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A Note on the Performance of the Natural Cross Dwarf (female) X Tall (male) in Coconut

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A Note on the Performance of the Natural Cross Dwarf (female) X Tall (male) in Coconut.

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INTRODUCTION.

THE coconut is an important cash crop in the West Coast of India and is cultivated mainly for copra and oil. Of the varieties of coconut available in India, the ordinary or Tall variety is the one that is extensively cultivated in all the important coconut tracts of India. This variety is tall growing, long lived, hardy, heavy yielding and yields oil and copra of good quality. Under favourable conditions it begins to bear in six to eight years after planting. The average yield of this variety on the West Coast is only about 30 nuts per tree per annum, though from really good trees yields of 100 nuts or more are being obtained. The mean copra content per nut is about 5 oz. and the percentage of oil in the copra is about 72 per cent.

Besides the Tall, there is another variety the trees of which are dwarfish in stature. It is called the Dwarf variety. It is a delicate palm of small stature attaining a height of about 15 feet, and living up to an age of about 35 years. It begins to bear early that is in about 3 to 4 years after planting. The average yield of this variety is about 60 nuts per tree per annum. This variety has three distinct forms namely those producing green, orange or yellow nuts. The nuts are small in size ovoid or round in shape and mainly used as tender coconuts. The copra obtained from the nuts is leathery and is not commercially important. This is irregular in bearing and is found to be very susceptible to the attack of diseases and pests. On account of these reasons the dwarf variety is considered as an uneconomic variety for growing on a plantation scale. It is grown only in house compounds mainly for the sake of tender nuts and ornamental purposes. The average copra content per nut is only 3 to 4 oz. and the oil percentage in copra is 66 to 68

The two varieties mentioned above differ in their mode of pollination also. While the Tall variety is largely cross pollinated in nature, Dwarf varieties record a high percentage of self-pollination, thus breeding true to type to a great extent. However, when the Dwarf palms are interplanted in gardens of Tall variety, intervarietal pollination does occur in nature, but the seedlings arising from these hybrids can easily be spotted out in the nursery because of their change of colour and vigorous growth.

Since the desirable characters such as high yield, better quality nut and early bearing are found distributed in different varieties, attempts were made in early thirties to combine them into one variety by controlled pollination or hybridisation. The hybrids of Tall female x Dwarf male and Dwarf female x Tall male were produced in large numbers and studied in detail in the nursery. Tall female x Dwarf male hybrids were found to be vigorous in their growth and exhibited hybrid vigour. These were, therefore planted out in the field for studying their future performance in the adult stage. The subsequent studies have more than confirmed the early expectations of them. They are found to be early bearing and give high yield of good quality nuts. The hybrids of Dwarf female x Tall male were not planted up for studying their performance up to the bearing stage. It has, therefore, not been possible to compare the performance of Tall female x Dwarf male with their reciprocals, either in regard to their growth or bearing. However, a few seedlings of the Dwarf varieties planted at the Central Coconut Research Station, Kasaragod do not appear to breed true to type. They appear to be natural crosses of the Dwarf with the Tall. These were observed in detail to study their behaviour and characters in comparison to controlled Tall x Dwarf hybrids, true Dwarfs and Tall. The results form the subject matter of this paper.

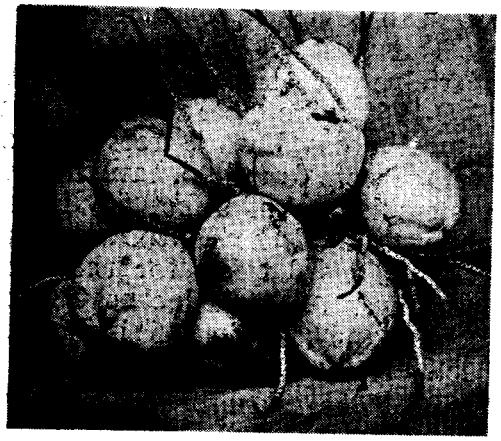
DETAILED DESCRIPTION OF THE DWARF NATURAL CROSSES COMPARED TO TALL, DWARF AND TALL X DWARF PALMS

In Block XI(part) of the Central Coconut Research Station, Kasaragod a number of varieties of coconut had been planted during the period 1935-1941. Among these, there were a few progenies of Dwarf varieties also. Later they began to exhibit different morphological and economical characters quite different from those of the typical Dwarfs. These appear to be natural crosses of the Dwarf mother palm with the Tall. A comparative statement showing the performance of these along with those of the Tall, Dwarf and Tall x Dwarf palms is appended. Significant features are discussed in brief below. All the palms have received identical treatment in regard to cultivation and manuring.

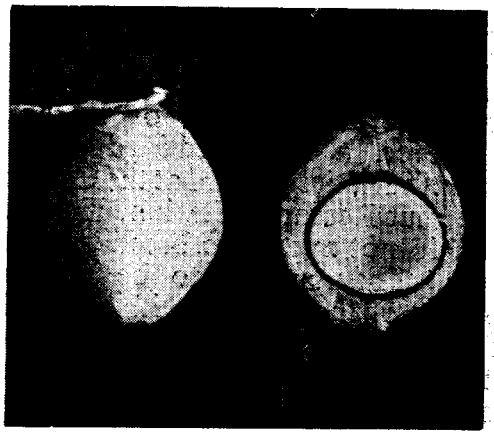
(i) *Growth:*—The natural cross Dwarf trees were found to grow quickly and very vigorously. The average rate of growth of these trees was found to be nearly equal to that of the Tall variety. During the period of twelve years since planting (from 1940-1952) (vide table appended) the natural cross Dwarf trees on an average were found to have formed a stem length of 9 feet 5.5 inches while that of the Tall, Dwarf and Tall x Dwarf trees for the same period was 10 feet 2 inches, 7 feet 6 inches and 13 feet 5 inches respectively.

(ii) *Time taken for first flowering* The natural cross Dwarf seedlings have taken about 3 years 8 months to flower from the date of planting

A Dwarf Palm



A bunch of nuts of the Dwarf Palm

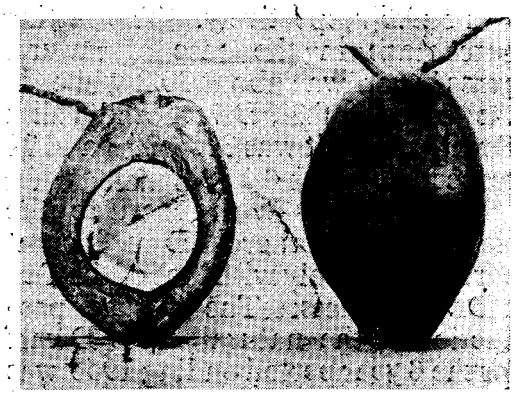


A nut of the Dwarf palm showing internal structure

A NOTE ON THE PERFORMANCE OF THE NATURAL CROSS DWARF (FEMALE) x TALL (MALE) IN COCONUT

4. A Natural Cross Dwarf Palm

5. A bunch of the Natural Cross Dwarf Palm



6. A nut of the Natural Cross Dwarf Palm showing the internal structure

just like the seedlings of the Dwarf and Tall x Dwarf which have taken 3 years 7 months for their first flowering, while the seedlings of the Tall variety took 4 years 8 months from the date of planting.

(iii) *Number of leaves on the crown and rate of production of leaves*:—The number of leaves in the crown varied between 33 and 42 with an average of 38.2 in the case of the natural cross Dwarfs, while in the case of Tall, Dwarf and Tall x Dwarf palms it was 33, 23 and 45 respectively. The average rate of production of leaves, for the natural cross Dwarfs and Tall x Dwarf palms, was 15 per year while it was 14 for the Tall and Dwarf palms.

(iv) *Rate of Production of Spadices*:—The average rate of production of spadices of the natural cross Dwarfs varied between 9.3 and 14.5 with an average of 12.1 per annum while for the Tall, Dwarf and Tall x Dwarf palms it was 15.3, 7.5 and 13.6 respectively per annum.

(v) *Female Flower Production and setting percentage*:—The female flower production for the natural cross Dwarfs varied between 205 and 577 with an average of about 342.7 per annum while for the Tall, Dwarf and Tall x Dwarf it was 230.6, 176.6 and 529.6 respectively. The setting percentage in the case of natural cross Dwarf was about 30.2 while in the case of Tall, Dwarf and Tall x Dwarf palms it was 31.7, 25.8 and 21 respectively.

(vi) *Yields*:—With regard to the yield, the natural cross Dwarfs compared favourably with that of the Tall x Dwarf palms. The average production of the natural cross Dwarf for the 6 year period ending 1955 was about 92 nuts per tree per annum while those of Tall, Dwarf and Tall x Dwarf trees were 71, 61 and 108 nuts per tree per annum respectively. A perusal of the table appended will indicate that the production of the natural cross Dwarf are definitely higher to those of the Tall or the Dwarf palms.

(vii) *Nut Characters*:—In nut characters it was noticed that the nuts of the natural cross Dwarfs were quite different from the nuts of the typical Dwarf palms in their characters and colour. They resembled the nuts of the Tall variety in all aspects.

(viii) *Copra Characters and Oil Percentage*:— The quality of copra of the natural cross Dwarfs was found to be good and resembled that of the ordinary Tall variety and was much superior to that of the Dwarf. The quantity of copra produced per nut was also more than that of either the Tall or Dwarf variety. The average quantity of copra obtained from a nut of the natural cross Dwarf was about 6.9 oz. while it was 6 oz. 4.6 oz. and 8 8 oz. in the case of Tall, Dwarf and Tall x Dwarf palms respectively. The oil percentage in the copra was about 72 for the Tall variety, 66 for the Dwarf and varied between 68 and 70 in the natural cross Dwarf.

DISCUSSION.

The natural crosses of the Dwarf are found to be heavy yielding and produce superior quality of copra with high percentage of oil unlike the typical Dwarf variety from which the seedlings were raised. In many respects, they seem to resemble closely the controlled Tall x Dwarf palms. The seedlings of the Dwarf

natural cross are found to be vigorous in growth in the nursery and stand out prominently among the typical Dwarf seedlings. According to Bhavani Shankar Rao and Koyamu (1955) ryots in Chowghat (South Malabar) are reported to select such seedlings in the nursery by their vigorous growth and petiole colour or planting in their gardens. They are of the opinion that these seedlings turn out to be regular bearing palms with high yield of nuts and good quality of copra. This lends support to the view expressed in this article that the natural cross Dwarf seedlings are also early and potentially good bearers.

The production of natural cross hybrids is relatively easy and no technical skill or knowledge is required as is necessary for producing Tall x Dwarf hybrids. Such seedlings can be spotted out even by layman from the nursery, because of their vigorous growth and petiole colour. Besides it is within the reach of an ordinary cultivator to produce such hybrid nuts from his Dwarf trees by removing the male flowers of the Dwarf trees immediately after the opening of the spathes and allowing the female flowers to be naturally cross pollinated by the pollen of the Tall trees. This is a very great advantage in favour of natural cross dwarfs, if the findings reported in the article are confirmed by further tests. Evidently this aspect requires further intensive studies before its full potentialities can be utilised to the best advantage. It may be that all the different Dwarf varieties may not prove equally suitable for this method. Again optimum parental combinations may have to be pitched upon. It is proposed to elaborate investigations on these various aspects at this Research Station.

SUMMARY.

The natural cross Dwarf trees planted during the period 1935-1941 at the Central Coconut Research Station, Kasaragod were studied for their different characters. Their characters and performances were compared with those of the Tall, typical Dwarf and controlled Tall x Dwarf hybrids. They are found to be early and potentially good bearers and resemble closely the controlled Tall x Dwarf palms in many respects. The easy production of such hybrid nuts and the selection of seedlings of these hybrids in the nursery without any technical skill or knowledge is also described. The need for an intense study of these hybrids is indicated.

The comparative performance of the Tall, Dwarf, Tall x Dwarf and natural cross Dwarf palms planted on the same day at the Central Coconut Research Station, Kasaragod is given in Table I of Appendix. About half a dozen seedlings of the natural cross Dwarf which were planted on different dates have also been studied for their different characters, data pertaining to which are given in Table II of Appendix.

ACKNOWLEDGEMENT.

The author expresses his gratitude to Dr. K. M. Pandalai, Joint Director, Central Coconut Research Station, Kasaragod for his guidance and suggestions and Shri. M. M. Krishna Marar, Agronomist for his kind help in the preparation of this note.

Reference:-

Bhavani Shankar Rao, M. and Koyamu K. (1955). The Dwarf coconut — The Indian Coconut Journal Vol. 8 No. 3 pp.106-112.

APPENDIX

Table I

Variety	Date of planting	Date of first flowering	Length of stem formed from the date of planting	No. of leaves on the crown in 1952	No. of spathes produced (Average for 6 years 1950-'55)	No. of female flowers produced (Average for 6 years 1950-'55)	Setting percentage (Average for 6 years 1950-'55)	Yield (Average for 6 years 1950-'55)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Tall	26-6-1940	Feb. '45	10′ 2″	33	15.3	230.6	31.7	71
2. Dwarf	26-6-1940	Jan. '44	7′ 6″	23	7.5	176.6	25.8	60.8
3. Tall X Dwarf	26-6-1940	Jan. '44	13′ 5″	45	13.6	529.6	21.0	107.8
4. N. C. D.*	26-6-1940	Jan. '44	11′ 2″	42	11.1	342.5	31.6	96.6
5. N. C. D.*	26-6-1940	Mar. '44	7′ 9″	33	9.3	205.6	47.1	89.5

Appendix, Table I *(continued)*

Variety	Weight of nut with husk lb. oz.	Volume of nut with husk in c.c.	Weight of nut without husk lb. oz.	Volume of nut without husk in c. c.	Volume of Water in c. c.	Volume of cavity in c. c.	Thickness of kernel in m. m.	Weight of copra in oz.	Oil percentage
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. Tall	2-11.8	3586.2	1-1..1	320	49.5	165	12.5	6.0	72
2. Dwarf	1-2.4	1012.5	0-12.3	446.6	46.1	170	10.4	4.6	66
3. Tall X Dwarf	2-10.5	2808	1-10.7	544	194.4	332.0	13.0	8.8	71
4. N. C. D. *	2-15.6	2798.7	1-10.6	748.7	151.2	348	12.5	6.5	68
5. N. C. D.*	2-15.3	2754	1-7.2	640	140.4	274	12.3	7.68	70

* N. C. D.=Natural Cross Dwarf.

Performance of other natural cross Dwarf palms planted at different dates at Central Coconut Research Station, Kasaragod is given in the Table II.

Table II

No.	Variety	Length of stem formed from date of planting	No. of leaves on the crown in 1952	No. of spathes produced	No. of female flowers produced	Setting percentage	Yield	Weight of nut with husk
				(Average for 6 years from 1950–'55)				lb. oz.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	N. C. D.*	14′ 3.5″	39	13.5	577.6	14.5	83.6	3-8
2.	N. C. D.*	11′ 9″	37	10.8	329.5	24.3	79.5	2-7
3.	N. C. D.*	14′ 8″	35	12.5	260.6	30.6	79.3	1-14
4.	N. C. D.*	16′ 5.5″	40	13.5	285.0	34.4	96.8	2-12.6
5.	N. C. D.*	10′ 6″	39	12	405.0	25.4	102.1	2-3.4
6.	N. C. D.*	13′ 6″	41	14.5	336.5	34.0	111.8	3-10.8

Table II *(continued)*

No.	Variety	Volume of nut with husk c. c. in (10)	Weight of nut without husk lb. oz. (11)	Volume of nut without husk c. c. (12)	Volume of cavity in c. c. (13)	Volume of water in c. c. (14)	Thickness of kernel in m. m. (15)	Weight of copra in oz. (16)	Oil percentage. (17)
1.	N. C. D.*	2838.7	1-8	392.5	155	194.5	13.4	7.68	
2.	N. C. D.*	2130	1-1	321	92.5	139.2	12.5	5.5	
3.	N. C. D.*	1413.7	1-2.5	433.7	108.7	148.0	12.8	6.0	68 to
4.	N. C. D.*	2611.2	1-7.6	532.5	156.2	202.5	12.9	7.37	70 %
5.	N. C. D.*	1700	1-0.8	412.5	85	119.2	12.7	5.0	
6.	N. C. D.*	2935	1-11.3	733.7	205	300	12.2	7.18	

N. C. D. = Natural Cross Dwarf.

Investigations on the Pests of Coconut Palm
Part III Nephantis serinopa Meyrick.
Control

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BIOLOGICAL CONTROL

THE coconut caterpillar *Nephantis serinopa* Meyr., is attacked by a number of parasites and predators, which have been described earlier. From time to time attempts have been made to multiply some of these parasites in the laboratories and liberate them in *Nephantis* infested areas, where they were lacking.

During 1924-25, this pest had spread in alarming proportions in Malabar and South Kanara regions of West Coast. Madras Government set up parasite breeding laboratories at Mangalore, Calicut and Ponnani, and took up a large scale breeding and liberation of the *Trichospilus pupivora* Ferr., and the *Perisierola nephantidis* Mues., and on a lesser scale *Elasmus nephantidis* Roh., and *Microbracon brevicornis* Wesm. At a later stage, a boat laboratory was also started, so as to reach the interior parts by the numerous canals, rivers and backwaters peculiar to Ponnani taluk. As a result of the concentrated work, the incidence of the pest was brought down to the irreduceable minimum by 1932. This special work was terminated in 1931, and only a casual watch was kept on the areas of infestation. The pest was present in a lingering condition on isolated palms at various points till 1934, in which year a slight increase of attack was noticed in scattered localities. The pest continued to multiply every year till by 1941–42, more than 50,000 palms were found affected along the coastal area. During 1938–40 the parasite breeding was restarted by the Entomology Department of Madras Government and releases of parasites were made throughout the affected area and according to Rao et al. (1948) the results were successful.

During 1947 reports of serious damage by *Nephantis serinopa* Meyr., were received from the deltaic areas of West and East Godavari. Two parasite breeding laboratories were started by the Madras Government in Narasapur and Razole. These laboratories, situated in the hearts of affected areas, were manned with trained technical staff and were fully equipped. The following larval and pupal parasites were multiplied in these laboratories and released in the affected areas:

i. Bethylid *Perisierola nephantidis* Mues.
ii. Braconid *Microbracon brevicornis* Wesm.
iii. Elasmid *Elasmus nephantidis* Roh.
iv. Eulophid *Trichospilus pupivora* Ferr.

The intensive colonisation of the parasites for a period of over two years brought about an appreciable reduction in the infestation and some of the worst affected areas were reported to have revived.