

## STUDIES ON NITROGEN AND PHOSPHORUS REQUIREMENT OF RAINFED CASTOR

P. MUTHUVELI<sup>1</sup>, R. SIVASAMY<sup>2</sup> and V. SUBRAMANIAN<sup>3</sup>

Field experiments conducted at the Agricultural Research Station, Kovilpatti under rainfed condition with castor variety SA. 2 revealed that addition of 60 kg N and 15 kg P<sub>2</sub>O<sub>5</sub>/ha results in higher seed yield through an enhancement in the plant height, number of spikes per plant and number of capsules per spike.

Castor, one of the important oil-seeds is mainly grown as a mixed and border crop in Tamil Nadu. It is catching up in the rainfed vertisol tract of southern districts. Its N and P requirement under rainfed condition with pure stand has not been studied in detail so far. Hence, field experiments were conducted at the Agricultural Research Station, Kovilpatti under rainfed condition with the variety SA 2 as test crop to evaluate the N and P requirement of sole crop of castor during rabi season of 1984-85 and 1985-86.

### MATERIALS AND METHODS

The experimental soil was deep vertisol with low available N (140 kg) and P (9.0 kg/ha) contents and high available K content (546 kg/ha.). The soil was neutral in pH and free from salinity and alkali hazards. The fertilizer treatments tried included four levels in each of N (0, 20, 40 and 60 kg N/ha) and P (0, 15, 30 and 45 kg P<sub>2</sub>O<sub>5</sub> /ha) each replicated three times in a factorial randomised complete block design. Altogether there were 16 treatment combinations. Entire dose of fertilizers were added basally.

Since the soil had very high available potash it was not included.

Seeds were sown in lines adopting a spacing of 60 cm between rows and 45 cm within the row at the rate of 2.3 per hill and the seedlings were thinned subsequently to single plant per hill. Routine cultural practices were followed in raising the crop. During the crop growth a total quantity of 357.6 mm of rainfall was received in 14 rainy days during 1984-85 and in 1985-86, 192.6 mm in 13 rainy days. At harvest, observations were made on plant height, number of spikes per plant (1984-85 only), and number of capsules per plant besides seed yield.

### RESULTS AND DISCUSSION

Plant height was higher under the dose of applied N (table) in both seasons. Pooled analysis of two years data also confirmed this. Number of spikes per plant was maximum under 60 kg N treatment during 1984-85 and it was on par with 40 kg N/ha. During 1985-86 since the crop experienced severe moisture stress there was only one spike per plant. Number of capsules per spike was maximum under 40 kg N treatment during 1984-85 and under 60 kg N treatment during 1985-86. Two years mean of this paramete

1. Associate Professor    2 & 3 Assistant Professors  
Agricultural Research Station, TNAU, Kovilpatti-627 701.

Table : Effect of varying levels of N and P on plant characters and seed yield of Castor SA 2

	Plant height (cm)		No. of spikes per plant (1984-85)	No. of capsules per spikes		Seed yield (kg/ha)			
	1984-85	1985-86 Pooled		1984-85	1985-86 Pooled	1984-85	1985-86 Pooled		
N 0	113.9	103.3	1.7	22.2	30.9	26.5	750	590	670
N 20	136.0	106.3	1.9	23.3	31.8	27.5	821	616	719
N 40	148.6	114.7	2.1	24.7	34.9	29.8	914	652	783
N 60	158.0	121.2	2.4	22.0	36.8	29.3	1130	697	914
P 0	133.2	107.5	1.9	23.6	31.0	27.2	820	569	695
P 15	143.9	111.9	1.9	24.2	34.2	29.1	928	647	788
P 30	140.1	111.6	2.1	21.9	34.5	28.2	932	667	800
P 45	139.4	114.4	2.1	22.5	37.7	28.6	934	972	803
SE	5.5	0.34	0.13	0.75	0.18	0.9	17.1	21.4	31.2
CD	16.1	0.98	0.38	2.2	0.5	2.8	51.1	61.9	94.0

revealed that all those treatments which received N application were on par and significantly superior to control. Seed yield was the highest under 60 kg N application in the two years of study. In the second year 60 kg N was on par with 40 kg N. Pooled mean of two years yield data revealed the superiority of 60 kg N. Ayyadurai *et al* (1961), Mariakulandai and Morachan (1965) and Sarma (1985) observed significant yield increase in castor due to the addition of Nitrogen. Significant increase in the seed yield as observed in the present studies due to applied nitrogen could be attributed to the increased plant height ( $r=0.9^{**}$ ) number of spikes per plant and number of capsules per spike ( $r=0.9^{**}$ ). Positive significant correlation between capsule number (Ananthasayana and Reddy, 1981) and capsules per plant and spikes per plant (Venkateswara Rao *et al.* 1983) and seed yield have already been reported.

With regard to application of phosphorus plant height and number of capsules per spike were higher under all those treatments which received P fertilizer as compared to control during 1985-86 only. Data for 1984-85 and also the pooled mean for the two years revealed that P addition did not have significant influence on plant height, number spikes per plant and number of capsules per spike. Seed yield data revealed that maximum seed yield was under 15 kg treatment and addition of P higher than this did not result

in significant yield increases. Paida and Parmar (1980) could not observe yield increase due to P addition even though a favourable influence was there on plant height, length of spike and test weight. Non responsiveness in seed yield due to P application was observed by Jain (1970) also.

## REFERENCES

- ANANTHASAYANA, K. and M. V. REDDY. 1981. Correlations and path analysis of yield components in inbreds and hybrids of castor (*Ricinus communis* L.). The Andhra Agric. J. 28: 112-115.
- AYYADURAI, S. G., P. KRISHNAMOORTHY, K. NAVAKODI and P. SITARAMAN. 1961. A study of the cumulative effect of artificial fertilizers on the yield of castor. Indian Oilseeds J. 5: 161-168.
- JAIN, T. C., 1970. Effect of N, P and K on yields evapotranspiration and water use efficiency of castor. (*Ricinus communis* L.) in arid tract of western Rajasthan. Indian J. Agron. Vo. XV: 13-20.
- MARIAKULANDAI, A. C. and Y. B. MORACHAN. 1965. Results of manurial trials in Madras State in Oilseeds. Madras Agric. J. 52: 3-9.
- PAIDA, V. J. and K. T. PARMAR. 1980. A note on effect of different levels of nitrogen and phosphorus on yield and yield attributes of castor. GAUCH 1 (*Ricinus communis* L.). G. A. U. Res. J. 5: 48-51.
- SARMA, D. A. 1985. Effect of varieties and levels of nitrogen on the yield of castor. The Andhra Agric. J. 32 (2): 133-134.
- VENKATESWARA RAO, T., D. SUBRAMANIAM, N. SREE RAMA REDDY and B. RATHNAKAR. 1980. Studies on Association of characters and path analysis in Castor (*Ricinus communis* L.). The Andhra Agric. J. 30: 33-55.