

Effect of genotypes and levels of fertilizer on seed yield and economics of french bean (*Phaseolus vulgaris* L.)

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ABSTRACT

A field experiment was carried out during *Rabi* season of 2005-06 at Department of Agronomy farm, Marathwada Agricultural University, Parbhani to investigate the Effect of genotypes and levels of fertilizer on seed yield and economics of french bean (*Phaseolus vulgaris* L.). The experiment was laid out in Factorial Randomized Block Design with three replications. Each replication consisted of twelve treatment combinations of four varieties *i.e.* Contender, Waghya, HPR-35, Varun and three fertility levels 90:45:45 NPK kg. ha⁻¹, 120:60:60 NPK kg. ha⁻¹, 150:75:75NPK kg. ha⁻¹. Variety V₃-HPR 35 recorded significantly higher seed and straw yield over rest of the varieties. It also recorded highest values of gross and net monetary returns as well as Benefit: Cost ratio. Application of 120:60:60 NPK kg. ha⁻¹ was at par with 150:75:75 NPK kg. ha⁻¹ and recorded significantly higher seed yield over application of 90:45:45 NPK kg. ha⁻¹. Highest values of gross monetary returns were recorded by application of 150:75:75 NPK kg. ha⁻¹. However, application of 120:60:60 NPK kg. ha⁻¹ recorded higher net monetary returns and Benefit: Cost ratio compared to application of 150:75:75 NPK kg. ha⁻¹ and 90:45:45 NPK kg. ha⁻¹.

Key words : French bean, Economics, Grain yield and Fertility level

INTRODUCTION

The ancestor of modern french bean were originated in south and central America. The green pods are mildly diuretic and contain a substance that reduces the blood sugar level. The dried mature pod is used in the treatment of diabetes. Though it is leguminous and short durational crop, it is unable to fix atmospheric nitrogen so nitrogen demand of this crop is much higher. The application of nitrogen induces the flower bud formation and ultimately the pod and finally yield. To increase the per hectare production of this crop, we can go for growing high yielding varieties and adopting intensive cultivation practices like use of fertilizers etc. Workers in India and abroad French bean has found positive response to improved cultivars, major and minor plant nutrients, sowing time, irrigation and rhizobium culture in number of field trials and pot culture experiments. Today, it is the need of the hour to make all possible efforts to utilize various sources for increasing nutrient levels in plant or soil in order to maintain the soil fertility and increase the production of this crop. Nitrogen, phosphorus, and potassium are major essential elements which are generally required in large quantities for growth and higher yields of this crop. Most of the research workers had concentrated their work on phosphorus and potash application. The positive response of nitrogen in combination with potash and phosphorus were reported by Lugo Lopez *et al.*, 1977. Particularly in

Marathwada region identification of suitable varieties and optimum fertilizer dose is highly essential. The research work on nutrition and varietal aspects is therefore undertaken in consequently.

MATERIALS AND METHODS

The present investigation was carried out at Department of Agronomy farm, Marathwada Agricultural University, Parbhani during *Rabi* season of 2005-06. The topography of experimental plot was fairly leveled. The soil was about 100 cm deep and clayey loam in texture and moderately fertile being low in organic carbon (0.56 %), high in phosphorus (26.19 kg. ha⁻¹) and very high in potassium (391.12 kg. ha⁻¹). The experiment was laid out in Factorial Randomized Block Design with three replications. Each replication was consisted of twelve treatment combinations of four varieties (Contendor, Waghya, HPR 35 and Varun) and four fertility levels (90:45:45, 120:60:60 and 150:75:75 NPK kg. ha⁻¹). The complete dose of Phosphorus and Potassium along with half dose of Nitrogen per treatment were applied 6 to 10 cm deep in line to side of crop row through fertilizer grade 10:26:26 and urea, remaining half dose of Nitrogen was applied 30 days after sowing through urea only. The sowing of crop was done on 21/11/2005 by keeping 45 cm spacing between rows and 10 cm between plants. All statistical analysis was performed using MAU, STAT

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statistical package.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been presented under following heads:

Effect of varieties :

All varieties in present investigation recorded significant response for all yield and yield contributing characters (Table 1). Variety HPR 35 found significantly superior over rest of the varieties (Varun, Waghya and Contendor) with respect to seed yield per plant, 100 seed weight (g), straw yield (kg.ha⁻¹) and seed yield (kg.ha⁻¹). Variety Varun recorded more number of pods per plant and was found at par with variety HPR 35, while variety Contender was found significantly superior over rest of all varieties for number of seeds per pod. Such Varietal differences were observed due to genetic makeup of the varieties and such differences in french bean varieties were also observed by earlier research workers (Ali, 1989a and Ahlawat, 1996).

Gross monetary returns, net monetary returns and B: C ratios were markedly affected by various varieties. The highest gross monetary returns (Rs.30063), net monetary returns (Rs.17351) and B: C ratio (2.36) was recorded by variety HPR 35 with an investment of

Rs.12712; it might be due to the highest values of yield and yield attributing characters of variety HPR 35. However, there was no marked difference between variety Contender and Waghya. Variety Varun was found second high yielding variety fetching net monetary returns (Rs.17, 351) and B: C ratio.

Effect of fertility levels :

Application of fertility level 150:75:75 NPK kg.ha⁻¹ to French bean significantly increased seed yield per plant. Fertility level 120:60:60 kg.ha⁻¹ was found at par with 150:75:75 NPK kg.ha⁻¹ with respect number of pods per plant, 100 seed weight (g) and seed yield (kg.ha⁻¹), these reports are on the line to those Ahlawat (1996) and Singh and Singh (2000).

Highest values of total returns of seeds (Rs.23420) and gross monetary returns (Rs.23785) were recorded at application of fertilizer level 150:75:75 NPK kg.ha⁻¹ while application of 120:60:60 NPK kg.ha⁻¹ to french bean recorded highest values of net monetary returns (Rs.10687) and B: C ratio (1.84) with an investment of (Rs.13450).It might be due to low investment on fertilizers as compared to fertilizer level 150:75:75 NPK kg.ha⁻¹.

Effect of Interaction :

The interaction effect of Variety x Fertility levels was found not significant at all growth and yield

Table 1 : Growth and yield and yield characters and available N, P and K in soil as influenced by different varieties of french bean and fertility levels

Treatments	Plant height (cm)	No. of Branches	Pod dry weight (g)	No. of pods/plant	No. of seeds/pod	Seed yield/plant (g)	100 seed wt. (g)	Available N (Kg/ha)	Available P (Kg/ha)	Available K (Kg/ha)
Varieties (V)										
V ₁ -Contender	20.83	3.57	9.38	6.45	5.33	6.62	27.66	218.27	33.77	460.74
V ₂ - Waghya	23.26	3.45	9.64	6.76	4.1	5.62	23.44	229.93	29.94	441.36
V ₃ - HPR 35	27.2	5.3	13.89	8.97	3.87	7.97	32.66	209.25	23.74	410.44
V ₄ - Varun	21.16	4.9	13.32	9.42	4.18	6.75	26.88	209.26	25.54	415.90
S.E. ±	0.3	0.03	0.32	0.32	0.14	0.26	0.923	2.79	0.57	6.16
C.D. (P=0.05)	0.88	0.09	0.94	0.93	0.41	0.77	1.24	8.18	1.69	18.04
Fertility levels (NPK kg/ha) (F)										
F ₁ - 90:45:45	22.1	3.8	10.99	7.17	4.34	5.91	26.41	203.24	23.61	421.25
F ₂ - 120:60:60	23.35	4.45	11.63	8.18	4.38	6.8	28.00	217.18	28.64	432.27
F ₃ - 150:75:75	23.92	4.67	12.05	8.35	4.39	7.5	28.58	229.62	32.49	442.80
SE ±	0.26	0.02	0.28	0.27	0.12	0.23	0.366	2.42	0.50	5.33
C.D. (P=0.05)	0.76	0.08	0.82	0.81	N.S	0.67	1.24	7.09	1.46	15.62
Interaction (VxF)										
SE ±	0.52	0.05	0.56	0.59	0.26	0.46	0.733	4.84	1.00	10.67
C.D. (P=0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	NS	NS	NS
G.M.	23.12	4.3	11.56	7.9	4.37	6.74	27.66	216.68	28.25	432.11

NS = Non significant

Table 2 : Growth and yield and yield characters and available N, P and K in soil as influenced by different varieties of French bean and fertility levels

Treatments	Seed yield (kg/ ha)	Straw yield (kg/ ha)	Nutrient uptake (kg/ha)			Protein Percentage	Protein yield (kg/ha)
			Nitrogen	Phosphorus	Potash		
Varieties (V)							
V ₁ -Contender	925	1269	37.82	5.98	35.20	25.50	235.87
V ₂ - Waghya	718	846	29.92	4.52	26.36	25.68	184.38
V ₃ - HPR 35	1480	1852	62.16	10.12	57.74	26.18	387.46
V ₄ - Varun	1335	1647	54.18	9.03	51.50	25.31	337.88
S.E. ±	8.024	21.63	0.20	0.09	0.33	--	--
C.D. (P=0.05)	23.5	63.36	0.60	0.28	0.99	--	--
Fertility levels (NPK kg/ha) (F)							
F ₁ - 90:45:45	1021	1385	40.85	6.60	37.75	24.93	254.53
F ₂ - 120:60:60	1152	1438	47.40	7.69	44.14	26.43	304.47
F ₃ - 150:75:75	1171	1463	49.81	7.94	46.21	25.68	300.71
S.E. ±	6.949	18.74	0.18	0.08	0.29	--	--
C.D. (P=0.05)	20.35	54.87	0.52	0.24	0.86	--	--
Interaction (VxF)							
S.E. ±	13.9	37.48	0.36	0.16	0.58	--	--
C.D. (P=0.05)	N.S	N.S	NS	NS	NS	--	--
G.M.	1078	1392	46.02	7.41	42.70	25.50	286.57

N.S.-Non significant

contributing characters.

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