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Short Communication

Performance of Castor (*Ricinus communis* L.) Variety GCH 4 at Varying Nitrogen and Phosphorus Levels under Irrigated Situation

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Castor (*Ricinus communis* L.) is getting popular in the transitional plains of the Luni river basin area of Pali, Jalor and Sirohi districts of Rajasthan, as traditional cotton crop is facing lot of problems. Besides, the net returns from irrigated castor crop (which remains in field up to the month of March) has been reported to be higher compared to cotton-wheat, cotton-mustard or cotton-barley crop sequences (Anon., 1999). The information on nitrogen and phosphorus requirement of castor in this region is meager. Therefore, to assess the requirement of nitrogen and phosphorus for castor variety GCH 4, extensively grown in the area under irrigated situation, the present studies were undertaken.

The field experiment was conducted during 1994-95 and 1995-96. The soil of the experimental site was sandy loam, having pH 7.8, low in organic carbon (0.25%) and nitrogen (155.1 kg ha^{-1}), medium in phosphorus (33.0 kg ha^{-1}) and high in potassium content (298.0 kg ha^{-1}).

The nine treatment combinations, comprising of 3 levels each of N (60, 80 and 100 kg ha^{-1}) and P_2O_5 (30, 40 and 50 kg ha^{-1}), were replicated thrice in randomized block design. The seeds of castor variety 'GCH 4' @ 8 kg ha^{-1} were sown by dibbling at 90 cm row-to-row and 60 cm plant-to-plant spacing in second fortnight of July in both the years. The net plot size was 7.2 x 5.0 m. Basal dose of 1/3 nitrogen and full phosphorus as per treatment was drilled in furrows at the time of sowing. The remaining nitrogen was top dressed at the time of first and third irrigations. The crop was given 7 irrigations at 20 day interval, starting from 55 days after sowing. Two hoeing-cum-weedings were done at 20 and 40 days after sowing to check weed growth. The crop received total rainfall of 515 and 573 mm during the years 1994-95 and 1995-96, respectively.

Data reveal that the highest seed yield of castor (3416 kg ha^{-1}) was recorded with the application of 100 kg N ha^{-1} (Table 1). However, the seed yield observed at 100 kg N ha^{-1} was at par with 80 kg N ha^{-1}. The main spike length and 100-seed weight exhibited similar trend. The spikes/plant and branches/plant increased significantly with N application upto 100 kg ha^{-1}. Application of 100 kg N ha^{-1} produced 8.3 branches and 11.3 spikes/plant, which were significantly higher over 60 kg N ha^{-1} by 108 and 71%, respectively. Corresponding

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Table 1. Seed yield, yield attributes and net return of castor variety GCH 4 as influenced by nitrogen and phosphorus levels under irrigated condition (Mean of 1994-95 and 1995-96)

Treatment	Plant height up to main spike (cm)	Branches plant^{-1}	Days to flow-ering	Main spike length (cm)	Spikes plant^{-1}	100-seed weight (g)	Seed yield (kg ha^{-1})	Net return (Rs. ha^{-1})	B:C ratio
Nitrogen level (kg ha^{-1})									
60	80	4.0	64	25.6	6.6	19.3	2135	10982	3.22
80	84	6.2	60	29.3	9.3	23.7	3074	19278	4.31
100	87	8.3	61	33.0	11.3	24.2	3416	22204	4.60
S.Em±	1.10	0.43	2.01	1.32	0.30	0.77	127		
CD (P=0.05)	3.29	1.29	NS	3.98	0.91	2.32	383		
Phosphorus level (kg ha^{-1})									
30	78	3.9	62	28.6	7.6	20.1	2599	15671	3.91
40	80	5.9	63	29.0	10.0	22.8	3017	18303	4.18
50	80	7.4	62	30.3	9.3	23.3	3011	18490	4.15
S.Em±	1.10	0.43	2.01	1.32	0.30	0.77	127		
CD (P=0.05)	NS	1.29	NS	NS	0.91	2.32	383		

increases over 80 kg N ha^{-1} were 55 and 41%. The days to flowering of castor were not affected by nitrogen application. Mathukia and Modhwadia (1993) also recorded maximum seed yield from GCH 4 castor with the application of 100 kg N ha^{-1}. The higher seed yield of castor at higher nitrogen levels could be attributed to cumulative effect of increased spike length, number of spikes/plant and 100-seed weight of castor. The correlation coefficient of main spike length (0.95), spikes/plant (0.89) and 100-seed weight (0.95) were found positive and significant with seed yield of castor. The net returns were maximum with 100 kg N ha^{-1} (Rs. 22,204 ha^{-1}), which were higher than 80 and 60 kg N ha^{-1} by Rs. 2,926 ha^{-1} and Rs. 11,222 ha^{-1}, respectively. These findings are in close agreement with that of Patel (1985).

Application of 40 kg P_2O_5 ha^{-1} produced maximum seed yield of 3017 kg ha^{-1}, which was significantly higher over 30 kg P_2O_5 ha^{-1}. The spikes/plant and 100-seed weight also improved significantly with phosphorus application upto 40 kg ha^{-1}. The branches/plant, however, responded significantly upto 50 kg P_2O_5 ha^{-1}. Application of 50 kg P_2O_5 ha^{-1} significantly improved the branches/plant over 40 and 30 kg P_2O_5 ha^{-1} by 25.4 and 89.7%, respectively. Significant improvement in these attributes with the application of phosphorus might be responsible for higher castor seed yield. The plant height, days to flowering and main spike length were not influenced significantly with phosphorus application. The net return received at 40 kg P_2O_5 ha^{-1} (Rs. 18,303 ha^{-1}) was higher by Rs. 2632 ha^{-1} over 30 kg P_2O_5 ha^{-1}. The highest

B:C ratio of 4.18 was also recorded with 40 kg P_2O_5 ha^{-1} application.

It is, therefore, concluded that application of 100 kg N and 40 kg P_2O_5 ha^{-1} is essential to achieve good yield and maximum net return from castor variety GCH 4 widely grown in Pali, Sirohi and Jalor districts of Rajasthan state.

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