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Effect of fertility levels and PSB application on growth yield and quality of field pea (*Pisum sativum* L.)

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Abstract
An experiment was conducted at Instructional Farm, Department of Agronomy, Faculty of Agriculture, AKS University, Sherganj, Satna (M.P.) during *Rabi* season of 2019-2020. The experiment consisted of randomize block design having Factorial arrangement in three replications. In this experiment, 12 treatment combinations including four different Fertility levels *viz*., 0 kg/ha - F_0, 10:20:10 kg NPK/ha - F_1, 20:40:20 kg NPK/ha - F_2, 30:60:30 kg NPK/ha - F_3, while three PSB levels *viz*., 200 gm/ha P_1, 250 gm/ha- P_2, 300 gm/ha - P_3 it was found that Fertility levels and PSB levels significantly affected plant height, number of branches per plant, number of grains/pod, thousand grain weight, grain and Stover yield of field pea. Interaction effect between Fertility and PSB levels significantly affect the plant height at 60 and 90 DAS and number of branches per plant at 60 and 90 DAS. Maximum plant height at 60 and 90 DAS was recorded under treatment F_3P_1 (30:60:30 kg per hectare and 200 g per hectare) *i.e*. 39.29 cm and 59.29 cm, respectively whereas, maximum number of branches per plant at 60 and 90 DAS was recorded under the same treatment *i.e.*, 7.80 and 9.20, respectively. Similarly, Interaction effect of fertility and PSB on yield parameters such as number of pods per plant (22.00), seed yield per hectare (22.1 q) and straw yield per hectare (28.29 q) were recorded maximum with the application of fertility and PSB at the rate of F_3P_1 (30:60:30 kg per hectare and 200 g per hectare) Were found to be significant.

Keywords: Field pea, PSB, plant, grains/pod, grain weight, Stover yield

Introduction
Field pea (*Pisum sativum* L.) belongs to the family fabaceae and its origin is Ethiopia. It is an important rabi pulse grown in Indian subcontinent. It is one of the main sources of dietary protein for the majority of Indians. The productivity (1356 kg/ha) of this crop is highest among the pulses. Moreover, its yield potential is 3.5 tones/ha if it is grown by the use of balanced fertilizer and more yields can be obtained than the potential if proper and balanced use of fertilizer is done (Anonymous 2009) [1]. Uttar Pradesh Madhya Pradesh, Bihar and Maharashtra are the major growing state in India, however, In Madhya Pradesh alone occupied 3.48 lakh ha area with 2.80 lakh tones production. It is highly nutritive, containing high percentage of digestible protein, carbohydrate, vitamins and very rich in minerals. Its fresh pod contains 7.2 percent protein, 19.8 percent carbohydrate, 0.8 percent mineral matter, while dried pea grain contains 19.7 percent protein, 56.6 percent carbohydrate, 2.1 percent mineral matter and 4.4 percent iron, besides being a rich source of vitamins A, B and C. The sowing can take place from winter to early summer, depending on location. The Optimum temperature for good growth is between 10 ºC to 18 ºC. Peas can be grown on all types of soils but it prefers well-drained sandy loamy soils. The soils should rich in organic matter as it enhances better growth by supplying nutrients at a slower rate. It does not thrive in highly acidic or alkaline soils or saline soils. It grows best at a pH of 6.5.

NPK improves the quality of field pea; Nitrogen promotes the leaf, stem and other vegetative parts of the plants. It also increases the protein content in field pea. It is an integral constituent of enzymes, proteins and chlorophyll and is present in many other compounds of great physiological importance in plant metabolism, such as nucleotides, phosphatides, alkaloids, enzymes, hormones and vitamins. It imparts dark-green colour in plants, hastens rapid early growth and improves capacity to fix atmospheric nitrogen symbiotically. Nodule formation and subsequent nitrogen fixation are very sensitive to external nitrogen sources, including fertilizer and available soil nitrogen. Nitrogen fertilizer applications generally inhibit biological N-fixation by *R. leguminosarum*. The inhibitory effect of N fertilizer on nodule formation results from the fertilizer's contribution to the soil N pool.

Nitrogen application to legumes at lower doses at the initial stage is essential for vigorous start. Phosphatic fertilizer is an important factor for low yield. An adequate supply of phosphorus has been reported by various workers to be beneficial for better growth and yield and better quality in legumes (Sammauria *et al*., 2009) [3]. It acts as a structural component of membrane system of cells, chloroplasts and mitochondria. It is a constituent of energy phosphates like ADP and ATP, nucleic acid, nucleo proteins, purines, pyrimidine, nucleotides and several co-enzymes. It is involved in the basic reaction of photosynthesis. It plays an important role for root growth. Potassium is important in nitrogen fixation on field pea and it is important in protein, starch synthesis, water nutrient, and sugar transport and crop quality improving on field pea. Consider as reaction catalyst and it affects the efficiency of various enzymes. Phosphate-solubilizing bacteria (PSB) in soil, which is poor in nitrogen, may help in boosting up production and consequently more nitrogen fixation.

In a field pea crop, Phosphate solubilizing Bacteria (PSB) significantly helps in the release of insoluble inorganic phosphate and makes it available to the plants. PSB are a group of beneficial bacteria capable of hydrolysis organic and inorganic phosphorus from insoluble compounds. P-solubilization ability of the microorganisms is considered to be one of the most important traits associated with plant phosphate nutrition. Phosphate solubilizing bacteria as inoculants simultaneously increases phosphorus uptake by the plant and crop yield. It has been shown through co-inoculation with other beneficial bacteria and mycorrhiza.

Materials and Methods

Experiment was carried out at the Instructional Farm, Faculty of Agriculture, AKS University, Sherganj, Satna (M.P.) during *Rabi* season 2019-2020. The experiment was conducted in randomize block design with Factorial concept with three replications. Different Fertility levels *viz*., 0 kg/ha - F_0, 10:20:10 kg NPK/ha - F_1, 20:40:20 kg NPK/ha - F_2, 30:60:30 kg NPK/ha - F_3, while three PSB levels *viz*., 200 gm/ha - P_1, 250 gm/ha - P_2, 300 gm/ha - P_3. The gross and net plot size was 5 m x 3 m, respectively. The experimental plots were fertilizers as per recommended dose.

Results and Discussion

The result shows that plant height, number of branches per plant, number of grains/pod, thousand grains weight, grain and Stover yield was influenced significantly due to different Fertility levels and PSB levels.

Data regarding plant height and number of branches per plant are reported in (Table-1). Statistical analysis of the data revealed that maximum plant height and number of branches per plant (60.57 cm and 9.20, respectively) were recorded in plots treated with F_3P_1 (30:60:30 kg per hectare and 200 g per hectare. while, lowest values were observed in plot that received, F_0P_3 (0 kg per hectare and 300 g per hectare). Similar findings were also recorded by Vimal and Natrajan (2000) [6], Yadav (2001) [7], Tomar *et al.* (2001) [4].

Table 1: Effect of fertility levels and PSB application on growth, yield and quality of field pea (*Pisum sativum* L.)

Treatment	Plant height (cm)	Number of branches/Plant	Test weight (g)	Seed yield per plant (g)	Seed yield (q/ha)	Stover yield (q/ha)
	Fertility levels (N:P:K)					
F_0	53.08	6.36	97.59	32.28	16.09	22.79
F_1	56.02	7.51	99.93	42.95	18.40	25.56
F_2	58.78	8.02	102.96	53.92	20.07	26.88
F_3	60.57	8.60	105.04	60.91	21.39	27.79
S.Em±	0.14	0.12	0.13	0.14	0.19	0.16
CD	0.42	0.36	0.39	0.42	0.57	0.48
	PSB levels (P)					
P_1	58.20	8.05	102.43	51.10	19.75	26.47
P_2	57.22	7.57	101.37	47.85	18.98	25.71
P_3	55.92	7.25	100.34	43.60	18.24	25.10
S.Em±	0.21	0.15	0.04	0.09	0.14	0.21
CD	0.63	0.45	0.12	0.27	0.42	0.63
	Interaction effect of Fertility and PSB levels					
F_0P_1	54.22	7.07	98.77	35.63	16.93	23.88
F_0P_2	53.53	6.33	97.33	32.57	16.13	22.85
F_0P_3	51.50	5.67	96.67	28.64	15.21	21.65
F_1P_1	56.93	7.67	100.43	45.61	18.97	26.18
F_1P_2	55.99	7.47	99.97	43.61	18.41	25.59
F_1P_3	55.13	7.40	99.40	39.63	17.81	24.91
F_2P_1	60.03	8.27	104.50	59.57	20.97	27.51
F_2P_2	58.55	8.00	102.77	52.63	19.83	26.63
F_2P_3	57.74	7.80	101.60	49.57	19.41	26.50
F_3P_1	61.61	9.20	106.03	63.57	22.11	28.29
F_3P_2	60.81	8.47	105.40	62.57	21.53	27.76
F_3P_3	59.29	8.13	103.70	56.57	20.51	27.33
S.Em±	0.32	0.25	0.15	0.21	0.24	0.32
CD	0.96	0.75	0.45	0.63	0.72	0.99

Test weight is an important yield contributing trait of field pea which is significantly influenced by the Fertility and PSB gave significant result whereas, interaction effect of F and P showed significant result. Maximum Test weight was recorded under treatment F_3 (30:60:30 kg per hectare) i.e. 105.04 g and Maximum Test weight was recorded under

treatment P_1 (PSB 200 g per hectare) i.e. 102.43 g.

Number of Seed yield per plant showed that effect of Fertility and PSB gave significant result whereas, interaction effect of F and P showed significant result. Maximum Seed yield per plant was recorded under treatment F_3 (30:60:30 kg per hectare) i.e. 60.91 g and it was at par with treatment F_0 (0 kg Fertilizer per hectare) i.e. 32.28 g. Maximum Seed yield per plant was recorded under treatment P_1 (PSB 200 g per hectare) i.e. 51.10 g.

Analysis data for seed yield (q) per hectare showed that effect of Fertility, PSB gave significant result and their combinations showed significant result. Maximum seed yield (21.39 q) per hectare with treatment F_3 (30:60:30 kg per hectare) statistically it was at par with treatment P_1 (PSB 200 g per hectare) i.e. (19.75 q). Higher seed yield of lintel was obtained mainly due to improvement in yield components.

Analysis data for straw yield (q) per hectare (Table 1) showed that effect of Fertility and PSB gave significant result and their combinations showed significant result. In case of Fertility, straw yield (27.79 q) per hectare with treatment F_3 (30:60:30 kg per hectare) and in case of PSB highest straw yield (26.47 q) per hectare with treatment P_1 (PSB 200 g per hectare).

Statistically Fertility, PSB and their interaction effect found significant result (Table 1). Maximum Protein percentage (21.73%) was recorded by treatment F_3P_1 (30:60:30 kg per hectare and 200 g per hectare). Similar findings were also recorded by Vikrant *et al*. (2005) [5] and Rathore *et al*. (2007) [2].

Summary and Conclusion

On the basis of results obtained the following specific conclusions are warranted. Application of (30:60:30 kg NPK per hectare along with PSB inoculation @200 g per hectare was assists statistically the best treatment and highest seed yield 21.39q/ha yield was obtained beside net income rupees 81624.66 was also obtain when 30:60:30 kg NPK per hectare was apply in field pea.

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References

1. Anonymous. Project Co-ordinator's Report. All India Co-ordinated Research Project on MULLaRP., 2009, 16.
2. Rathore VS, Singh JP, Soni ML, Beniwal RK. Effect of nutrient management on growth, productivity and nutrient uptake of rainfed clusterbean (*Cyamopsis tetragonoloba*) in arid region. Indian Journal of Agricultural Sciences. 2007;77(6):349-353.
3. Sammauria R, Yadav RS, Nagar KC. Performance of field pea (*pisum sativum* L.) as influenced by nitrogen and phosphorus fertilization and biofertilizer in Western Rajasthan. Indian Journal of Agronomy. 2009;54(3):319-323.
4. Tomar A, Kumar N, Pareek RP, Chaube AK. Synergism among VAM, phosphate solubilizing bacteria and *rhizobium* for symbiosis with black gram (*Vigna mungo* L.) under field conditions. Pedosphere. 2001;11(4):327-332.
5. Vikrant Singh H, Malik CVS, Singh BP. Grain yield and protein content of cowpea as influenced by farm yard manures and phosphorus application. Indian Journal of Pulses Research. 2005;18(2):250-251.
6. Vimla B, Natrajan S. Effect of nitrogen, phosphorus and biofertilizers on pod characters, yield and quality in pea (*Pisum sativum* L. spp. hortense). South Indian Horticulture. 2000;48:60-63.
7. Yadav OS. Effect of nitrogen sources and biofertilizer on growth and quality of cowpea. M.Sc. (Ag.) Thesis, Rajasthan Agricultural University, Bikaner, 2001.