

Original Research Article

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Influence of Seed Pelleting on Crop Performance and Seed Yield in French Bean (*Phaseolus vulgaris* L.) cv. Arka Anoop

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ABSTRACT

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An field experiment was conducted during rabi, 2013 at Department of Horticulture, UAS, GKVK, Bangalore to understand the influence of seed pelleting on crop performance and seed yield of French bean cv. Arka Anoop. The experiment consists of eight treatments with seed pelleting viz., T₁(control), T₂ (seed pelleting with clay + Gypsum (1:1), T₃ (seed pelleting with clay +Neem leaf powder + Gypsum (1:1:1), T₄ (seed pelleting with biofertilizers (*Rhizobium*) @ 30 g/kg), T₅ (seed pelleting with ZnSO₄ @ 3g/kg), T₆ (seed pelleting with Borax @ 3g /kg), T₇ (seed pelleting with Capton (2.5g/kg) + Imidacloprid (2.5g/kg) and T₈ (seed pelleting with ZnSO₄ @ 3 g/kg + borax @ 3g/kg + Capton (2.5g/kg) + Imidacloprid (2.5g/kg) and laid out in RCBD design with three replications. The experimental results indicated the superiority of seed pelleting with ZnSO₄ @ 3g/kg + borax @ 3 g/kg + Capton (2.5g/kg) + Imidacloprid (2.5g/kg) as compared to all other treatments including unpelleted control. Data on crop performance and seed yield parameters such as field emergence (92.00%), plant height at harvest (48.56cm), number of branches at harvest (10), number of leaves at harvest (43.66) number of flowers per plant (30.33), days to anthesis (28.00), days taken to 50 per cent flowering (32.66), days to maturity (86.00), number of pods per plant (21.66), pod weight per plant (27.06g), pod length (16.53cm), number of seeds per pod (5.33), seed yield per plant (24.47g), seed yield per plot (513.8g) and seed yield per hectare (28.54q) was maximum in seed pelleted with ZnSO₄ @ 3g/kg + borax @ 3g/kg + Capton (2.5g/kg) + Imidacloprid (2.5g/kg) compared to control.

Introduction

French bean (*Phaseolus vulgaris* L.) is one of the most important vegetable pulse crop which is native to new world probably Central Mexico which belongs to family *Fabaceae* is a nutritious vegetable consumed as tender pods, shelled beans and dry beans. It has many synonyms like Snap bean, Kidney bean, Haricot bean and also called Rajmash in Hindi. It posses some medicinal properties which is useful in controlling diabetics and

certain cardiac problems and it is a good natural cure for bladder burn. It has both carminative and reparative properties against constipation and diarrhoea (Duke, 1981).

Seed pelleting is the process of enclosing a seed with small quantity of inert material just large enough to produce globular unit of standard size to facilitate precision planting. The inherent material creates natural water

holding media and provides small amount of nutrients to young seedlings. It also reduces the problem of thinning, gap filling and chemicals required in low quantity. Keeping in view the experiment is followed to know the outcome of the seed pelleting on crop performance and seed yield.

Materials and Methods

The experiment was conducted during rabi, 2013 at Department of Horticulture, University of Agricultural Sciences, GKVK, Bangalore. The experiment was laid out in randomized complete block design with eight treatments replicated thrice. The French bean seeds were pelleted with T₁(control), T₂ (seed pelleting with clay + Gypsum (1:1), T₃ (seed pelleting with clay +Neem leaf powder + Gypsum (1:1:1), T₄(seed pelleting with biofertilizers (*Rhizobium*) @ 30g/kg), T₅(seed pelleting with ZnSO₄ @ 3g/kg), T₆(seed pelleting with Borax @ 3g /kg), T₇(seed pelleting with Capton (2.5g/kg) + Imidacloprid (2.5g/kg) and T₈ (seed pelleting with ZnSO₄ @ 3g/kg + borax @ 3g/kg + Capton (2.5g/kg) + Imidacloprid (2.5g/kg). The spacing of 30 x 10 cm was followed with net plot size of 1.2 x 1.5 m. All the recommended cultural practices for French bean crop were followed. Five normal plants were selected randomly in the net plot area and tagged with a label in each treatment to record the observations.

The observation on field emergence, plant height at harvest, number of branches at harvest, number of leaves at harvest, number of flowers per plant, days to anthesis, days taken to 50 per cent flowering, days to maturity, number of pods per plant, pod weight per plant, pod length, number of seeds per pod, seed yield per plant, seed yield per plot and seed yield per hectare was recorded. The data was statistically analysed and the results are presented in table 1 and 2.

Results and Discussion

The results on crop performance and seed yield as influenced by the seed pelleting is significant and discussed here with the seeds pelleted with different chemicals and botanicals recorded significantly higher field emergence, plant height at harvest, number of branches at harvest, number of leaves at harvest, number of flowers per plant over control where as, days to anthesis, days taken to 50 per cent flowering, days to maturity was minimum in T₈ over control. Among the different pelleting treatments, seeds pelleted with T₈ (seed pelleting with ZnSO₄ @ 3g/kg + borax @ 3g/kg + Capton (2.5g/kg) + Imidacloprid (2.5g/kg) recorded significantly highest field emergence (92.00%), plant height at harvest (48.56cm), number of branches at harvest (10.00), number of leaves at harvest (43.66) and number of flowers per plant (30.33) over all other treatments, while, control recorded lower values for these parameters.

The increased in growth parameter like field emergence, plant height, more number of branches, leaves and flowers per plant was found in seed pelleted with ZnSO₄ @ 3g/kg + borax @ 3g/kg + Capton (2.5g/kg) + Imidacloprid (2.5g/kg) is due to enhanced carbohydrate metabolism and metabolic and physiological processes by plants (Ashour and Reda, 1972) and increased cell division. Similar increased plant height and number of leaves noticed with ZnSO₄ may be ascribed to its involvement in biosynthesis of auxin (Krishnasamy, 2003) and cell expansion. Masuthi (2005) in cowpea and Supreeta Angadi (2004) in soybean. While, Capton and Imidacloprid might have provided protection against seed and soil borne pathogens and insects leading to early vigorous growth of plants, that leads to early reproduction phase. (Manjunath, 2009).

Table.1 Influence of seed pelleting on crop performance in French bean cv. Arka Anoop (*Phaseolus vulgaris*)

Treatments	Field emergence at 20 DAS (%)	Plant height at Harvest (cm)	Number of branches per plant at Harvest	Number of leaves at Harvest	Days to anthesis	Number of flowers per plant	Days taken to 50 per cent flowering	Days to maturity
T ₁	74.66	35.20	7.33	37.33	34.66	19.33	38.66	92.66
T ₂	77.00	37.43	8.00	38.33	33.66	20.33	38.33	91.66
T ₃	79.33	39.60	8.33	39.33	32.33	21.66	37.00	90.66
T ₄	81.00	41.63	8.66	40.33	31.33	23.33	36.33	89.66
T ₅	86.33	44.73	9.00	42.33	29.33	27.66	34.33	87.33
T ₆	83.67	43.23	8.66	41.33	30.33	26.00	35.33	88.33
T ₇	89.00	46.36	9.66	43.33	28.33	29.33	33.33	86.66
T ₈	92.00	48.56	10.00	43.66	28.00	30.33	32.66	86.00
Grand mean	82.87	42.09	8.70	40.75	31.00	24.75	35.75	89.12
S. Em±	0.32	0.25	0.21	0.33	0.26	0.25	0.26	0.29
C.D (P=0.05)	0.98	0.76	0.66	1.00	0.79	0.76	0.79	0.89
CV (%s)	4.90	10.20	4.34	5.40	4.47	5.76	6.27	6.57

Table.2 Influence of seed pelleting on seed yield in French bean (*Phaseolus vulgaris*) cv. Arka Anoop (*Phaseolus vulgaris*)

Treatments	Number of pods per plant	Pod weight per plant (g)	Pod length (cm)	Number of seeds per pod	Seed yield per plant (g)	Seed yield per plot (g)	Seed yield per hectare (q)
T ₁	15.66	19.32	12.80	3.33	17.42	366.0	20.32
T ₂	16.66	19.84	13.23	3.66	18.12	380.5	21.14
T ₃	17.66	22.22	13.63	4.00	19.13	401.7	22.31
T ₄	18.33	23.74	14.06	4.00	20.25	405.5	22.50
T ₅	20.33	24.73	14.90	5.00	22.15	465.1	25.84
T ₆	19.33	23.74	14.46	4.33	21.43	450.2	25.01
T ₇	21.00	25.66	15.56	5.00	22.95	481.1	26.72
T ₈	21.66	27.06	16.53	5.33	24.47	513.8	28.54
Grand mean	18.83	23.29	14.40	4.33	20.74	433.0	24.04
S. Em±	0.27	0.21	0.08	0.19	0.13	2.69	0.13
C.D (P=0.05)	0.82	0.63	0.26	0.58	0.41	8.61	0.41
CV (%)	4.49	6.56	5.04	7.76	9.15	10.98	11.28

While, days to anthesis (28.00), days taken to 50 per cent flowering (32.66) and days to maturity (86.00) were early in seeds pelleted with ZnSO₄ @ 3g/kg + borax @ 3g/kg + Captan (2.5g/kg) + Imidacloprid (2.5g/kg) compared to control. The earliness in flowering behaviour may be ascribed to better growth of plants as reflected with higher number of leaves resulting in higher photosynthetic activity triggering in synthesis of hormones involved in flower behaviour and their active role in various physiological and bio-chemical processes of the plants. Similar results were also reported by Masuthi (2005) in cowpea and Balaji (1990) and Supreeta Angadi (2004) in soybean.

Among pelleting treatments ZnSO₄ @ 3g/kg + borax @ 3g/kg + Captan (2.5g/kg) + Imidacloprid (2.5g/kg) recorded highest number of pods per plant (21.66), pod weight per plant (27.06g), pod length (16.53cm), number of seeds per pod (5.33), seed yield per plant (24.47g), seed yield per plot (513.8g) and seed yield per hectare (28.54q) respectively over control which was due to the involvement in sugar synthesis and its efficient translocation for seed formation and development (Berger, 1949; Shkolnik and Abdurashitov, 1958). Similar results with boron were reported by Srimathi *et al.* (2001) and Supreeta Angadi (2004) in soybean and Masuthi (2005) in cowpea and Angumuthu (1991) in minor millets. Zinc element is involved in auxin metabolism, plays a pivotal role in seed size and development. The second phase of seed development requires adequate amount of zinc dependent upon auxin for seed development. Hence the study can be concluded seed pelleted with (T8) ZnSO₄ @ 30 g/kg + borax @ 30 g/kg + Captan (2.5g) + Imidacloprid (2.5g/kg) could be recommended for the French bean cultivation to harvest higher seed yield and seed quality.

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