

FRACTIONAL APPLICATION OF FERTILIZERS FOR COCONUT SEEDLINGS

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Proper manuring from the very beginning is necessary to give a good start to the coconut seedlings. Investigations conducted by Nelliath and Muliyaar (1971) showed maximum growth responses by coconut seedlings to the application of fertilizers. Sathirasegaram *et. al* (1966) suggested that the most efficient method of fertilizer application to coconut would be to apply small quantities frequently on the basis of their experiments conducted in Sri Lanka. Studies conducted in India by Markose and Nelliath (1975) indicated that fractionated use of fertilizers are more effective in the case of adult bearing palms. Information is meagre on split application of fertilizers to coconut seedlings. The results of a field experiment conducted during 1965-1972 at the Coconut Research Station, Kumarakom, Kerala to find out the relative efficiency of soil and foliar application of fertilizers in split doses in terms of morphological characters like height, girth at collar, rate of leaf production, commencement of flowering, number of spadices produced and per cent setting of female flowers are presented in this paper.

Materials and Methods

The soil type of the region where the experiment was conducted is reclaimed kari (clayey; pH 5.2) and the variety used in the trial was West Coast Tall. The nutrient status of the soil are as follows: Nitrogen 0.085%, Organic Carbon 0.940%, H₁ soluble P₂O₅ 0.160%, K₂O 0.140%, CaO 0.400% MgO 0.580%, Available P₂O₅ 2.242 kg/ha and o trace.

The experiment was started in 1965 and was laid out as a Randomised Block Design with 11 treatments replicated 12 times. The treatments were (1) Single application of N1 P1 K1 (2) Single application of N2 P2 K2 (3) Tr. 1 in two equal split doses (4) Tr. 2 in two equal split doses (5) Tr. 1 given fth basally and in 2 foliar applications (6) Tr. 1 given fth basally and in 3 foliar applications (7) Tr. 1 given fth basally and in 4 foliage applications (8) Tr. 1 applied in 4 foliar applications (9) Control - no manure. The dose of N P K nutrients were progressively increased from the 2nd year of planting to the 6th year as given in Table 1. N P K was given in the form of urea, superphosphate and muriate of potash respectively. Tr. 1 and 2 were applied during August—September, Tr. 3 and 4 in May—June & September—October and Tr. 5 and 6 in May—June, August—September and November—December. Foliar application of fertilizers were done during February, April, May, July,

Table 1**Fractional application of fertilizers on coconut seedlings
N P K treatment doses (gin/seedlings)**

	N1	P1	K1	N2	P2	K2
2nd year (1966)	50	50	100	100	100	200
3rd year (1967)	100	75	150	200	150	300
4th year (1968)	150	100	200	300	200	400
5th year (1969)	200	150	250	400	300	500
6th year (1970)	250	250	450	500	500	900

September and November according to the schedule fixed. Data on height of seedlings, girth at collar and total number of leaves produced were recorded from 1967 onwards. Observations on the commencement of flowering, number of spadices opened and per cent setting of female flowers were noted for the years 1971 and 72.

Results and Discussion

Since the effect of fertilizer treatments on coconut is normally manifested only one year after application, the observation on morphological characters during the 'interim period' 1966 was not considered. The data on the increase in mean height, girth at collar and number of leaves produced are presented in table 2. Statistical analysis of the growth measurements did not show any significant difference in height of seedlings and girth. But the increase in leaf production was highly significant over control eventhough the result has not attained the level of significance during 1967. The lack of response in height and girth may be attributed to varietal characteristics, soil and climatic conditions prevailing in the region as evidenced by Bhatnagar and Pandalai (1958). It was observed that maximum increase in number of leaves were recorded in treatment 4 during 1969 and 70 where the fertilizers are applied basally in two split doses, eventhough the difference between Tr. 4 and Tr. 5 are not evident statistically. The results indicated that higher level of N P K in two split doses was equivalent to three fractionated application of the lower level of N P K. The higher and lower rates of N P K when applied as single dose each was on par with those added partly through soil and foliage. The higher level of N P K does not influence the rate of production of leaves, in spite of the same given in three splits. Markose and Nelliat (1975) obtained highest response in terms of yield and copra out-turn of bearing palms when the annual dose was applied in two splits. The lack of efficiency of treatments observed in 1967

T o e 2

Split application of fertilizer to coconut seedlings effect on increase in height, girth and leaf production.
(A e g /Pal.)

Treatment	1967			1968			1969			1970		
	Height cm	Girth cm	No. of leaves	Height cm	Girth cm	No. of leaves	Height cm	Girth cm	No. of leaves	Height cm	Girth cm	No. of leaves
1	119.5	31.3	7.8	102.8	32.1	5.1	9.0	8.0	5.8	105.0	19.7	8.9
2	128.3	32.5	8.3	100.8	37.7	6.2	20.0	7.0	6.3	135.0	16.5	9.3
3	103.6	28.2	7.1	58.7	31.5	6.1	54.3	14.5	7.3	86.2	24.4	9.2
4	121.0	27.6	6.5	90.0	36.8	6.8	50.0	10.7	8.2	123.5	15.5	10.8
5	111.0	28.0	6.0	101.1	33.5	6.8	41.9	10.1	7.5	128.9	21.7	10.7
6	122.3	29.2	5.9	118.5	38.0	6.3	72.5	8.6	7.3	102.1	28.6	9.3
7	119.6	30.2	6.3	86.0	33.5	6.0	46.9	13.5	6.7	133.5	16.1	9.5
8	110.0	26.5	8.8	84.1	30.1	5.1	60.0	14.0	6.0	138.7	21.0	9.4
9	132.0	31.8	8.1	77.9	35.9	5.8	39.6	7.4	6.8	125.3	18.5	9.3
10	114.9	23.3	6.6	46.0	26.4	5.2	76.8	21.0	6.2	97.1	20.4	8.6
11	119.7	22.5	5.8	49.9	21.2	4.5	43.4	16.0	5.4	150.9	11.1	7.4
F	NS	NS	NS	NS	NS	Sig	NS	NS	NS	NS	NS	Sig
CD (5%)	—	—	—	—	—	0.7	—	—	0.8	—	—	1.2

Sig: Significant at 0.01% level

NS: Not significant

may be due to the reason that the uptake of nutrients was greater in the case of later applications, as suggested by Markose (1973). Results of combined analysis of the data of 1967 - 70 revealed that the growth of seedlings in terms of height, girth at collar and production of leaves was remarkable and a progressive increase was observed between years. The interaction between years and treatments were also tested but there was no significance.

The data on the flowering and setting of female flowers of the test palms are presented in Table 3. Early flowering and maximum number of spadices

Table 3

Effect of fractional application of fertilizers on the flowering and percentage setting of female flowers on coconut

Treatment	No. of palms flowered		No. of spadices opened		No. of female flower produced		Setting of female flower	
	1971	1972	(Average/Palm)		(Average/Palm)		1971	1972
			1971	1972	1971	1972		
1	16.7	25.0	0.4	2.7	0.4	4.8	20.0	43.8
2	8.3	41.7	0.3	2.2	0.0	5.4	0.0	46.2
3	0.0	25.0	0.0	1.2	0.0	1.3	62.5	33.3
4	50.0	58.3	0.8	2.8	0.7	7.1	57.1	62.4
5	58.3	66.7	0.7	2.8	0.6	8.1	42.8	67.0
6	25.0	33.3	0.5	2.6	0.6	6.1	0.0	54.8
7	16.7	25.0	0.0	0.8	0.4	3.4	0.0	27.7
8	0.0	33.3	0.0	1.7	0.0	3.8	0.0	20.0
9	8.3	33.3	0.0	0.1	0.0	3.9	0.0	31.9
10	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
CD (0.05)	2.3	30.0	0.4	0.9	0.4	2.1	20.2	27.4

Sig : Significant at 0.01 % level

ces were observed in those palms where N P K @ 250 : 250 : 450 gm/palm was applied basally in 3 split doses. Fifty eight per cent of the palms in Tr. 5 flowered during the sixth year of planting (1971) followed by 50% in Tr. 4. The same trend was observed during the 7th year also. The early flowering thus

observed may be due to the reason that a larger number of leaves were produced in these treatments during the previous periods.

The average number of spadices opened per palm was greater in Tr. 4 in 1972 followed by Tr. 5 and 6. Patel (1938) reported positive linear correlation between the number of leaves produced and the spadices. In the present trial maximum number of spadices were formed in Tr. 4 and 5, where we observed greater rate of production of leaves. The production of female flowers was also greater in Tr. 4 during 1971 and Tr. 5 during 1972 when the fertilizers were received in split doses. The effect was on par with Tr. 5 during 1971 and with Tr. 6 in the succeeding year. Some earlier reports have indicated that N exercises much influence on the formation of female flowers (Nelliath, 1973). The present observation is in conformity with the findings of Markose and Nelliath (1975), where it was stated that the production of female flowers is directly related to the amount and duration of availability of N in the soil.

A critical review of the data on the setting percentage of female flowers makes it clear that split application of fertilizers have aggravated the percentage setting. During 1971, Tr. 3 recorded maximum percentage setting, while the effect was evident in Tr. 5 in 1972. The response in the latter treatment was on par with Tr. 4, 6, 2 and 1. Foliar application of a part of the nitrogen fertilizer showed no response in per cent setting of female flowers. Thus the higher setting per cent observed in Tr. 4 and 5 can be attributed to the effect of split application and timings of N application. The greater setting percentage observed in the present study may be attributed to the elevated bearing capacity of those palms as observed by Patel (1938) Menon and Pandalai (1958) reported that application of nitrogenous manures has often been found to increase fruit setting in coconut palm.

Summary

The results of a field experiment conducted to evaluate the relative benefits of soil application in split doses Vs. foliar application of a part of the fertilizer to coconut seedlings are presented in the paper. Significant increase in the mean number of leaves produced were obtained due to fractionated application of N P K, while the response was negative in respect of increase in height and girth of seedlings. Soil application of fertilizers was found better than foliar treatments. Early flowering, maximum number of spadices, larger number of female flowers and higher setting percentage were observed when the fertilizers were applied in split doses.

എന്നറിയുന്നതിനു് വേണ്ടി നടത്തിയ ഒരു പരീക്ഷണത്തിൽ ഒരു തൈക്കു് 250 : 250 : 450 ഗ്രാം എന്ന തോതിലുള്ള N P K വളം ആണ്ടിൽ മൂന്നു roiajsmdfgocal കൊടുക്കുന്നതു് ഏറ്റവും മെച്ചമായി കണ്ടു. N P K rooorucugsBCa മണ്ണിൽ ചേർക്കുന്നതു് ഇലകളിൽ തളിക്കുന്ന രീതിയേക്കാൾ നല്ലതായും കാണപ്പെട്ടു. കൂടാതെ രാസവളങ്ങൾ ഒന്നിൽ കൂടുതൽ അവലകളായി വിഭജിച്ചു് മണ്ണിൽ ചേർത്തപ്പോൾ തെങ്ങുകൾ നേരത്തേ പുഷ്പിക്കുകയും കൂടുതൽ പെൺപുഷ്പുകളുടെ ഉണ്ടാവുകയും ദ്രവ്യമാവുകയും ചെയ്തതായി തെളിഞ്ഞിരിക്കുന്നു.

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