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Influence of Irrigation and Phosphorus on Yield and Economics of Pigeonpea

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Pigeonpea [*Cajanus cajan* (L.) Mills] is generally grown under rainfed condition and without much fertilizer application. Poor yield of pigeonpea was observed due to moisture stress at reproductive stage and also low status of available phosphorus in soils of Region I of Narmada Command. Therefore, post monsoon irrigation and application of phosphorus in Region I of Narmada command assumes paramount importance. A field experiment was undertaken to study the effect of irrigation and phosphorus on yield of pigeonpea.

A field experiment was conducted in randomized block design with three replications during rainy season of 1991-92 to 1995-96 except 1992-93 and 1994-95 at Narmada Irrigation Research Farm, Khandha, Gujarat with pigeonpea variety BDN-2. The rainfall received during crop season was 1022, 978 and 687 mm in 1991-92, 1993-94 and 1995-96, respectively. The soil is clayey in texture with pH 7.2, low in total N (0.029 per cent), Olsen's P_2O_5 (11 kg/ha) and high in available K_2O (1179 kg/ha). The crop was sown from end of July to first week of August in the intra and inter row spacing of 90 and 30 cm, respectively. Sixteen treatments comprising of four levels of irrigation viz., no irrigation 0.5, 0.7 and 0.9 IW : CPE ratio and four levels of P_2O_5 i.e. 0, 25, 50 and 75 kg/ha were used. A uniform dose of 20 kg N/ha was applied as basal to all the plots. Irrigation each of 80 mm was imposed in respective IW : CPE ratios after the cessation of rains.

The effects of irrigation levels and phosphorus application on yield of pigeonpea are presented in Table 1. The application of irrigation either at 0.5, 0.7 or 0.9 IW : CPE ratio gave significantly higher yield over no irrigation in all the years as well as in pooled analysis. The effect of different IW : CPE ratio on yield was at par statistically. Hence, pigeonpea require to be irrigated at 0.5 IW : CPE ratio i.e. 3 irrigations after cessation of monsoon. The results are in agreement with the findings of Patel and Patel (1994).

The application of phosphorus gave significantly higher yield over no phosphorus but different levels of P_2O_5 were at par statistically during all the years and in pooled analysis (Table 1). The results corroborate the findings of Sarvaiya *et al.* (1993).

The Ecomonic analysis of treatments are presented in Table 2. It revealed that the application of irrigation at 0.7 IW : CPE ratio

TABLE 1

Effect of irrigation and phosphorus levels on seed yield of pigeonpea.

Treatments	*Yield, q/ha*				*No. of irrigation*	*Qty. of water applied mm*
	1991-92	*1993-94*	*1994-95*	*Pooled*		
IW : CPE ratio						
No irrigation (control)	15.24	11.34	13.50	13.36	—	—
0.5	19.73	12.95	16.58	16.42	3	240
0.7	18.90	14.49	19.57	17.66	4	320
0.9	19.16	13.13	19.96	17.42	5	400
S. Em. ±	0.44	0.31	0.10	0.73		
C. D. at 5%	1.27	0.90	0.30	2.52		
P_2O_5 levels (kg/ha)						
0	16.52	11.83	16.68	15.01		
25	18.22	13.25	17.10	16.19		
50	19.62	13.33	17.74	16.90		
75	18.66	13.49	17.91	16.69		
S. Em. ±	0.44	0.31	0.10	0.30		
C. D. at 5%	1.27	0.90	0.30	1.03		
C. V. %	8.3	8.3	6.1	6.8		

TABLE 2

Economics as influenced by different treatment of irrigation and phosphorus over control.

Treatment	*Mean yield Q/ha*	*No. of irrigation*	*Addl. yield over control (Q/ha)*	*Addl. income (Rs/ha)*	*Addl. cost (Rs/ha)*	*Net income (Rs/ha)*	*CBR*	*NCBR*
Irrigation levels								
No irrigation control	13.36	-	-	-	-	-	-	-
0.5 IW/CPE	16.42	3	3.06	5355	1080	4275	1 : 4.96	1 : 3.96
0.7 IW/CPE	17.65	4	4.29	7508	1440	6068	1 : 5.21	1 : 4.21
0.9 IW/CPE	17.42	5	4.06	7105	1800	5305	1 : 3.94	1 : 2.94

1.	2.	3.	4.	5.	6.	7.	8.	9.
P_2O_5 levels (kg/ha)								
0	15.01	-	-	-	-	-	-	-
25	16.19	-	1.18	2065	431	1634	1:4.79	1:3.79
50	16.90	-	1.89	3308	862	2446	1;3.84	1:2.84
75	16.69	-	1.68	2940	1293	1647	1:2.27	1:1.27

Selling price of pigeonpea Rs. 1750/Q
Price of P_2O_5 per kg Rs. 17.25
Labour cost for irrigation application Rs. 60/irrigation
Cost of irrigation water Rs. 300/irrigation.

CBR = Cost Benefit Ratio
NCBR = Net Cost Benefit Ratio

gave higher net return of Rs. 6068/ha. In case of phosphorus application, 25 kg P_2O_5/ha gave higher net cost benefit ratio i.e., 1 : 3.79. The results confirm the findings of Bhan and Khan (1979).

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REFERENCES

Bhan, Suraj; and Khan, S. A. 1979. Response of *kharif* crops to irrigation in light texture alluvium of Uttar Pradesh. *Indian J. Agron.*, 24 : 410-416.

Patel, J. R. and Patel, Z. G. 1994. Effect of irrigation, Rhizobium inoculation and nitrogen on yield, quality and economics of pigeonpea (*Cajanus cajan*). *Indian J. Agron.*, 39 : 659-661.

Sarvaiya, B. G.; Patel, M. P. and Patel, H. S. 1993a. Response of pigeonpea (*Cajanus cajan* L. Mills) to row spacing, nitrogen and phosphorus, *Indian J. Agron.*, 38 : 134-135.