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Short Communications

Influence of Different Levels of Nitrogen and Phosphorus on Yield and Nutrient Uptake by Castor (*Ricinus communis* L.)

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A field experiment was carried out at Main Oilseeds Research Station, Gujarat Agricultural University, Junagadh during *kharif* 1986-87 with five levels of nitrogen (0, 25, 50, 75 and 100 kg. N ha^{-1}) and four levels of phosphorus (0, 25, 50 and 75 kg P_2O_5 ha^{-1}) under rainfed conditions in randomized complete block design with four replications. The variety GCH-4 evolved recently at Main Oilseeds Research Station, Gujarat Agricultural University, Junagadh was sown on 30th July, 1986 at 90 x 60 cm spacing with 6 kg ha^{-1} seed rate and harvested according to maturity of different spikes. The soil was clayey in texture (74.96 clay) having pH 7.8, EC 0.51 mmhos cm^{-1}, organic carbon 0.63 % total nitrogen 1340 kg ha^{-1}, available P_2O_5 36.96 kg ha^{-1} and available K_2O 307.02 kg ha^{-1}. According to different treatment combinations, the full dose of phosphorus in the form of single super phosphate and half dose of nitrogen as urea were applied before sowing and remaining half the quantity of nitrogen was top-dressed in the form of urea after one and half month of sowing.

Perusal of data presented in Table 1 revealed that the 100-seed weight was significantly influenced by nitrogen levels and increased with each incremental level of nitrogen. Application of 100 kg N ha^{-1} recorded the highest test weight but remained at par with 75 and 50 kg N ha^{-1}. Higher uptake of nitrogen and phosphorus by seed under 50, 75 and 100 kg K ha^{-1} levels might have produced and converted more photo-synthate needed for seed development. The results corroborate the report of Paida (1976). Oil content of seed considerably decreased from 48.44 per cent under control to 47.86 per cent under 100 kg N ha^{-1}. Remarkably higher test weight and uptake of nitrogen by seed under higher levels of nitrogen may be responsible for lower oil content. Moreover, there is a marked competition for photosynthate between different metabolic sinks in oilseed crops, hence increasing the level of N nutrition may enhance the crude protein content but lower the oil content. Oil yield increased appreciably with each increment in level of nitrogen.

TABLE 1

Effect of nitrogen and phosphorus on quality and nutrient removal by castor.

Treatment	*100-seed weight (g)*	*Oil content (%)*	*Oill yield (q ha^{-1})*	*N uptake (kg/ha^{-1})*		*P uptake (kg/ha^{-1})*		*Seed yield (q ha^{-1})*	*Stalk yield (q ha^{-1})*
				Seed	*Stalk*	*Seed*	*Stalk*		
N-kg ha^{-1}									
0	26.48	48.44	6.46	39.08	22.68	7.45	2.94	13.92	15.94
25	26.88	48.41	6.65	39.81	22.78	7.56	2.95	13.73	15.52
50	27.71	48.24	7.15	41.88	24.02	7.80	2.97	14.81	16.34
75	27.96	48.11	7.20	42.10	24.07	7.87	2.97	14.96	16.59
100	28.19	47.96	7.19	43.00	24.91	7.93	2.98	14.99	16.77
C. D. at 5 %	0.80	0.23	0.43	2.46	1.24	0.22	0.02	0.87	0.28
P_2O_5 kg ha^{-1}									
0	27.27	48.09	6.76	39.90	23.31	7.67	2.95	14.06	15.59
25	27.46	48.24	6.87	40.78	23.50	7.72	2.96	14.23	15.72
50	27.50	48.26	6.95	41.70	23.67	7.74	2.97	14.39	16.56
75	27.57	48.35	7.14	41.92	23.81	7.76	2.97	14.77	16.58
C. D. at 5 %	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.01	N.S.	0.70

Application of 100 kg N ha^{-1} recorded the highest oil yield but was at par with 75 and 50 kg N ha^{-1}. A marked increase in seed yield under higher levels of nitrogen was directly responsible for higher oil yield. The findings are in accordance with those of Ignatev and Gubarev (1970) and Tokareva (1973).

An appreciable increase in nitrogen and phosphorus uptake by seed as well as stalk was observed due to 50, 75 and 100 kg N ha^{-1}, but the differences among themselves were not significant. The higher N and P removal by castor under higher levels of nitrogen was probably due to higher seed and stalk yields under these levels. In addition to these, N fertilization increases the cation exchange capacity of plant roots and thus makes them more efficient in absorbing nutrient ions.

Application of phosphorus did not show any remarkable influence on 100-seed weight, oil content and oil yield. It may be due to the fact that different levels of phosphorus failed to exert their significant influence on N and P uptake by seed. P application has not any remarkable effects on seed yield and oil content, hence ultimately led to non-significant differences in oil yield. The findings are in agreement with those of Paida (1976) and Patel (1985).

Different levels of phosphorus did not exert their significant effects on N uptake by seed and stalk as well as P uptake by seed. Non-significant differences in seed yield might have been accounted for such results. Castor roots have a great capacity to uptake the phosphorus from not easily soluble calcium phosphate. Further calcareousness and high clay content of experimental soil with medium status of available phosphorus might have been responsible for such types of results. However, phosphorus uptake by stalk was significantly higher under 50 and 75 kg P_2O_5 ha^{-1} levels which may be due to higher stalk yields under these levels.

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