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Short Note

Influence of phosphorus and seed soaking on productivity of French bean under Lahaul valley conditions of Himachal Pradesh

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In Lahaul valley of Himachal Pradesh, seed production of French bean (*Phaseolus vulgaris* L.) is a viable venture in summer fetching premium prices. Being a leguminous crop, this crop responds to higher levels of phosphorus (Jasrotia and Sharma, 1998). Seed soaking and coating with nutrient solutions especially P are advocated to increase the yields (Teixeira *et al.*, 1999). These practices not only help in supplying P and reducing the overall requirement of P but are considered economical compared to solid fertilizers. The information on this aspect under Lahaul valley conditions is lacking. Therefore, seed soaking and coating with graded doses of P was evaluated.

A field experiment was conducted during summer seasons of 2001 and 2002 at the research farm of Highland Agricultural Research and Extension Centre, Kukumseri (32°44′15″ N latitude, 76°41′23″ E longitude and 2772 m altitude). The soil of experimental field was sandy loam in texture, rich in organic matter (2.4%) with pH 6.8. The soil had available N 256 kg/ha, available P 19.9 kg/ha and available K 237 kg/ha. The mean monthly temperature ranged between 20.9 to 24.3°C and 16.8 to 25.0°C in 2001 and 2002, respectively. During its life cycle, crop received 198 and 283 mm rainfall during 2001 and 2002, respectively. French bean variety 'Contender' was sown by the second week of June and harvested by the second fortnight of September each year. Crop was sown at 35 cm row spacing using 80 kg seed/ha. Twelve treatment combinations comprising three seed soakings (wet seeding, SSP and dry seeding) and four phosphorus levels (0, 30, 60 and 90 kg P_2O_5) were tested in randomized block design with three replications (Table 1).

Table 1. Effect of treatments on yield attributes, yield and economics of French bean

Treatments	Plant population (000'/ha)	Plant height (cm)	Pods/ plant	Seeds/ pod	Seed yield (kg/ha)	Straw yield (kg/ha)	Net return (Rs/ha)	B:C ratio
Seed soaking and coating								
Wet	270.2	47.9	12.1	4.6	2382	2753	123699	5.63
SSP	271.1	48.8	12.9	4.8	2524	2835	132295	6.02
Dry	269.9	47.5	11.8	4.5	2317	2693	119774	5.45
SE (m) ±	1.8	0.3	0.2	0.1	28.9	26.3	1759	5.7
LSD (P=0.05)	NS	1.0	0.6	0.3	86.9	80	5278	0.17
P_2O_5 levels (kg/ha)								
90	270.8	49.5	12.5	4.9	2542	2890	132404	5.75
60	270.6	48.5	12.9	4.8	2547	2828	133318	5.98
30	270.3	47.8	12.0	4.4	2398	2763	125031	5.79
0	269.9	46.4	11.7	4.3	2143	2560	110271	5.28
SE (m) ±	2.3	0.4	0.3	0.1	0.33	0.31	2030	0.6
LSD (P=0.05)	NS	1.2	0.7	0.3	100	93	6095	0.19

Seed: Rs 60/kg; Straw: Rs 1.20/kg

The whole amount of N (20 kg/ha) and K_2O (30 kg/ha) and P_2O_5 as per the treatment was applied as basal. Pre-emergence spray of pendimethalin at 1.2 kg/ha was done immediately after sowing of the crop with manually-operated knapsack sprayer fitted with flat fan nozzle using 800 l water/ha. The crop was given supplemented irrigation as and when required by sprinkler irrigation system. All the management practices were in accordance with the recommended package of practices. Yields were harvested from net plot (3.5 m x 3.0 m). Economics of the treatments was worked out based upon prevalent market prices.

The trends were similar during both the years. Pooled data showed that number of pods/plant and seeds/pod was significantly higher due to wet seeding over dry seeding (Table 1). The increase in these yield contributing traits resulted in higher seed and haulm yields of French bean under wet seeding. Higher yields increased net return and B: C ratio significantly over dry seeding. The productivity and profitability were further improved due to seed coating and soaking with 2% SSP solution. Seed soaking and coating with 2% SSP gave 207 kg/ha more seed yield and Rs 12521/ha more net returns over dry seeding. Similar results were reported by Joseph (1991) and Badole *et al.* (1992).

Application of P upto 60 kg P_2O_5/ha increased pods/plant and seeds/pod and thereby seed yield of French bean. Higher P rate at 90 kg P_2O_5/ha showed a decreasing trend in yield. Jasrotia and Sharma (1998) reported similar findings.

The response to P fertilizer was quadratic (Fig 1.) as shown by the equation,

$$Y = 2140.6 + 10.99P - 0.072\ P^2 \quad \text{.....(i)}$$

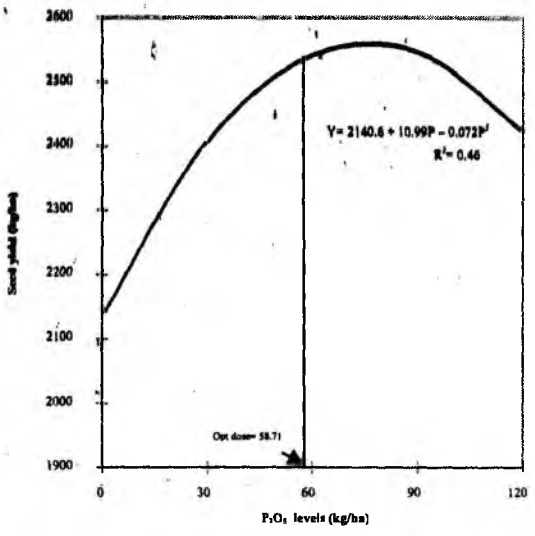


Fig 1. Response of French bean to P application

It was revealed that optimum dose of P_2O_5 was 58.71 kg/ha corresponding to 2537 kg/ha of seed yield. The net returns and B: C ratio increased up to 60 kg P_2O_5/ha. There was no benefit in using higher dose of P as net returns were not affected significantly, whereas B: C ratio was significantly lower at 90 kg than at 60 kg P_2O_5/ha. Integrated effects of seed soaking treatments and P levels were not significant.

It was concluded that seed soaking and coating with 2% SSP was a good practice for French bean cultivation in Lahaul valley conditions of Himachal Pradesh.

References

Badole WP, Umale SR and Meshram SS 1992. Effect of seed treatments on growth and development with graded doses of fertilizers in green gram. New Agriculturist 3 (2): 221-22.

Jasrotia RS and Sharma CM 1998. A note on phosphorus and farmyard manure application on French bean (*Phaseolus vulgaris* L.) under mid hill conditions. Veg. Sci. 25 (2): 197-98.

Joseph K 1991. Studies on the effect of soil moisture content and seed soaking on the germination of legumes. Legume Res. 14 (3): 153-54.

Teixeira MG, Guerra JGM, Almeida DL-de, Araujo AP and Franco AA 1999. Effect of seed phosphorus concentrations on nodulation and growth of three common bean cultivars. J. Plant Nutr. 22 (10):1599-1611.