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Effect of Bio Fertilizers and Boron on Growth and Yield of Lentil (*Lens culinaris* L.)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

A field Experimen on the topic "Effect of bio fertilizers and boron on growth and yield of lentil (*Lens culinaris* L.)" was conducted during *Rabi* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) to examine treatments consisting of three tyoes of biofertilizers *viz,*Rhizobium, PSB and VAM and three levels of Boron *viz*. 1, 1.5, and 2 kg/ha. The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.28 %), available N (225 kg/ha), available P (19.50 kg/ha) and available K (92 kg/ha). There were 10 treatments each being replicated thrice and laid out in RBD. The findings showed that treatment 3 (Rhizobium - 20 g/kg seeds + Boron - 2.0 kg/ha) had significantly higher growth characteristics at 60 DAS, including plant height (26.83 cm), dry weight (6.61 g), and yield characteristics at harvest, including number of pods per plant (112.07), number of seeds

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per pod (2.00), test weight (29.60 g), seed yield (1.75 t/ha), stover yield (2.17 t/ha), maximum gross return (INR 87,666.67), net return (INR 60,184.45) and b:c ratio (2.19) as compared to other treatments.

Keywords: Bio fertilizers; boron; growth; lentil; yield; economics.

1. INTRODUCTION

India is world's largest homeland of vegetarian population and world leader in pulses production. Pulses serve as a cost-effective and nutritionally balanced rich source of protein to the people of India. Among the many pulse species, Lentil (*Lens culinaris* L.) is one of the most nutritious cool season food legumes. Humans have known lentils since the beginning of civilization. It is widely cultivated in temperate, subtropical and tropical climate, as a winter crop. It grows well in a variety of soil types, from light loams to black cotton soils. It is a major source of vegetable protein on the Indo-Gangetic plain. Lentils contain important components of human nutrition, such as 25% protein, 1.1% fat, 59% carbohydrate, and are also rich in important vitamins, minerals, and soluble and insoluble dietary fiber. Their water- soluble vitamin content (except vitamin C) is also relatively high, while the amounts of carotenes and retinols are low, as with most other legumes in South Asia and the Middle East lentils occupy an important place in the daily diet. Worldwide production of lentils was 6.3 Mt in 2018. In India, it is produced in an area of 1.424 M ha and production is 1.217 M t with an average productivity of 855 kg/ha. The lentil sometimes known as "Masoor," is a significant annual leguminous crop in the Fabaceae family. Lentil is a pulse that can be eaten. It is around 40cm (16in) tall and produces seeds in pods with two seeds in each. Lentils, one of the first crops domesticated in the Near East, have been a part of human nutrition since the aceramic (pre-pottery) Neolithic period. Archaeological evidence suggests that they were consumed between 9,500 and 13,000 years ago. Lentils come in a variety of colors, including yellow, red-orange, green, brown, and black. Lentils are available in various sizes and forms, with or without skins, whole or split [1].

Rhizobium provide a new eco-friendly technique that overcomes the disadvantages of traditional chemical-based farming and has a favorable impact on both soil sustainability and plant growth. They gradually boost soil fertility by fixing nitrogen from the atmosphere. They can also aid to replenish depleted soil nutrients and increase plant root proliferation [2]. The use of phosphorous solubilizing bacteria (PSB) as an inoculant increases both P availability to plants and crop output. Certain microorganisms, such as phosphate solubilizing bacteria (Pseudomonas sp., Bacillus sp., etc.), actinomycetes, particularly those found in the plant rhizosphere, are known to convert insoluble inorganic P into soluble form that plants can use [3,4].

Biofertilizers like (PSB) create plant development ingredients in the soil by saturating insoluble soil phosphates like tri-calcium phosphate. Rhizobium is one of the most important bio-fertilizers available. Rhizobium fixes atmospheric nitrogen symbiosis with the help of legumes. After PSB inoculation, more phosphorus was readily available in the soil, encouraging enhanced root development and producing a favorable nodulation effect with increased PSB bacterial activity. Increased nitrogen fixation may increase output if a productive strain of Rhizobium is added to a nitrogen-deficient soil. As inoculants in the root zone of agricultural plants, phosphorus-solubilizing bacteria partially solubilize insoluble phosphate and boost phosphorus usage productivity [5].

Although the most frequently accepted roles of VAM fungi in natural ecosystems are the improvement of plant nutrition status and growth promotion, it appears that under drought stress conditions it simply thrives on plant survival needs [6]. A multifunctional consortium of various Rhizobium strains, phosphate-solubilizing bacteria and fungi, arbuscular mycorrhizal fungi, and free-living nitrogen-fixing Azotobacter strains has been shown to significantly increase the noduling ability, nitrogen content, and herbage yield of subabul seedlings (*Leucaena leucocephala*) when compared to the application of each consortium member separately. There are approved products with multi-strain consortia that exhibit a specific beneficial impact available on the market. Bio-N and Bio-Spark are two examples of such goods [7].

Micronutrients like boron is one of the mineral nutrients required for normal plant growth. According to Ahmad et al. [8], boron plays structural roles in the growth of cell walls, cell division, seed development, and the stimulation or inhibition of particular metabolic pathways for the production of hormones and sugars. Additionally, boron deficit results in decreased pollen germination, pollen grain count, etc. Additionally, it affects seed filling and growth factors. It is generally acknowledged that dry soil conditions reduce boron availability. Therefore, boron shortage is frequently linked to dry climates and low soil moisture levels. The inability of plants to absorb boron from soil due to a lack of moisture in the rhizosphere may be the cause of this behavior [9]. This behavior may be related to the restricted release of boron from organic complexes. Keeping in view the above facts, the present experiment was undertaken to find out "Effect of bio fertilizers and boron on growth and yield of lentil (*Lens culinaris* L.)".

2. MATERIALS AND METHODS

Field study carried out during the *Rabi* season 2022, at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) which is located at 25º 39' 42''N latitude, 81º 67' 56" E longitude and 98 m altitude above the mean sea level (MSL). This area is situated on the right side of the *Yamuna* River by the side of Prayagraj - Rewa road about 12 km from the city. The experimental plot's soil had a sandy loam texture, a pH of 7.1 thatwas almost neutral, medium levels of available nitrogen (225 kg/ha), low levels of phosphorous (19.50 kg/ha) and available potash (92.00 kg/ha). It also included medium levels of organic carbon (0.28%). The treatments comprise of types of Bio fertilizers viz., Rhizobium, PSB and VAM and three levels of Boron *viz*. 1, 1.5, and 2 kg/ha. whose effect is observed on Lentil (var. PL 406). The experiment wasexecuted in Randomized Block Design with ten treatments replicated thrice. The experiment comprising ten treatment possible combination of above factor, *viz.,* T1: Rhizobium - 20 g/kg seeds + Boron – 1.0 kg/ha, T2: Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha, T3: Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha, T4: PSB - 20 g/kg seeds + Boron – 1.0 kg/ha, T5: PSB - 20 g/kg seeds + Boron – 1.5 kg/ha, T6: PSB - 20 g/kg seeds + Boron – 2.0 kg/ha, T7: VAM - 20 g/kg seeds + Boron – 1.0 kg/ha, T8: VAM - 20 g/kg seeds + Boron – 1.5 kg/ha, T9: VAM - 20 g/kg seeds + Boron – 2.0 kg/ha, T10: 10. Control (RDF-20:40:20 NPK kg/ha). Observations regarding growth and yield attributes using ANOVA Statistical method were recorded during the field experiment.

3. RESULTS AND DISCUSSION

3.1 Effect of Bio Fertilizers and Boron on Growth Parameters of Lentil

3.1.1 Plant Height (cm)

Based on recorded and tabulated data pertaining to growth parameters, significantly highest plant height (42.03 cm) was recorded in treatment with Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha However, treatment with Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha (41.30 cm) was statistically at par with the treatment Rhizobium - 20 g/kg seeds + Boron –2.0 kg/ha. While the minimum plant height (37.53 cm) was recorded with Control (RDF - 20:40:20 NPK kg/ha).

Boron may be involved in various physiological processes such as enzyme activation, electron transport, chlorophyll production, stomatal regulation, and so on, which may explain the increase in plant height. Boron fertilizer enhanced plant height gradually, which might be attributed to improved photosynthetic activity and chlorophyll synthesis, leading in better vegetative development (Myageri et al., 2022). Similar results were reported by Shil et al. [10].

3.1.2 Dry weight (g/plant)

Based on recorded and tabulated data pertaining to growth parameters, significantly highest plant dry weight (16.17 g) was recorded in treatment with Rhizobium - 20 g/kg seeds + Boron –2.0 kg/ha However, treatments with Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha (16.09 g), Rhizobium - 20 g/kg seeds + Boron – 1.0 kg/ha (15.92 g) and PSB - 20 g/kg seeds + Boron – 2.0 kg/ha (15.63 g) were statistically at par with the treatment Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha. While the minimum plant dry weight (12.17 g) was recorded with Control (RDF - 20:40:20 NPK kg/ha).

Rhizobium bacteria establish a symbiotic relationship with lentil plants, forming nodules on their roots. Within these nodules, nitrogen fixation occurs, where atmospheric nitrogen is converted into a usable form (ammonium) for the plant. The increased nitrogen availability through Rhizobium-mediated nitrogen fixation contributes to enhanced plant growth and biomass production [11].

With increasing Boron levels, dry weight increased considerably. Because boron effects cell division and nitrogen absorption from the soil, it may improve plant growth, which is reflected in plant dry weight [9]. These findings are in harmony with those obtained by Tekale et al. [12]

3.2 Crop Growth Rate (g/m^2/day) and Relative Growth Rate (g/g/day)

Based on recorded and tabulated data pertaining to growth parameters, significantly highest Crop growth rate (5.97 g/m^2 /day), Relative growth rate (0.0134 g/g/day) was recorded in treatment with Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha. However, treatments with Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha (5.92 g/m^2/day) and (0.0134 g/g/day), Rhizobium - 20 g/kg seeds + Boron – 1.0 kg/ha (5.81 g/m^2 /day) and (0.0133 g/g/day), PSB - 20 g/kg seeds + Boron – 2.0 kg/ha (5.59 g/m^2/day) and (0.0129 g/g/day) respectively were statistically at par with the treatment Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha. While the minimum Crop growth rate (2.26 g/m^2 /day) and Relative growth rate (0.0061 g/g/day) was recorded in treatment with Control (RDF - 20:40:20 NPK kg/ha).

Rhizobium bacteria have the ability to fix atmospheric nitrogen and convert it into a usable form for plants. This symbiotic nitrogen fixation increases the nitrogen availability in the soil, promoting higher crop growth rates in lentils [13].

Boron plays a role in various enzymatic processes within plants, including phenolic compound metabolism, lignin synthesis, and cell wall-related enzyme activity. These enzymatic processes are vital for plant growth and development, contributing to the overall crop growth rate [14].

3.3 Effect of bio Fertilizers and Boron on Yield Attributes of Lentil Number of Pods/Plant

Maximum number of pods per plant (112.07) was recorded in treatment with Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha However, treatments with PSB - 20 g/kg seeds + Boron – 2.0 kg/ha (109.00) and VAM - 20 g/kg seeds + Boron – 2.0 kg/ha (108.33) were statistically at par with the treatment Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha. While the minimum number of pods/plant (90.47) was recorded with treatment Control (RDF - 20:40:20 NPK kg/ha).

Rhizobium inoculation enhances the plant's nutrient uptake efficiency, including the uptake of phosphorus and potassium. These essential nutrients play a crucial role in the reproductive phase of plants, contributing to flower and pod development. By improving nutrient uptake, Rhizobium inoculation can positively impact the number of pods per plant [15].

3.4 Seed Yield (t/ha)

According to the yield attributes data that was collected and analyzed at harvest, highest seed yield (1.75 t/ha). However, treatments with PSB - 20 g/kg seeds + Boron – 2.0 kg/ha (1.65 t/ha) and VAM - 20 g/kg seeds + Boron – 2.0 kg/ha (1.61 t/ha) were statistically at par with the treatment Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha. While the lowest seed yield (1.15 t/ha) was recorded with treatment Control (RDF - 20:40:20 NPK kg/ha).

Effect of rhizobium may be due to better availability of nitrogen to plants it will play an important role in increasing the crop production. Rhizobium produce growth hormones which stimulates root morphology. It increases the number of such microorganisms which accelerates the microbial process which in turn augment the extent availability of nutrient in the form which is easily assimilated by the plant [16,17].

Boron is essential for increasing seed yield since it is involved in numerous physiological processes in plants such as chlorophyll synthesis, stomatal control, and starch consumption, all of which increase seed yield. Boron is required for various physiological processes and plant growth; also, proper nutrition is essential for increasing agricultural yields and quality [9]. These results are in confirmatory with the work of Tekale et al. [11].

3.5 Stover Yield (t/ha)

According to the yield attributes data that was collected and analyzed at harvest, highest stover yield (2.17 t/ha). However, treatments with PSB - 20 g/kg seeds + Boron – 2.0 kg/ha (2.07 t/ha) and VAM - 20 g/kg seeds + Boron – 2.0 kg/ha (2.03) were statistically at par with the treatment

Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha. While the lowest was stover yield (1.57 t/ha) was recorded with treatment Control (RDF - 20:40:20 NPK kg/ha).

Table 1. Effect of Bio fertilizers and boron on growth parameters of lentil

Treatments	Plant Height (cm)	Plant Dry Weight (g)	CGR ($g/m^2/day$)	RGR (g/g/day)
Rhizobium - 20 g/kg seeds + Boron – 1.0 kg/ha	40.97	15.92	5.81	0.0133
Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha	41.30	16.09	5.92	0.0134
Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha	42.03	16.17	5.97	0.0134
PSB - 20 g/kg seeds + Boron – 1.0 kg/ha	40.20	14.53	4.48	0.0108
PSB - 20 g/kg seeds + Boron – 1.5 kg/ha	40.53	14.73	4.65	0.0111
PSB - 20 g/kg seeds + Boron – 2.0 kg/ha	40.77	15.63	5.59	0.0129
VAM - 20 g/kg seeds + Boron – 1.0 kg/ha	38.83	13.17	3.17	0.0081
VAM - 20 g/kg seeds + Boron – 1.5 kg/ha	39.03	13.53	3.48	0.0087
VAM - 20 g/kg seeds + Boron – 2.0 kg/ha	39.23	13.87	3.80	0.0094
Control (RDF-20:40:20 NPK kg/ha)	37.53	12.17	2.26	0.0061
F - Test	S	S	S	S
SEm(±)	0.29	0.29	0.34	0.0007
CD (p=0.05)	**0.85**	0.87	1.00	0.0022

Table 2. Effect of bio fertilizers and boron on yield attributes of lentil

Treatments	No. of pods/plant	No. of Seeds/Pod	Seed Index (g)	Seed yield t/ha)	Stover Yield (t/ha)	Harvest Index (%)
Rhizobium - 20 g/kg seeds + Boron – 1.0 kg/ha	96.80	1.47	26.13	1.39	1.81	43.42
Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha	103.47	1.53	28.13	1.54	1.96	43.98
Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha	112.07	2.00	29.60	1.75	2.17	44.65
PSB - 20 g/kg seeds + Boron – 1.0 kg/ha	96.47	1.33	26.13	1.28	1.70	42.93
PSB - 20 g/kg seeds + Boron – 1.5 kg/ha	98.67	1.53	27.80	1.53	1.95	43.97
PSB - 20 g/kg seeds + Boron – 2.0 kg/ha	109.00	1.80	28.87	1.65	2.07	44.36
VAM - 20 g/kg seeds + Boron – 1.0 kg/ha	93.80	1.13	26.07	1.21	1.63	42.62
VAM - 20 g/kg seeds + Boron – 1.5 kg/ha	97.67	1.53	26.20	1.47	1.89	43.76
VAM - 20 g/kg seeds + Boron – 2.0 kg/ha	108.33	1.53	28.80	1.61	2.03	44.23
Control (RDF-20:40:20 NPK kg/ha)	90.47	1.07	26.00	1.15	1.57	42.27
F-Test	S	NS	NS	S	S	NS
SEm(±)	1.66	0.26	1.11	0.06	0.06	1.57
CD (p=0.05)	4.94	--	--	0.18	0.19	--

Table 3. Effect of bio fertilizers and boron on economics of lentil

Treatments	Total cost of cultivation	Gross Returns	Net Returns	B:C ratio
Rhizobium - 20 g/kg seeds + Boron – 1.0 kg/ha	27362.22	69333.33	41971.11	1.53
Rhizobium - 20 g/kg seeds + Boron – 1.5 kg/ha	27422.22	76833.33	49411.11	1.80
Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha	27482.22	87666.67	60184.45	2.19
PSB - 20 g/kg seeds + Boron – 1.0 kg/ha	27354.22	63833.33	36479.11	1.33
PSB - 20 g/kg seeds + Boron – 1.5 kg/ha	27414.22	76666.67	49252.45	1.80
PSB - 20 g/kg seeds + Boron – 2.0 kg/ha	27474.22	82666.67	55192.45	2.01
VAM - 20 g/kg seeds + Boron – 1.0 kg/ha	27378.22	60666.67	33288.45	1.22
VAM - 20 g/kg seeds + Boron – 1.5 kg/ha	27438.22	73666.67	46228.45	1.68
VAM - 20 g/kg seeds + Boron – 2.0 kg/ha	27498.22	80500.00	53001.78	1.93
Control (RDF-20:40:20 NPK kg/ha)	27178.22	57500.00	30321.78	1.12

Higher straw yield was reported as a result of improved plant development in terms of plant height, number of branches, and dry weight as a result of nutrient intake [9]. Effect of Bio fertilizers and boron on economics of lentil

The economic return of lentil was scrutinized after harvesting the crop based on market pricing, the result indicated a growing trend in with the increasing yield trend across treatment.

The maximum Gross returns (INR 87,666.67/ha), Net returns (INR 60,184.45/ha) and Benefit cost ratio (2.19) was evaluated in treatment with the application of Rhizobium - 20 g/kg seeds + Boron – 2.0 kg/ha.

4. CONCLUSION

It can be concluded that better production and economic returns in lentil were observed with the application of Rhizobium - 20 g/kg seeds and Boron – 2.0 kg/ha. Since the findings are based on one season, further trails are needed to confirm the results.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Singh KM, Singh AK. Lentil in India: An Overview, General article published in Book; 2014.
2. Gebrekidan Feleke Mekuria. Nutrient utilization and yield response of (*Lens culinaris* Medikus) to *Rhizobium* inoculant and sulphur fertilization. Agriculture, Forestry and Fisheries. 2019;8(3):64-72.
3. Vikram A. Efficacy of phosphate solubilizing bacteria isolated from vertisols on growth and yield parameters of sorghum. Research Journal Agrilcultural Science. 2007;2(1):76-78.
4. Fankem H. Occurrence and functioning of phosphate solubilizing microorganisms from oil palm tree (*Elaeis guineensis*) rhizosphere in Cameroon, African Journal of Biotech. 2006;5:2450-2460.
5. Charles J, Dawson, Joy. Influence of Biofertilizers and Gibberellic Acid on

Growth and Yield of Blackgram (*Vigna mungo* L.). International Journal of Environment and Climate Change. 2023;13:329-335. Available:10.9734/IJECC/2023/v13i92235.

6. Varma A, Hock B. Mycorrhiza: Structure, Function Molecular Biology and Biotechnology. 2nd edition, springer-verlag, Berlin; 1999.
7. Patel, Rajeev, Maurya, Rishabh, Chaubey, Chandrakant, Tiwari, Himanshu, Pathak, Deepak. Bio-Fertilizers: Present Status and Future Prospects in India; 2023.
8. Ahmad W, Niaz A, Kanwal S, Rahmatullah, Rashed MK. Role of boron in plant growth: a review. Journal of Agriculture Research. 2009;47(3): 329-338.
9. Myageri PV, Dawson J. Effect of Phosphorous and Boron Levels on Growth and Yield of Lentil (*Lens culinaris* L.) International Journal of Plant & Soil Science. 2022;34(20):504-510.
10. Shil NC, Noor S, Hossain MA. Effects of boron and molybdenum on the yield of chickpea. Journal of Agriculture and Rural Development. 2007;5(1&2):17-24.
11. Kumar A, Kumar A, Bharti A. Response of lentil genotypes to Rhizobium inoculation. International Journal of Current Microbiology and Applied Sciences. 2019; 8(4):1289-1294.
12. Tekale RP, Guhey A, Agrawal K. Impact of boron, zinc and IAA on growth, dry matter accumulation and sink potential of pigeonpea (*Cajanus cajan* L.). *Agriculture Science Digest*. 2009;29(4):246-249.
13. Yadav RK, Kaushik M, Singh K. Effect of biofertilizers on growth and yield of lentil (*Lens culinaris Medik.).* International Journal of Chemical Studies. 2019;7(3): 3154-3157.
14. Brown PH, Hu H. Phloem mobility of boron is species dependent: Evidence for phloem mobility in sorbitol-rich species. Annals of Botany. 1997;80(2): 215-221.
15. Saleem MF, Aslam M, Nadeem M, Aslam A. Influence of Rhizobium inoculation and phosphorus levels on growth and yield of lentil (*Lens culinaris*). Journal of Animal and Plant Sciences. 2018;28(5):1406-1412.
16. Mounika S, Mehera B, Sathvik D, Chandan N. Influence of Bio Fertilizers and Zinc on Growth and Yield of Lentil (*Lens culinaris* L.). International Journal of Environment and Climate Change. 2022;12(10):788-793.
17. Naik MV, Debbarma V. Influence of Nitrogen and Boron on Growth and Yield of Lentil (*Lens culinaris* Medikus.). International Journal of Plant & Soil Science. 2022;34(21):882-7.

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