

Effect of post-monsoon irrigation, *Rhizobium* inoculation and nitrogen on yield and yield attributes of pigeonpea (*Cajanus cajan*)

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Received: June 1993

ABSTRACT

A field experiment was conducted during 1989 and 1990 to study the effect of post-monsoon irrigation, *Rhizobium* inoculation and nitrogen on yield and yield attributes of 'BDN 2' pigeonpea [*Cajanus cajan* (L.) Millsp.] in Vertisol of south Gujarat. Irrigation treatments except control did not differ significantly for their effect on grain yield but gave significantly higher grain yield over no irrigation (control). Among the irrigated treatments, irrigation water : cumulative pan evaporation (IW : CPE) ratio of 0.25 showed its superiority to the others and recorded the higher grain yield of 17.39 q/ha. The seed treatment with *Rhizobium* did not exert its significant effect on seed yield, while the application of nitrogen @ 20 kg/ha gave significantly highest (18.32 q/ha) grain yield.

The productivity of pigeonpea [*Cajanus cajan* (L.) Millsp.] is low. Water and nutrient management are the most important inputs, which have great influence on the productivity of pigeonpea. Any strategy to make suitable adjustment in these 2 vital inputs will go a long way in enhancing the productivity of pigeonpea. Therefore the present experiment was planned on these aspects.

MATERIALS AND METHODS

A field experiment was conducted at the College Farm, Navasari, during the rainy seasons of 1989 and 1990 on a clayey soil (65% clay), containing 120 kg/ha available nitrogen, 31 kg P_2O_5 /ha and 346 K_2O /ha with pH 7.9. Treatments consisted of 4 schedules of irrigation (no irrigation, irrigation scheduled at 0.25, 0.50 and 0.75 IW : CPE ratio) as main plots and 2 inoculation treatments (no inoculation and *Rhizobium*

inoculation) and 3 levels of nitrogen (0, 10 and 20 kg/ha) as subplots, replicated 4 times in split-plot design. Pigeonpea 'BDN 2' was sown at 90 cm x 20 cm spacing on 5 and 7 July in 1989 and 1990 respectively. A uniform dose of 40 kg P_2O_5 /ha was applied basal to all plots. The rainfall received during 1989 and 1990 was 1,130 and 1,128 mm respectively. Irrigation schedules based on IW : CPE ratios of 0.25, 0.50 and 0.75 were imposed after cessation of the monsoon, which received 1, 2 and 4 irrigations each of 80 mm depth respectively.

RESULTS AND DISCUSSION

Irrigation schedules significantly influenced the grain yield, but the differences under irrigation treatments except the control were not remarkable during both the years. The pooled means revealed that irrigation IW : CPE (160 CPE) at ratio of 0.50 re-

Table 1. Yield and yield attributes of pigeonpea as influenced by different levels of irrigation, inoculation and nitrogen (pooled data of 2 years)

Treatment	Pods/ plant	Length of pod (cm)	Grains/ pod	100-seed weight (g)	Seed yield (q/ha)		
					1989	1990	Pooled
<i>Irrigation (CPE value)</i>							
No irrigation	158.94	4.15	3.23	10.58	10.72	13.04	11.68
0.25 IW : CPE*	227.39	4.16	3.26	10.87	17.08	17.71	17.39
0.50 IW : CPE*	223.59	4.25	3.29	10.96	16.45	18.69	17.57
0.75 IW : CPE*	243.07	4.33	3.29	11.31	15.96	19.16	17.56
CD (P = 0.05)	NS	0.09	NS	0.21	1.62	1.66	1.08
<i>Inoculation</i>							
No inoculation	207.16	4.20	3.23	10.90	14.87	16.94	15.91
<i>Rhizobium</i> inoculation	219.34	4.25	3.31	10.96	15.23	17.35	16.29
CD (P = 0.05)	10.14	NS	NS	NS	NS	NS	NS
<i>Nitrogen (kg/ha)</i>							
0	171.00	4.08	3.12	10.66	12.59	14.80	13.70
10	208.21	4.24	3.27	10.93	15.24	17.32	16.28
20	260.54	4.35	3.41	11.20	17.32	19.32	18.32
CD (P = 0.05)	12.42	0.04	0.06	0.09	0.88	0.65	0.54

*CPE 320, 160 and 107 mm for 0.25, 0.50 and 0.75 IW CPE respectively

corded the maximum grain yield (17.57 q/ha); however, it was at par with rest of the IW : CPE ratios (Table 1). As the minimum number of irrigations was applied at 0.25 IW : CPE ratio, it was recommended for scheduling irrigation to pigeonpea during the rainy season. The increase in seed yield under irrigated treatments over no irrigation was mainly because of improvement in pods/plant, length of pod and 100-seed weight. These findings are in accordance with the findings of those reported by Tiwari *et al.* (1988) and Lal (1989).

Seeds treated with *Rhizobium* did not increase the grain yield up to the level of significance in both the years as well as in pooled data. This finding is in line with that reported by Khurana *et al.* (1981) and

Subbian and Ramiah (1982).

The seed yield increased gradually with increase in levels of nitrogen during both the years. Significantly highest seed yield of 18.32 q/ha was recorded with 20 kg N/ha, which was 12.5 and 33.7% higher over 10 kg N/ha and the control respectively on pooled basis. This increase was owing to the cumulative effects of improvement in yield attributes such as pods/plant, length of pod, seeds/pod and 100-seed weight of pigeonpea.

Thus maximum yield in 'BDN 2' pigeonpea was accrued by irrigating the crop at IW : CPE ratio of 0.25 after cessation of the monsoon and fertilizing with 20 kg N/ha with or without *Rhizobium* treatment.

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