

EFFECT OF DIFFERENTIAL APPLICATION OF NITROGEN ON GROWTH AND YIELD OF TURMERIC (*Curcuma longa* L.)

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The influence of nitrogen application on the growth and yield of fresh rhizome of turmeric cv. CO. 1 was assessed by conducting two field experiments during cropping seasons of 1980-81 and 1981-82. The turmeric responded favourably and significantly due to increasing levels of N application. Application of nitrogen @ 120 kg/ha was found to enhance the growth and yield of fresh rhizome.

Turmeric (*Curcuma longa* L.) is a major spice crop grown in Tamil Nadu. Generally turmeric needs heavy doses of nitrogen application and farmers in the turmeric areas of Periyar District usually go for higher doses well above 100 kg N/ha. In order to optimise the nitrogen application and to study the effect of nitrogen on the growth parameters and yield components of turmeric, a study was conducted at Agricultural Research Station, Bhavanisagar which represents the majority of turmeric grown soils of Periyar district.

MATERIALS AND METHODS

Two field experiments were laid out with Co.1 turmeric during 1980-81 and 1981-82. The type of soil was sandy red loam popularly known as Irugur series of soils. The treatments included nitrogen application at 100, 120, 140 and 160 kg along with no application of nitrogen as control. The other nutrients P and K were applied at a constant level of 60 kg each for all treatments. One fifth of 'N' and entire quantity of P and K were applied as basal dressing and the remaining 'N' at 1/5th level each was

applied on 30th, 60th, 90th and 120th day of planting. Experiment was laid out in Randomised block design with four replications. The plot size was 4.95 m x 4 m. Finger rhizomes were planted on both sides of broad ridges with a spacing of 50 cm x 15 cm. The other package of practices like irrigation and plant protection measures were given as per schedule. The growth parameters like sprouting percentage on 30th day of planting, establishment percentage on 60th day of planting, plant height and number of leaves and tillers/plant on 180th day of planting and leaf area on 120th day of planting were recorded. The crop was harvested on 280th day of planting and yield components namely number and weight of mother, primary and secondary finger rhizomes per plant and total yield of fresh rhizomes per ha were observed.

RESULTS AND DISCUSSION

The results of this study are presented in Table-1.

Application of different level of N did not influence the sprouting and establishment of plants. The plant hei-

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Table 1: Effects of differential application of nitrogen on growth and yield of turmeric cv. CO 1

N levels (g/ha)	Sprouting percentage		Establishment percentage		Plant height (cm)		No. of leaves/plant		No. of tillers/plant	
	1980-81	1981-82	1980-81	1981-82	1980-81	1981-82	1980-81	1981-82	1980-81	1981-82
Control	50	64	67	73	65.9	62.2	12.8	13.1	2.3	1.9
100	55	69	74	74	68.3	71.5	17.4	15.6	2.4	2.6
120	58	70	75	76	110.2	108.7	26.3	24.8	0.9	4.8
140	57	58	74	76	92.6	89.3	20.7	21.2	3.8	3.6
160	54	68	72	75	73.4	71.2	18.6	19.7	3.2	3.1
CD	NS	NS	NS	NS	9.2**	10.3**	3.6**	4.2**	2.2*	2.4*

Table 1. (Contd.)

	Actual leaf area (cm ² leaf ⁻¹)		Mother rhizomes/plant	
	1980-81	1981-82	1980-81	1981-82
Control	107.63	213.57	1.8	1.9
100	204.50	271.58	2.1	2.3
120	364.87	502.19	4.7	4.9
140	306.26	425.07	4.3	4.4
160	192.68	352.38	4.0	4.0
CD	15.8**	19.6**	2.1*	2.1*
			4.1**	4.1**
			0.210	0.210
			0.220	0.260
			0.260	0.320
			0.140	0.150
			0.120	0.130

Table 2

N levels (kg/ha)	Primary finger rhizomes/plant			Secondary finger rhizomes/plant			Yield/ha (kg)		Cost benefit ratio for treatments
	1981-82			1980-81			1980-81	1981-82	
	Number	Weight (kg)	Weight (kg)	Number	Weight (kg)	Weight (kg)	Weight (kg)	Weight (kg)	
Control	6.9	0.310	0.305	9.4	0.140	0.138	25460	25230	1.00
100	9.7	0.360	0.320	10.8	0.180	0.160	26113	28090	1:1.10
120	14.7	0.470	0.510	15.9	0.260	0.290	40120	41870	1:1.62
140	12.6	0.420	0.420	13.7	0.210	0.240	37030	40115	1:1.52
160	10.8	0.380	0.380	12.1	0.190	0.210	33450	34795	1:1.35
CD	3.9**	0.18**	0.2**	4.6**	0.12**	0.18**	9820**	10102**	

ght, number of leaves and tillers and leaf area were significantly influenced by nitrogen application at higher doses Nair (1964) reported significant effect of nitrogen on plant height and tiller production. In both seasons, application of 120 kg N/ha had recorded maximum values for plant height (110.2 cm and 108.7 cm), number of leaves (26.3 and 24.8), number of tillers (4.9 and 4.8), leaf area 364.87 cm² and 502.19 cm² leaf⁻¹ than other levels of nitrogen and control. Beyond this levels, all these growth parameters were found to decrease with increasing doses of N application. The values for these parameters were the lowest in control.

Turmeric is an exhaustive crop and respond favourably to heavy manuring (Agnihotri, 1949; Choudhry 1957; Nair 1964). The positive response of turmeric on increased fertilization expresses itself by the way of enhanced tillering and luxurious foliage coupled with increased yields (Rao, 1973; Rao *et al* 1975). In the present studies, the dose of 120 kg N/ha had recorded maximum yield in both the seasons recording 40 120 kg/ha (1980-81) and 41,870 kg/ha (1981-82). This was closely followed by 140 kg N/ha yielding 37030 kg/ha and 40,115 kg/ha, respectively. Beyond 120 kg N/ha, the yield appeared to be slightly reduced in both the seasons (Table 2). Earlier workers like Randhawa *et al.* (1973) and Rao *et al.* (1975) reported a positive correlation between N application and yield of turmeric. Muralidharan and Balakrishnan (1972) reported that 100 kg N/ha gave maximum yield whereas Rajput *et al* (1983) observed maximum yield for 150 kg N/ha. From table 2, it be-

came evident that the increased in yield due to 120 kg N/ha could be attributed to enhanced yield components like number and weight of mother, primary finger rhizomes/plant in both the seasons which were found to be influenced significantly by the application of differential levels of nitrogen.

From this investigation it could be concluded that application of nitrogen @ 120 kg/ha along with 60 kg/ha in each of P and K was found to enhance the growth and yield of fresh rhizome of turmeric.

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