EFFECT OF NPK FERTILISERS ON COCONUT GROWN ON CORAL SOILS OF LAKSHADWEEP

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Information on a suitable fertiliser schedule for coconut based on experimental findings is lacking under the conditions of Lakshadweep. Shamsuddin (1986) has suggested application of 360 g N, and 720 g K_2O per palm per year in the form of urea and muriate of potash respectively for coconut. A manurial experiment was conducted by C.P.C.R.I. on coral soil and the results are presented below:

The soil of the experimental site is highly calcareous (93.8 per cent $CaCO_3$), deep to very deep, well drained and structureless. The fine and coarse grained particles are made up of weathered coral and the clay content is around two per cent. The experimental soil analysed pH 8.1, organic carbon 0.35 per cent and available phosphorus 15.2 ppm with very poor available potassium status.

A field experiment was laid out in the year 1983 in Minicoy Island with different combinations of NPK on Laccadive ordinary coconut. There were seven treatments, namely, six fertiliser combinations and a control laid out in a randomised block design and replicated four times. Each treatment plot consisted of five palms. The treatments are as follows:

1) Control ($N_0P_0K_0$).
2) 600 g K_2O without N and P ($N_0P_0K_1$).
3) 1200 g K_2O without N and P ($N_0P_0K_2$).
4) 250 g N and 600 g K_2O without P($N_1P_0K_1$).
5) 500 g N and 1200 g K_2O without P ($N_2P_0K_2$).
6) 250 g N, 160 g P_2O_5 and 600 g K_2O ($N_1P_1K_1$).
7) 500 g N, 320 g P_2O_5 and 1200 g K_2O ($N_2P_2K_2$).

The fertiliser sources were urea, single superphosphate and muriate of potash for N, P and K respectively. They were applied in two split doses during the month of June (one-third) and September (two-third dose) in all the years.

The growth parameters such as leaf production, total functional leaves, number of yellow leaves per palm and coconut yield were recorded periodically. Soil and leaf (Frond 14) samples were collected during 1990 and analysed following standard methods.

The control plot and the treatments where nitrogen and potassium were not applied have produced low yield in all three years. Treatments $N_2P_0K_2$, $N_1P_1K_1$ and $N_2P_2K_2$ produced significantly more coconuts than control and also over plots where potassium alone was applied. It can be seen that the coconut yield was significantly high in treatment combination with and without phosphorus (Table 54.1). Though available P content in the soil increased with phosphorus addition, the effect of P enrichment on the nut yield was not noticed in this experiment. There was no significant difference in coconut yield between the $N_1P_1K_1$ and $N_2P_2K_2$. However, $N_1P_1K_1$ dose has given an increased yield of 123 to 160 per cent over control.

Table 54.1: Mean number of coconuts produced per palm/year in various treatments

Treatments	*1988*	*1989*	*1990*	*Mean of 3 years*
Control	21.50	32.25	33.50	29.08
$N_0P_0K_1$	37.50	54.00	45.75	45.75
$N_0P_0K_2$	38.00	63.75	73.75	58.50
$N_1P_0K_1$	47.00	65.00	69.00	60.33
$N_2P_0K_2$	65.30	85.00	87.75	79.35
$N_1P_1K_1$	72.30	82.00	75.25	76.52
$N_2P_2K_2$	54.00	83.75	73.75	70.50
CD at 5%	24.72	28.78	29.91	–

Leaf Production — Annual leaf production as an index of response to fertiliser application was significant during 1988 and 1990 while it was not significant during 1989. The treatments where nitrogen and potassium are applied together influenced the production of leaves on par with NPK combination. The treatment $N_2P_2K_2$ produced significantly more number of leaves than control and in treatments which did not receive nitrogen.

When the total number of functional leaves were considered $N_2P_2K_2$ treatment produced maximum number of leaves (33.9) followed by $N_1P_1K_1$ (33.2) and $N_2P_0K_2$ (32.6) compared to control (23.1). This indicated the importance of nitrogen and potassium in manuring coconuts in Lakshadweep. Similarly, when the number of yellow leaves per palm was taken into account, it could be seen that the palms in the control plot had the maximum yellow leaves (7.3) compared to all other treatments (3.05 to 4.4).

The yellowing of leaves noticed in treatments receiving potassium might be due to its depressing effect on magnesium uptake (Khan *et al.*, 1986) and also due to the highly calcareous nature of the soil. However, the least yellowing was recorded in $N_1P_1K_1$ treatment.

Application of fertilisers increased the soil available phosphorus and potassium significantly over control. Organic carbon contents of the soil increased marginally over control plot. The information suggested that soil fertility of coral soils can be improved with application of inorganic fertilisers.

Foliar Nutrients

The effect of fertiliser application was much evident from the significantly higher nitrogen and potassium content in treatments $N_2P_0K_2$, $N_1P_1K_1$ and $N_2P_2K_2$ as against control and other treatments (Table 54.2). It is noteworthy that the potassium content in the control plots was below the critical level and that all the treatments having different levels of potassium gave significantly higher potassium content in leaf than control. Though phosphorus content of the plant also increased with fertiliser application, differences among treatments were not significant. Interestingly phosphorus content of the leaf was the highest (> 0.14 per cent) in all the treatments. It was evident that improved nutrition consequent upon the fertiliser application was influencial in increasing the yields.

Table 54.2: Leaf nutrient contents (%) as influenced by NPK treatment

Treatments	*N*	*P*	*K*	*Ca*	*Mg*	*Na*	*S*
Control	1.70	0.14	0.38	0.60	0.32	0.34	0.18
$N_0P_0K_1$	1.72	0.14	1.15	0.57	0.25	0.43	0.20
$N_0P_0K_2$	1.70	0.15	1.28	0.60	0.25	0.37	0.20
$N_1P_0K_1$	1.81	0.15	0.79	0.56	0.29	0.45	0.21
$N_2P_0K_2$	2.00	0.16	1.12	0.57	0.27	0.42	0.21
$N_1P_1K_1$	1.96	0.16	0.96	0.58	0.29	0.42	0.21
$N_2P_2K_2$	2.01	0.16	1.29	0.56	0.24	0.40	0.21
CD at 5%	0.15	NS	0.20	NS	NS	0.06	0.02

Treatments $N_1P_0K_1$, $N_2P_0K_2$, $N_1P_1K_1$ and $N_2P_2K_2$ recorded significantly higher sodium and sulphur in the leaf than control. This result is in conformity with the findings of Fremond and Ross (1957) who reported that application of potassium also enhances sodium content in the leaf. The analysis of leaf samples for micronutrients did not reveal any significant difference between treatments. However, copper, iron and zinc were in the sufficiency range (Cu-5-7 ppm; Fe 60-80 ppm; Zn 14-18 ppm) while manganese recorded below the critical level (Mn-12-16 ppm).

Thus annual application of 250 g N, 160 g P_2O_5 and 600 g K_2O/palm/year could be recommended for palms growing in Lakshadweep.

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