

PERFORMANCE OF DWARF X TALL HYBRID COCONUT IN ROOT (WILT) AFFECTED AREAS OF KERALA UNDER DIFFERENT FERTILIZER LEVELS

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ABSTRACT

A field experiment was conducted to study the performance of Dwarf x Tall hybrid coconut palms under different fertilizer levels in the root (wilt) disease affected area. With the lowest level of fertilizer application, an average yield of 120 nuts/palm/year was obtained. 500 g N, 300 g P₂O₅ 1000 g K₂O with 500 g Mg O could be taken as the ideal dose of fertilizer application in the early bearing periods under rainfed conditions. About 22 per cent of the total palms had contracted root (wilt) disease at the end of ninth year from planting.

INTRODUCTION

The beneficial characters of Dwarf x Tall hybrid coconut palms such as early bearing and high production of nuts with high copra content have been reported by Satyabalan (1956). Based on the results of the survey on the performance of D x T hybrids in the root (wilt) disease affected areas of Kerala, Pillai and Rawther (1972) have recommended the large-scale propagation of the hybrids in these areas as they show considerable tolerance against root (wilt) disease. The influence of fertilizer management on growth, yield and incidence of root (wilt) disease, in Chowghat Dwarf Orange x West Coast Tall hybrid palms (D x T) up to ninth year of planting are presented in this paper.

MATERIAL AND METHODS

The experimental field representing endemic root (wilt) affected area has sandy loam soil with low fertility status. The soil is acidic

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(pH 5.5) and mechanically analysed 86 per cent sand, 7.8 per cent clay and 2 per cent silt. The nutrient status was poor with 4 and 28 ppm of available N and K. The soil was rich in available P (18 ppm). One year old D×T hybrid coconut seedlings were planted in July 1972 in a randomized block design with three levels of NPK, at $L_1 = 500, 300$ and $1000 \text{ g N, P}_2\text{O}_5$ and K_2O /adult palm/year respectively; L_2 —twice the dose of L_1 ; L_3 —thrice the dose of L_1 ; two levels of Ca (0 and 12.5 kg Ca(OH)_2 /palm/year) and three levels of Mg (0.500 and 1000 g MgO /palm/year) in a $3 \times 2 \times 3$ factorial design with three replications. The seedlings were planted at a spacing of $7.5 \times 7.5 \text{ m}$. Each plot consisted of 6 palms in a 3×2 rectangular shape.

Fertilizers were applied to the seedlings at the rate of 1/10th the adult dose after three months of planting, 1/3rd after one year, 2/3rd after two years and full dose from third year onwards using urea and ammophos for N and P, muriate of potash for K, slaked lime for Ca and magnesium sulphate (hydrated) for Mg. Fertilizers were applied in two splits namely, 1/3 of the annual dose in April-May (pre-monsoon), and 2/3 in August-September (post-monsoon). NPK and Mg fertilizers were applied in basins around the palms, whereas lime was broadcast over the entire plot including the basins, and ploughed/forked in. A basal application of 50 kg of cattle manure per palm was given during July-August every year since 1974. The palms were grown under rainfed conditions.

Height, girth at collar and total number of leaves were recorded at the time of planting, and observations on leaf production, flowering and incidence of disease were taken, periodically in addition to the yield of nuts.

RESULTS AND DISCUSSION

The interaction of $\text{NPK} \times \text{Ca} \times \text{Mg}$ was significant on the production of leaves in 1973 and till December, 1978 (Table 1). The first level of NPK, $\text{Ca}_1 \text{ Mg}_1$ combination and the second and third levels of NPK, $\text{Ca}_1 \text{ Mg}_2$ combinations gave the highest leaf production. In 1974, the effect of NPK became significant on frond production (Table 2). Maximum number of leaves were produced under the highest level of NPK namely, $1500 \text{ g N, } 900 \text{ g P}_2\text{O}_5$ and 3000 g

K₂O. The main effect of Mg on frond production was significant only in 1978 (Table 2). Although the effect of Mg was positive on the height of the palms, it was not significant.

Table 1. Interaction of NPK × Ca × Mg on leaf production till 1978 (mean)

	N ₁ P ₁ K ₁		N ₂ P ₂ K ₂		N ₃ P ₃ K ₃		Mean
	Ca ₀	Ca ₁	Ca ₀	Ca ₁	Ca ₀	Ca ₁	
Mg ₀	71.37	70.97	71.97	72.27	76.53	75.10	73.03
Mg ₁	70.63	76.67	73.53	71.07	74.00	74.60	73.41
Mg ₂	75.10	68.47	74.53	75.10	72.70	77.17	73.84
Mean	72.36	72.03	73.34	72.81	74.41	75.62	73.42

C.D. (0.05): 5.11

Table 2. Effect of NPK and Mg on leaf production

Treatment	Leaves produced in 1974		Treatment	Leaves produced in 1978
		till December 1978		
(NPK) ₁	9.28	72.2	Mg ₀	16.61
(NPK) ₂	9.12	73.1	Mg ₁	16.73
(NPK) ₃	9.93	75.0	Mg ₂	17.24
CD (0.05)	0.66	2.1	CD (0.05)	0.47

The effect of NPK and Mg, and the NPK × Mg and Ca × Mg interactions on the percentage of palms flowering upto December 1976 was significant (Table 3). The highest percentage of palms

Table 3. Effect of NPK, Ca and Mg on the percentage of palms that flowered upto December, 1976

Treatment	Mg ₀	Mg ₁	Mg ₂	Mean
(NPK) ₁	8.3	44.4	38.9	30.6
(NPK) ₂	25.0	38.9	58.8	40.9
(NPK) ₃	52.8	50.0	50.0	50.9
Mean	28.7	44.4	49.2	40.7
Ca ₀	29.6	38.9	50.0	39.5
Ca ₁	27.8	50.0	48.1	42.0

CD (0.05) = NPK level: 10.1, Mg level: 10.1

NPK × Mg: 17.5 and Mg × Ca: 14.5

flowered in (NPK)₂ Mg₂ treatment. An interaction between Ca and Mg levels was also noticed in the percentage of palms flowering.

The effect of treatments on the yield of nuts harvested in 1981 is summarized in Table 4. The yield was highest under the treatment (NPK)₁. Application of Mg also increased the yield.

Table 4. Yield of D×T (nuts/palm/year) at the 9th year (1981) under varying fertility levels.

	Ca ₀	Ca ₁	Mg ₀	Mg ₁	Mg ₂	Mean
(NPK) ₁	115.3	109.8	98.5	125.3	113.8	112.5
(NPK) ₂	111.5	109.0	97.4	110.5	122.8	110.2
(NPK) ₃	90.3	94.3	95.6	93.7	87.6	92.3
Mean	105.7	104.4	97.2	109.8	108.1	105.0

C.D. (0.05) for NPK=14.2

Yellowing of leaves in the outer whorls characteristic of Mg-deficiency was noticed on palms which did not receive Mg. Root (wilt) disease incidence during the period of investigation showed an increase from 1.8-22.2 per cent in D×T as compared to 2.2-35.5 per cent in WCT. (Table 5).

Table 5. Comparative performance of D×T and WCT palms with respect to disease and yield upto 9th year of planting

Years after planting	Disease incidence (%)		Average yield (nuts/palm/year)	
	D×T	WCT	D×T	WCT
4	1.8	2.2	—	—
5	3.5	4.3	55.9	—
6	5.0	8.8	100.9	—
7	5.0	22.5	75.9	16.8
8	8.8	29.3	91.1	39.6
9	22.2	35.5	104.8	49.4

From the results presented it would be seen that the young D×T hybrid palms respond to higher levels of fertilizer with respect to growth and early flowering and the lowest dose with 500g MgO gave an average yield of 125 nuts per palm in the 9th

year. Hence, 500g N, 300g P₂O₅, 1000g K₂O, along with 500g MgO could be taken as the ideal dose for this variety under rainfed condition. Application of Mg at the rate of 500g MgO, gave a significant response, on growth, flowering and initial yield. Robert Cecil *et al.* (1978) reported response to magnesium application in WCT palms also in a similar fertilizer experiment. Fertilizer experiments on coconut hybrids by I.R.H.O. in the Ivory Coast on coastal soils with low fertility status, have stressed the need for N, K and Mg application from young stages (Coomans, 1977). Experimental results from Sri Lanka also show that palms which received NPK + Mg gave 46 nuts compared to 20 nuts only with NPK alone and that Magnesium deficiency could be one of the limiting factors in establishing new plantations (Anon., 1964).

In this study, application of NPK, Ca and Mg was not found to be effective in preventing incidence of root (wilt) disease in D × T hybrid palms. The results of nutritional survey conducted in healthy and root (wilt) disease affected area of Kerala, (Pillai *et al.*, 1975) indicated that the contents of major nutrients in the soil and in the leaf were not related to the incidence of root (wilt) disease (Robert Cecil *et al.*, 1978). However, the incidence of disease was low in D × T hybrids in the present investigation when compared to that of WCT palms of the same age at CPCRI farm at Kayangulam (Table 6).

ACKNOWLEDGEMENT

The authors are thankful to Dr. M. S. Swaminathan, F.R.S., former Director-General, I.C.A.R. for suggesting the problem, and to Dr. K. V. Ahamed Bavappa, Director, CPCRI, Kasaragod and Dr. N. P. Jayasankar, Joint Director, C.P.C.R.I., Kayangulam for their keen interest in this work.

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