

# YIELD VARIATION AND ITS RELATIONSHIP WITH AGE AND GROWTH OF UNDERPLANTED COCONUT PALMS

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The tall variety (Var. *typica*) of the coconut palm, which lives even up to 80 or 90 years, is the one that is most extensively cultivated on a plantation scale in all the coconut tracts of the world. The age at which the palms come into bearing and their performance are highly variable and are dependent on the soil and climatic conditions and methods of management. In Kerala, the South-West Coast of India, since fresh area is not available for planting, new plantings taken up are all of underplanting nature with the result that the growth and performance of the seedlings underplanted are affected by the root and shade effects of the neighbouring palms. In this paper the results of a study made on the yield variation of underplanted coconut palms of West Coast Tall variety, the time they had taken to attain their full bearing stage, the period taken to attain regularity in yield and the relationship of yield with the age and growth characters of the palms are presented and discussed.

### MATERIAL AND METHODS

Seventy-five selected seedlings of high yielding palms of West Coast Tall variety underplanted in 1917 in an existing plantation on a red sandy loam soil in the Main block of this Research Institute were studied for the variation in yield during the thirty year period, 1928 to 1957. Based on their mean yield for a period of twenty years, 1938 to 1957, they were grouped into three yield groups, viz. high yielders (mean annual yield of over 80 nuts), medium yielders (40 to 80 nuts per year) and low yielders (less than 40 nuts per year). Mean yield of these three yield groups for every ten year period from 1928 to 1957 was worked out to study the variation in yield of nuts and to determine the period when the palms attained their maximum stabilised yield. Regularity in bearing of these palms was studied for the periods 1938 to 1947 and 1948 to 1957, based on the coefficient of variation. The height (length from the base of the palm to just below the crown) and the number of fully opened leaves on the crown of the palms at the time of observation were taken for every five year period from 1922 to 1952. The moving average yield of the palms for every quinquennial period from 1925 to 1954 was also calculated to study the relationship of yield with the growth factors of the palms. All the palms studied were raised under rainfed conditions and were growing under average conditions of management.

### RESULTS AND DISCUSSION

On the basis of yield data for a twenty year-period, 1938 to 1957, out of the seventy-five seedlings planted in 1917, thirteen were found to be high yielders, forty-seven medium yielders and fifteen low yielders. Figure 1 illustrates the performance of these yield groups during every ten year period from 1928 to 1957. During the period from 1938 to 1947, a sudden increase in yield of 89.2 per cent, 113.8 per cent and 22.2 per cent were noticed in the high, medium and low yield groups, respectively, over those of the previous ten year period, viz. 1928 to 1937. During the next ten year period 1948 to 1957, the three different yield groups showed either an insignificant increase or decrease in yield. Full bearing of the palms of

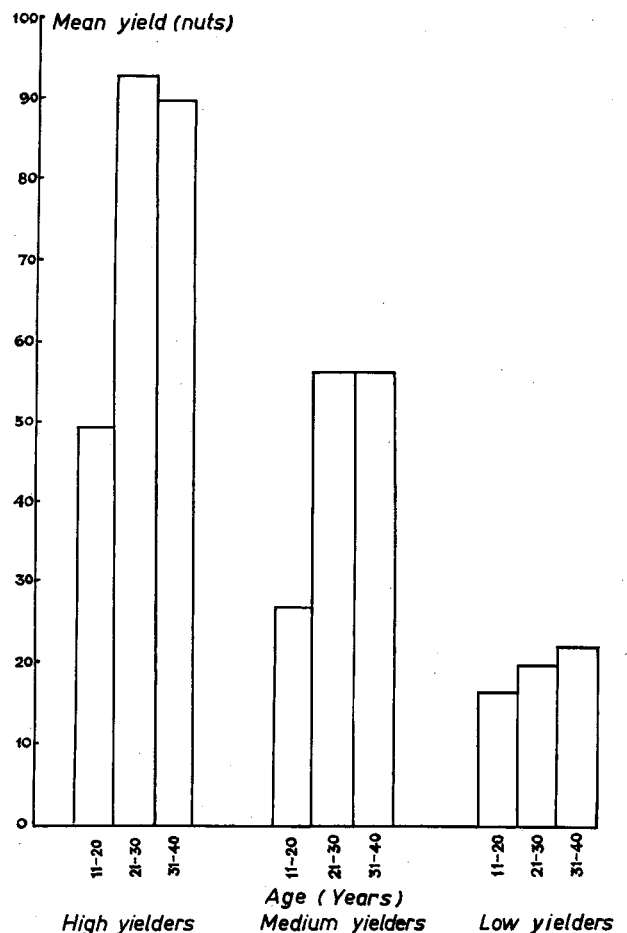


Fig. 1. — Performance of palms planted in 1917 during every ten year period from 1928 to 1957

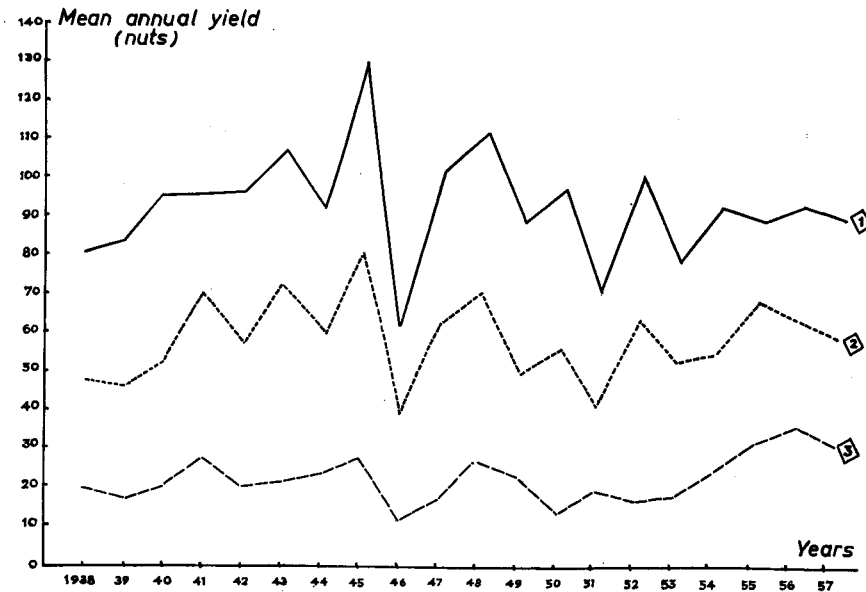


FIG. 2. — Performance of palms planted in 1917 during the period 1938 to 1957.  
1 = High yielders. 2 = Medium yielders. 3 = Low yielders

all the yield groups would therefore be said to have been reached during the period 1938 to 1947, when the palms were between 21 to 30 years old. Year-wise yield data for the period 1938 to 1957 has shown that in all the yield groups, the palms had attained their full bearing in the year 1945 when they were 28 years old. (Fig. 2).

The study has also indicated that the yield potentiality of the palms can be gauged even from their initial yields during the early stages of their bearing period. According to LIYANAGE and ABEYWARDANE (1958) the yield of the second and third years of bearing has a relation to the yielding capacity of the adult palm. The initial yield is helpful in spotting out the low yielders and replacing them in the early stages itself as they are not likely to improve considerably in future. JACK (1925) has stated that good yielders remain good and the poor remain poor. Thinning of

uneconomic palms in coconut groves has been advocated by many workers (MENON and PANDALAI 1958, CHILD 1964 and PIGGOTT 1964).

On the basis of coefficient of variation for yield during the periods 1938 to 1947 and 1948 to 1957, the palms were grouped into regular bearers having a C. V. of 30 per cent or less and irregular bearers having a C. V. of over 30 per cent, as worked out by SATYABALAN *et al.* (1968). It is during the ten year period 1938 to 1947 that the greatest number of palms in the high and medium yield groups attained their regular bearing nature. Since the maximum stabilised yield is obtained only during the period 1938 to 1947, the palms seem to have attained steady bearing in yield during the period of their full bearing stage.

Data on mean height, as well as number of fully opened leaves on the crown of the palm for every five years during the period 1927 to 1952, the 5 year

TABLE I

Mean values of growth characters and yield for palms in different yield groups during every quinquennial period from 1922 to 1952

Characters	Yield group	Year of observation						
		1922	1927	1932	1937	1942	1947	1952
Height of palm (in ft.) . . . . .	High	—	6.1	14.9	21.1	25.4	29.1	31.7
	Medium	—	4.7	11.3	17.2	21.0	24.5	26.7
	Low	—	4.3	9.1	13.4	17.3	20.8	22.5
Number of fully opened leaves on the crown . . . . .	High	11.5	22.4	28.8	32.2	32.2	31.2	30.7
	Medium	10.1	18.7	25.9	28.8	29.6	28.7	29.0
	Low	9.9	15.7	19.1	22.4	25.0	25.5	25.3
Yield of nuts (5 year moving average) . . . . .	High	—	28.1	44.1	67.8	99.9	99.5	89.7
	Medium	—	11.8	19.1	36.7	62.3	61.2	57.2
	Low	—	3.1	7.7	11.6	20.7	22.1	18.8
Coefficient of correlation between yield of nuts and (i) height . . . . .	General	—	—	—	0.686**	0.636**	0.581**	0.616**
	(ii) No. of fully opened leaves . . . . .	General	—	—	—	0.680**	0.620**	0.473**

\*\* Significant at P = 0.01

moving average yield from 1925 to 1954 for the three yield groups and the coefficients of correlation for height and number of leaves with yield for 1937 to 1952 are set out in table I. The total height as well as the number of leaves on the crown were maximum throughout the period for high yielders, followed by medium yielders and low yielders. Maximum increase in height was noticed in all the three yield groups during the period 1927 to 1932, when the palms were 10 to 15 years old. Highest rate of increase in yield was registered by the three groups during 1937 to 1942, when the palms were 20 to 25 years old. This may be due to the vigorous growth during the previous ten year period 1927 to 1932. The number of

functioning leaves on the crown was also maximum in 1942, when the maximum rate of increase in yield was obtained. Thus the growth factors, viz. the height of the palm and the number of functioning leaves on the crown are associated with the yield of the palm. The coefficients of correlation for height and number of leaves with the yield of palm for 1937 to 1952 were all highly significant at  $P = 0.01$ . This is in accordance with the report of PATEL (1938) that, in a grown up tree, the length of stem and the number of leaves are significantly correlated with the yield. This will be helpful in locating the desirable palms in a plantation where the palms are of the same age and have received the same treatment.

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