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Response of Greengram to Irrigation and Phosphorus*

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Pusa Baisakhi greengram was grown in the Periyar and Vaigai Canal Command area. Irrigating the crop at 0.80 IW/CPE ratio had perceptible effect of growth characters like plant height, number of branches per plant and leaf area index and on yield attributes viz., number of pods per plant and 100 grain weight which, in turn, gave higher grain yield. Applied phosphorus has pronounced effect on plant height, leaf area index, number of pods per plant and 100 grain weight. Application of 50 kg P_2O_5/ha was beneficial.

Water management work on pulses is meagre since the pulses are grown as rainfed crops or as mixed crops with cereals and millets. Greengram can come up well under a wide range of environments it exhibit's its full potential under efficient water management and fertilization, especially with phosphorus.

MATERIAL AND METHODS

A field experiment was conducted at the Agricultural College and Research Institute, Madurai in June—August, 1978. The soil type was of sandy loam with a pH of 7.1, low in available nitrogen (280 kg/ha) and phosphorus (10.2 kg/ha) and high in available potassium (390 kg/ha). The soil bulk density and particle density were 1.46 and 2.52 while the percentage porosity, maximum water holding capacity, field capacity and wilting point were 48.3, 41.7, 20.5 and 9.8, respectively. The design was split plot with four irrigation regimes (0.4, 0.6, 0.8, & 1.0 IW/CPE ratios) in the main plots and five levels of P (0, 25, 50, 75 and 100 kg/ha) in the sub-plots. Plant height and total number of branches per plant were recroded at pre-bloom (30th day), bloom (45 day) and at harvest (68 day). Leaf area index was computed at blooming (45th day).

RESULTS AND DISCUSSION

The height of the plant was the maximum when it was irrigated at 0.80 IW/CPE ratio.

Irrigation regimes exerted considerable influence on branching and leaf area index, IW/CPE ratio of 0.8 recording higher values (Table I). Scheduling irrigation at 0.8 IW/CPE ratio produced four times the number

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TABLE I Effect of irrigation regimes on growth characters and yield attributes of greengram

Irrigation regimes (IW/CPE ratio)	Plant height (cm)	Number of primary branches per plant	Leaf area Index	Number of pods per plant	No. of grain per pod	Pod length (cm)	100 grain weight (g)	No. of irrigations	Quantity of water applied (cm)
0.4	31.12	1.45	1.18	7.9	11.3	8.1	3.0	2	17.5
0.6	32.47	2.63	1.11	11.1	11.7	8.6	3.1	3	23.1
0.8	58.66	2.36	1.41	28.5	11.9	8.5	4.0	5	34.5
1.0	56.64	2.51	1.54	25.6	12.0	8.2	4.1	6	40.4
SED	0.36	0.08	0.06	1.0	0.3	0.3	0.03		
CD (P=0.05)	0.87	0.19	0.14	2.5	NS	NS	0.08		

TABLE II Effect of P levels on growth characters and yield attributes of greengram

Phosphorus levels (kg/ha)	Plant height (cm)	Number of branches per plant	Leaf area Index	No. of pods per plant	No. of grain per pod	Pod length (cm)	100 grain weight (g)
0	42.44	2.06	1.15	11.5	12.0	8.5	3.3
25	43.81	2.07	2.25	17.0	11.4	8.3	3.4
50	45.61	1.99	1.41	24.3	11.6	8.2	3.6
75	45.74	2.05	1.32	22.7	12.0	8.3	3.7
100	46.29	2.07	1.30	21.4	11.6	8.3	3.8
SED	0.36	0.07	0.08	0.3	0.3	0.3	0.04
CD (P 0.05)	0.73	NS	0.08	0.8	NS	NS	0.07

of pods that obtained at 0.4 ratio. Similarly the grains were heavier by 34 per cent at 0.8 ratio than at 0.4 ratio.

Number of pods per plant was also more at 0.8 ratio. Verma and Rao (1975) and Gill and Cheema (1976) reported higher number of pods per

TABLE III Effect of irrigation and P levels on grain yield of greengram

P levels (kg/ha)	IW/CPE Ratio 0.4	0.5	0.8	1.0	Mean	SED	CD
0	414	583	913	868	694		
25	533	714	1074	993	823		
50	575	535	1397	1178	971	26	43
75	586	786	1222	1135	932		
100	557	742	1129	1060	872		
Mean	533	712	1147	1047	--		
SED		21					
CD		85					

SED for I at P : 46 SED for P at I : 42

CD : 98 CD : 86

plant and 100 grain weight with irrigation at 40 per cent soil moisture availability which was about equal to 0.8 IW/CPE ratio in sandy loam soil.

Phosphorus application did not exert and significant influence on branching. Tallest plants were observed due to addition of 100 kg P_2O_5/ha. Similar effect was observed in LAI also (Table II).

Number of pods per plant was maximum at 50 kg P_2O_5/ha and the increase was 110 per cent over that of no phosphorus application. Number of grains per pod and length were unaffected by applied P. These two yield attributes of greengram were unaffected by irrigationlevels as well. Increasing the level of P application increased the 100 grain weight.

Higher grain yield was observed with increased moisture availability upto 0.8 IW/CPE ratio, beyond which the yield tended to decrease. The highest grain yield of 1147 kg/ha was obtained with irrigation at 0.8 IW/CPE (Table III).

Increase in plant growth and yield characters, particularly of number of pods per plant observed at 0.8 IW/CPE

ratio, may be the cause for the high yield in this moisture regime. Maximum grain yield of greengram was recorded by Verma and Rao (1975) at 50 per cent available moisture.

Applied P influenced the grain yield of 971 kg/ha was recorded at 50 kg P_2O_5/ha. Paroda *et al.* (1979) reported that higher grain yield of greengram was obtained with the application of 40 to 50 kg P_2O_5/ha. Interaction effect was found to be significant. The maximum yield of 1397 kg/ha was obtained with 50 kg P_2O_5 and irrigating the crop at 0.8 IW/CPE ratio.

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