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FREQUENCY OF FERTILISER APPLICATION TO BEARING COCONUT PALMS—EFFECT ON YIELD AND YIELD COMPONENTS

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ABSTRACT

The results of a field experiment conducted to evaluate the relative benefits of fractionated annual and biennial applications of fertilisers to coconut, are presented in this paper. The highest response in terms of yield of ripe nuts and copra outturn per palm was obtained when annual dose of fertilisers was applied in two splits. Effect on the yield components, *viz.*, production and percentage set of female flowers, and copra content of nut, is also discussed.

INTRODUCTION

STUDIES carried out in India and Sri Lanka in coconuts have shown that the increased availability of N and K due to fertiliser application do not last long under the prevailing agroclimatic conditions. Sathirasegaram, Rajaratnam, and Ferdinandez (1966), on the basis of their studies on some of the coconut soils in Sri Lanka that were deficient in the major nutrients, suggested that the most efficient method of fertiliser application would be to apply small quantities frequently. No published work is available from India on split application of fertilisers to coconut palm. This paper presents the results of a field experiment conducted during 1967–1970 to find out the relative efficiency of utilisation of fertiliser nutrients in terms of production and quality of nuts when applied at different frequencies.

MATERIALS AND METHODS

The experiment was laid out in a sandy loam soil using palms aged about 45 years. The characteristics of the soil are given in Table I. A randomised block design with five replications was adopted. Calibrated plots, using the 4-year pre-treatment yield (1963–66) as a calibrating variate, were grouped into blocks and each plot consisted of 6–10 palms.

The fertiliser treatments were : t_1—control (no fertiliser) ; t_2—annual dose applied in October every year ; t_3—half the annual dose applied in July and the other half in October every year ; t_4—biennial dose applied in October in alternate years ; and t_5—half the biennial dose applied in July and the other half in October of alternate years.

TABLE I

Major nutrient status of the soil (0–30 *cm*) (%)*

N		P_2O_5		K_2O	
Total	Available	Total	Available	Total	Available
0·03	0·009	0·098	0·0085	0·371	0·0015

* After Ramanandan *et. al.* (1961).

The annual dose of fertilisers consisted of 500 g N as ammonium sulphate, 250 g P_2O_5 as single superphosphate, and 1,000 g K_2O as muriate of potash. The biennial dose was double this. The fertilisers were applied in circular basins of 1·5 m radius, dug around the base of palms to a depth of 20–25 cm. The basins were covered with soil after applying fertilisers.

Harvesting was done every month and the number of female flowers and nuts in each bunch were also recorded for all the palms. The number of female flowers and ripe nuts produced were totalled for each calendar year and from these the percentage of female flowers that matured into ripe unts (percentage

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set) was calculated. Four ripe coconuts from each experimental plot were collected at random in April 1973 and 1974 and their kernels were processed into copra by sun-drying to a moisture content of 6%. The out-turn of copra/palm was worked out from these.

RESULTS

Since the effect of fertiliser treatments on the production and quality of ripe nuts is normally manifested only two years after application, the yield of nuts during the 'interim period', 1967 and 1968, was not considered. The data on the mean annual yield of nuts/palm during the pre- and post-treatment periods are presented in Table II.

TABLE II

Mean yield of nuts/palm/year

Treatment	Pre-treatment 1963–66	Treatment means
t_1 Control	61·9	65·6
t_2 Annual	63·5	75·2
t_3 Annual split	63·7	81·5
t_4 Biennial	61·6	66·8
t_5 Biennial split	61·6	71·8
General mean		72·1
SE per plot		10·40
F ratio (treatments)		3·87
CD (5% level)		9·31

While the yield in the 'no fertiliser' treatment showed an increase of 3·7 nuts/palm over the pre-treatment mean, that in t_2 (fertilisers applied annually), showed an increase of 11·7 nuts. When the annual dose of fertilisers was applied in two equal splits, an increase of 17·8 nuts over the pre-treatment mean was obtained. Although biennial applications of fertilisers increased production, the increase was considerably lower than that due to annual applications. Also, biennial split application was superior to biennial single application.

The effect of these treatments on the important yield components, production and percentage set of female flowers and copra content of nuts, was also studied (Fig. 1, Table III).

TABLE III

Mean production and percentage set of female flowers and copra content of nuts (Mean 1968 *and* 1969)*

Treatments	N umber of female flowers produced/ palm/year	Per cent female flowers set	Copra content g/nut
t_1 Control	140·1	40·3	138·8
t_2 Annual application	182·2	41·2	148·0
t_3 Annual split application	188·0	44·2	152·2
t_4 Biennial application	154·7	43·3	149·1
t_5 Biennial split application	160·8	43·8	137·6
General mean	165·2		
SE/plot	24·22		
F ratio (treatments)	6·67		
CD (5% level)	21·67		

* Corresponds to harvest of ripe nuts 1969 and 1970.

Annual application of fertilisers, single as well as split, resulted in high production of female flowers. The increase in the annual split application was about 35% over control (no fertiliser) and 22% over the biennial single application. The percentage set of flowers was the highest in annual split application.

The copra content of nut, the important economic produce, showed that the mean copra content of nut was the highest in annual split application. The mean copra out-turn/palm/year worked out to 12·40 kg in the case of split annual application and it was 36·3% higher than that of the control, 11·7% of annual, 24·5% of biennial, and 25·3% of biennial split applications.

DISCUSSION

In the trials in Sri Lanka (Anonymous, 1970) annual and biennial applications of fertilisers increased the yield of nuts by 11%

and 5%, respectively, over 'no fertiliser'. On the coastal marine sandy soil (Anonymous, 1969), quarterly application of fertilisers raised the yield by 241–500%. The results obtained in the present experiment are in conformity with the above findings.

Some earlier reports have indicated that N exercises much influence on the formation of female flowers (Salgado, 1948 ; Nelliat, 1973). It can, therefore, be assumed that the production of female flowers is directly related to the amount and duration of availability of N and inversely to the deficiency of this nutrient. The maximum number of female flowers in this experiment was obtained in the two annual application treatments. The mean monthly production of female flowers (Fig. 1) in treatments t_2 and t_4 attains the peak in March-April and then it steadily decreases, while in the treatment, annual split application of fertilisers, there are two peak production periods, in March-April and July-September. A second peak is discernible in biennial split application also although not as much marked as in t_3.

Potash has been reported to increase the number of flowers (Nelliat, 1973). The highest setting obtained in the annual split application indicated that the availability of K is enhanced through fractional frequent applications.

It is, therefore, evident that to ensure the continuous availability of N and K and thus to ensure a higher efficiency of utilisation of applied nutrients by the coconut palms, N and K fertilisers should be applied in small doses frequently rather than in larger doses at wider intervals. Kamala Devi, Nelliat, and Pillai (1973), from their studies on the nutritional requirement of high yielding genotypes of coconut also stressed the need to apply slow release nitrogenous fertilisers.

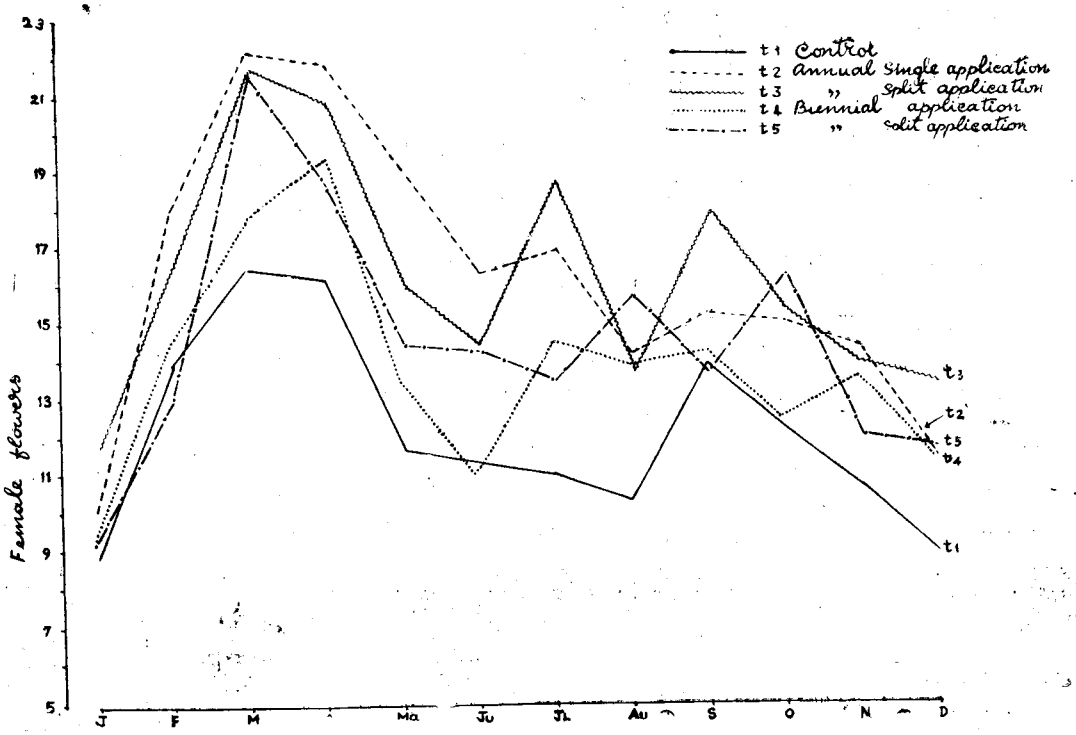

FIG. 1. Production of female flowers per palm (Mean for 1968 and 1969)

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