hybrid seed production.

The practical utility of the above suggestions, however, depends on how far the results obtained in one individual in a given variety could be repeated in others in the same variety in view of the highly heterozygous nature of the crop. The consistently better results obtained by pollination with different trees of variety *Kappadam* in trees of two closely related varieties indicate that the same results could be expected with more probability within a majority of individuals in the same variety. Incidentally, it may also be pointed out that in trials conducted with *West Coast Tall* variety as female and a few other varieties as males, *Kappadam* gave the best performance (Ninan unpublished). The present results indicate that systematic trials on the above lines with promising local varieties as "females" and all available local and foreign breeds as "males" may lead to results that could be of practical utility in increasing crop yields.

#### SUMMARY

Results of preliminary investigations on the effect of different varieties as pollen parents on copra content in two trees belonging to *Laccadive small* and *Laccadive micro* varieties of coconuts are reported. In both the trees, highly significant differences in copra content of nuts obtained by pollination with different varieties were observed. Variety *Kappadam* as male showed consistently better performance in both trees. Compared to nuts obtained by pollination with *Spicata* in the first trial and *West Coast Tall* in the second trial, (which gave the lowest values) *Kappadam* as male gave an increase of 23.5 gms. and 22.6 gms. of copra respectively. The percentage increase over controls, of copra content per nut, with *Kappadam* as male was 8.2 and 35.4 in the first and second trials respectively. It is probable that the increase in copra content resulting from certain combinations is a manifestation of hybrid vigour. Indications have also been obtained that go to show that varieties

with large nut size and high copra content as "males" give generally better copra content in the resulting nuts. The present finding opens up interesting possibilities of improving crop yields by interplanting such breeds as would give maximum copra content per nut on inter-breeding. If such breeds are economic themselves and also happen to be high combiners, the double advantage of increasing crop yields and hybrid seed production could be derived by their interplanting.

#### ACKNOWLEDGEMENTS

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TABLE I

*Effect of pollen of seven varieties on copra content in Laccadive small-7 tree No. XI/41.*

Sl. No.	Male parents	No. of nuts studied	Copra/nut (gms.)	Percentage increase over control
1	<i>Gangabondum</i>	13	119.4	8.3
2	<i>Kappadam</i>	13	119.3	8.2
3	<i>Dwarf green</i>	13	117.4	6.4
4	<i>Male tree</i>	15	114.6	3.9
5	<i>Tall x Dwarf hybrid</i>	15	114.2	3.5
6	<i>West Coast Tall (Control)</i>	14	110.3	—
7	<i>Spicata</i>	8	95.8	-13.1
	S. E. per nut		10.96	
	C. D. at 5% [ 1, 2, 3, vs 6]		8.41	

TABLE 2

Effect of pollen of eight varieties on copra content in Laccadive Micro - Tree No. O. C. 27.

Sl. No.	Male parents	No. of nuts studied	Copra / nut (gms.)	Percentage increase over control
1	<i>Kappadam</i>	16	86.5	35.4
2	<i>Andaman giant</i>	16	86.4	35.2
3	<i>Cochin China</i>	25	82.6	29.3
4	<i>Selfing</i>	18	79.3	24.1
5	<i>New Guinea</i>	15	78.4	22.7
6	<i>Dwarf green</i>	25	74.0	15.8
7	<i>Laccadive small</i>	28	72.8	13.9
8	<i>West Coast Tall (Control)</i>	20	63.9	—
S. E. per nut			10.48	
C. D. at 5% (1, 2 vs 5)			7.33	