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RESPONSE OF RAJMASH (*Phaseolus vulgaris* L.) TO IRRIGATION AND FERTILIZERS

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ABSTRACT

A field experiment was conducted at Agricultural Research Farm of S.D.J. (P.G.) College, Chandeshwar, Azamgarh during Rabi season of 2010-11 and 2011-12 on a silty loam soil. Results revealed that sum treatments recorded higher value of growth, yield attributes and seed yield as compared to other treatments. Plant growth, yield attributes and seed yield imporved with the increase in frequency of irrigation being highest with irrigation at 75 mm. C.P.E. Crop showed favourable response to applied N 100 Kg. and and P 60 Kg. per hec. The economics scheduling of irrigation at 1.2 IW/CPE ratio along with 100 kg. N/ha and 60 Kg. P_2O_5/ha. was the best for achieving higher yield under eastern U.P. conditions.

KEYWORDS : Rajmash, Irrigatio, Fertilizer

French bean (*Phaseolus vulgaris* L.) is traditionally a crop of temperate zones in India. In the recent past, breeders have evolved varities which showed great promise under plain conditions. However, optimum requirement of inputs like irrigation, nitrogen and phosphatic fertilizer need to be worked out in order to exploit higher yield potential of the crop. In view of the above, efforts have been made to find out the optimum need of irrigation, nitrogen and phosphatic fertilizers for freanchbean under Eastern U.P. conditions.

MATERIALS AND METHODS

An experiment was conducted at Agricultural Farm of S.D.J. (P.G.) College, Chandeshwar, Azamgarh during rabi seasons of 2010-11 and 2011-12 The soil was silty loam containing 0.40% organic carbon, 130.87 Kg. available N/ha. 18.85 Kg. available P/ha. and 258.42 available K/ha. with pH 7.4. The field capacity wilting point bulk density values were 25.08%, 10.87% and 1.43g/cc, respectively. The treatment consisted 3 irrigation, 3 levels of nitrogen and 3 levels of P_2O_5 were laid out in Split Plot Design with 4 replications.

The crop was shown in rows 30 cm. apart in first fortnight of November in both the seasons. Nitrogen and phosphorus was applies as per treatment while application was applies 40 kg/ha as basal. The depth of each irrigation was constant at 60 mm. The number of irrigation were 3,4 and 5 in 2001-02 and 3, 3 and 4 in 2002-03 when scheduled at 75, 60 and 50 mm CPE.

RESULTS AND DISCUSSION

Moisture Regimes

In general growth and yield attributes improved with the increasing supply of water to crop (Table,1) Plant height, pods/plant, seeds/plant and seed yield markedly increased with liberal supply of water (1.2 IW/CPE) might have contributed towards higher grain yield. The water use efficiency was, however, higher at lower frequency of irrigation (0.8 IW/CPE). The lower WH with liberal water supply (1.2 IW/CPE) was due to lower specific heat and excessive evaporative and leaching losses (Table,2) (Dobariya et al. ,1985).

Nitrogen Fertilization

Nitrogen levels recorded significant differences in growth, yield attributes and seed yield in both the years. The data presented in (Table,1) clearly indicate that nitrogen level 100 kg/ha was more effective in enhancing growth and yield of the crop as compared to remaining levels. The lowest seed yield was recorded under no nitrogen application (Ahlavat and Sharma, 1989 ; Singh 1987).

Phosphate Fertilization

Phosphorus application improved growth and yield of the crop significantly in both the seasons (Table,1). Out of three levels of phosphorus, application of 60 Kg. P_2O_5/ha was found to be highly effective in increasing growth yield attributes and ultimately seed yield in both the years. The lowest seed yield was recorded under control (0 Kg. P_2O_5/ha). (Ahlavat and Sharma, 1989 ; Singh 1987).

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Table 1 : Growth and yield attributes and seed yield of Frenchbean as affected by moisture regimes, Nitrogen and Phosphorus application

Factors	Plant height		Pods/Plant		Seed/Pod		1000 Seed weight		Seed yield (q/ha.)	
	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11	2011-12
Moisture regime (IW/CPE ratio)										
0.8	34.35	29.58	8.14	7.57	3.07	3.00	348.15	345.05	12.02	11.47
1.0	36.92	35.98	10.03	9.22	3.88	3.67	373.26	369.81	14.36	13.59
1.2	39.40	40.57	11.85	10.99	4.21	4.14	379.58	374.46	16.03	15.20
C.D. at 5%	2.73	1.59	0.62	0.34	0.34	0.17	24.91	15.57	1.03	0.73
Nitrogen level (Kg/ha)										
0	25.82	23.61	6.03	5.38	2.78	2.63	280.05	276.10	6.27	5.75
50	38.94	37.50	11.22	10.63	3.98	3.88	348.02	380.44	15.84	15.13
100	45.91	45.02	12.77	11.77	4.40	4.30	436.92	435.78	20.30	19.38
C.D. at 5%	1.21	1.18	0.45	0.25	0.16	0.16	11.29	14.39	0.56	0.53
Phosphorus level (Kg/ha)										
0	31.20	29.28	9.05	8.28	3.31	3.11	348.44	345.16	12.01	11.48
30	38.40	36.33	10.18	9.41	3.80	3.70	362.84	359.87	13.97	13.19
60	41.07	40.52	10.79	10.09	4.05	4.00	389.71	387.29	16.43	15.59
C.D. at 5%	1.21	1.18	0.45	0.25	0.16	0.16	11.29	14.39	0.56	0.53

Table 2 : Consumptive use and Water use efficiency as affected by moisture regimes, Nitrogen and Phosphate application

Factors	Consumptive use		Water use efficiency (Kg ha^{-1} cm)	
	2010-11	2011-12	2010-11	2010-11
Moisture regime (IW/CPE ratio)				
0.8	15.56	15.97	73.73	64.86
1.0	19.40	20.88	71.01	62.06
1.2	25.97	25.05	59.13	50.13
Nitrogen level (Kg/ha^{-1})				
0	17.65	18.02	34.54	25.54
50	20.36	20.36	78.28	69.28
100	22.92	23.31	91.05	82.33
Phosphorus level (Kg/ha^{-1})				
0	19.45	19.83	62.14	53.21
30	20.34	20.69	66.64	57.65
60	21.13	21.37	75.12	66.23

Economics

The highest benefit cost ratio (3.34 and 2.91) was receive when the Rajmash was irrigated at moisture regime of 1.2 IW/CPI ratio and fertilized with 100 Kg. N and 60 Kg. P_2O_5/ha during both the years of experiment.

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