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Response of soil and foliar applications of biozyme in french bean under dry temperate high hill conditions of Himachal Pradesh

M. C. Rana, S. S. Rana, G. D. Sharma and R. S. Rana
Department of Agronomy
CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur – 176 062.

Abstract

Soil application and foliar sprays of Biozyme, a commercial product biologically derived from Norwegian seaweed (*Ascophyllum nodosum*) were studied on French bean cv 'Contender'. The results revealed that imposition of Biozyme treatments brought about significant effect on yield and yield contributing characters of French bean. Increase in Biozyme levels through soil application increased the number of pods per plant and number of grains per pod which further resulted in increased seed and straw yields over control. Application of Biozyme 40 kg/ha increased the seed yield to the tune of 7.6 per cent over control, thereby resulting in more net returns of Rs. 8,283 over no soil application of Biozyme. Among the foliar application of Biozyme, the spraying schedule having two sprays *viz.* one each at one month after sowing and at pre flowering stage being statistically similar to three sprays schedule *viz.* one each at one month after sowing followed by at early flowering stage followed by at early grain filling stage resulted in significantly higher number of pods per plant and seed per pod thereby resulting in higher seed and straw yields over other foliar spray treatments. The three sprays schedule increased the seed yield by 19.9 per cent over control thus resulting in more net returns of Rs. 19,848 over no foliar application of Biozyme.

Keywords: French bean, seaweed, biozyme, hormone, nutrients.

Introduction

French bean (*Phaseolus vulgaris* L.) is an important vegetable crop grown for its succulent pods rich in protein and minerals. Dry temperate high hills conditions of the state offer an opportunity to the farmers to undertake the seed production of this crop for fetching lucrative profits. Environmental conditions prevailing in high lands of Lahaul valley of Himachal Pradesh are favourable for the production of disease free seed besides higher yields. If this potential crop is grown organically, its marketability in national/international market can increase due to improvement in quality aspects. In the recent years plant growth promoting substances have come into use in agriculture in a big way (Ocertli, 1987). In this context, Biozyme (WOKOZIM) is an organic store house of naturally occurring nutrients derived from seaweed (*Ascophyllum nodosum*), traditionally known for its rich possession of vital nutritional elements. Keeping above considerations in view, a field investigation was undertaken to study the effect of biozyme through soil and foliar applications on production and productivity of French bean.

Material and Methods

A field experiment comprising of fifteen treatment combinations of three soil applications (0, 20 & 40 kg/ha) and five foliar applications [control, vegetative stage (V, 30 days after sowing, DAS) + pre flowering stage (F), 30 DAS + early grain filling stage (G), pre flowering stage + early grain filling stage, 30 days after sowing + pre flowering stage + early grain filling stage] @ 500 ml/ha were evaluated in Randomized Block Design (Factorial) with three replications during summer 2000 and 2001 at the research farm of Highland Agricultural Research and Extension Centre, Kukumseri (2772 m above msl) of CSK HPKV, Palampur representing dry temperate high hills zone of Himachal Pradesh. Soil application

and foliar sprays of biozyme as per the treatments were made through commercial formulations 'Biozyme granules' and 'Biozyme crop+', respectively. The soil of the experimental field was sandy loam in texture. The crop was fertilized with 40 kg N, 60 kg P_2O_5 and 30 kg K_2O as recommended dose at the time of sowing. The initial soil contained 0.70% organic carbon and available N, P, K were 250, 34 and 211 kg/ha, respectively. French bean variety 'Contender' was sown on June 8 and May 30 during summer seasons of 2000 and 2001, respectively. The crop was raised with assured irrigation at weekly interval with sprinkler irrigation system. Yields were harvested from net plot. Economics of the treatments was computed based upon the prevalent market prices.

Results and Discussion

The results revealed that soil and foliar application of biozyme did not influence plant population of French bean. Plant height, number of pods/plant and number of seeds/pod were affected significantly both by soil and foliar application of biozyme. Each increment of 20 kg biozyme applied through soil application produced significantly taller plants, more pods/plant and higher number of seeds/pod. The tallest plants with higher number of pods/plant and number of seeds/pod were obtained at the highest dose of 40 kg/ha. Foliar application of biozyme proved significantly better than no application of biozyme (control). Plant height and number of seeds/pod did not increase significantly with increase in number of foliar applications at different stages of crop. Number of pods per plant was influenced significantly with the frequency of foliar application of biozyme at different stages of the crop. Foliar application at one month after sowing followed by pre-flowering and at grain filling stages produced significantly higher number of pods/plant compared to the other schedule of foliar application (Table 1).

The results further revealed that imposition of Biozyme treatments brought about significant effect on yield and yield contributing characters of French bean. Increase in Biozyme levels through soil application increased the number of pods per plant and number of grains per pod which further resulted in significant increase in yield of seed and straw over control. Application of Biozyme @ 40 kg/ha increased the seed yield to the tune of 7.8 per cent over control, thereby resulting in more net return of Rs.8,283 over no soil application of Biozyme. Among the foliar applications of Biozyme, the spraying schedule having two sprays *viz.* one each at one month after sowing and at pre flowering stage being statistically similar to three sprays schedule *viz.* one each at one month after sowing followed by at early flowering stage followed by at early grain filling stage resulted in significantly higher seed and straw yields over other foliar spray treatments. The three sprays schedule increased the seed yield by 19.9 per cent over control thus resulting in more net returns of Rs. 19,848 over no foliar application of Biozyme.

This is due to the plant hormonal effect of biozyme imparted on French bean. Quite a large number of studies made on the commercial preparation of plant hormones like Vipul (triacontanol) & cycocel have discussed at length the hormonal effect on plant growth (Gabali *et al.*, 1986, Ries & Hootz, 1983). Kadam *et. al.* (1988) studied the hormonal effect of Vipul spray on spinach and reported that triacontanol spray enhanced the activities of peroxidase, polyphenol oxidase and catalase enzymes and increased the levels of soluble and total proteins in spinach. It is quite likely that these preparations trigger the hormones of the plant and enhance plant growth. In beans also, cytokinin-like activity and enhanced leaf chlorophyll levels owing to the the application of seaweed extract have been shown (Stirk and Staden 1996; Blunden *et al.*, 1996).

Table 1. Effect of biozyme application on growth, yield and economics of french bean (Pooled data)

Treatment	Plant population (000/ha)	Plant height (cm)	Number of pods/ plant	Number of seeds / pod	Seed Yield (q/ha)	Straw Yield (q/ha)	Net Returns (Rs/ha)	Benefit Cost ratio
Soil Application (kg/ha)								
0	275.3	44.2	11.2	5.9	26.4	30.9	95574	6.6
20	276.1	48.5	11.8	6.3	27.1	32.1	98709	6.7
40	275.8	53.0	12.7	6.8	28.4	33.4	103857	7.0
CD (P=0.05)	NS	1.2	0.7	0.3	1.3	1.3	-	-
Foliar Application (500 ml/ha)								
Control	273.6	46.4	10.4	5.8	24.6	29.4	88272	6.1
V+F	275.5	48.6	12.5	6.6	28.5	33.1	104177	7.1
V+G	276.4	48.7	11.7	6.4	27.5	32.3	100189	6.8
F+G	275.0	49.3	11.4	5.9	26.5	31.5	96142	6.5
V+F+G	278.1	49.7	13.5	6.9	29.5	34.4	108120	7.3
CD (P=0.05)	NS	1.6	0.9	0.4	1.7	1.6	-	-

V, Vegetative stage (30 DAS); F, Pre flowering stage; G, Grain filling stage

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