Available online at https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.12 Issue 1 Page No 179-183

Effect of Fertility Levels and Bio fertilizers on the Yield of Mung Bean (*Vigna radiata L.*)

[1] Vaishali Chaturvedi, [1] O.P. Sharma
[1] School of Agriculture, Suresh Gyan Vihar University
Email: vishsha84@gmail.com

Abstract:- The productivity of mung bean depends greatly on balanced nutrient management and biological inputs that improve soil fertility. A field experiment was conducted to examine the influence of different fertility levels and bio fertilizer applications on mung bean yield. The study was laid out in a randomized block design with four fertility levels (control, 50%, 75%, and 100% recommended dose of fertilizer) and four bio fertilizer treatments (no inoculation, Rhizobium, phosphate-solubilizing bacteria, and Rhizobium + PSB). The results revealed that integrated nutrient management significantly improved yield attributes and grain productivity. The highest seed yield was recorded under 100% RDF combined with Rhizobium + PSB, indicating the beneficial interaction of chemical fertilizers and bio fertilizers.

Key Words:- Rhizobium, PSB, Pods, Bio fertilizers

1. Introduction

Pulses, also known as grain legumes, are next to cereals in terms of agriculture importance and have been considered best option for diversification and intensification of agriculture across the globe because of their intrinsic value such as nitrogen fixing ability (15-35 kg/ha), high protein content and ability to thrive well in less endowed environments. In India, mung bean is grown on 5.13 million hectares area with total production of 3.17 million tonnes and an average productivity of 570 kg/ha (Anonymous, 2022-23a). The important mung bean growing states are Rajasthan, Madhya Pradesh, Uttar Pradesh, Punjab, Haryana, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. Among states, Rajasthan occupied first position in total mung bean production of India, which produces 1.6 million tonnes from 2.62 million hectares with an average productivity of 545 kg/ha (Anonymous, 2022-23b) .It is mostly grown in arid and semi-arid districts of Rajasthan including Nagpur, Jodhpur, Jaipur, Ajmer, Pali, Jalore, Sriganganagar, Tonk, Churu, Barmer and Bikaner. Bio fertilizers, a component of integrated nutrient management are considered to be cost effective, eco-friendly and renewable source of non-bulky, plant nutrient supplementing component in sustainable agriculture. Their

*Correspondence to: **Vaishali Chaturvedi**, School of Agriculture, **Suresh Gyan Vihar University, India***
Corresponding author. E-mail addresses: vishsha84@gmail.com

Available online at https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.12 Issue 1 Page No 179-183

role assumes a special significance in present context of very high costs of chemical fertilizers. Use of bio fertilizers can have a greater importance in increasing fertilizer use efficiency. Indian soils are of low to medium status for available nitrogen and available phosphorus. The seed of pulses is inoculated with Rhizobium with an objective of increasing their number in the rhizosphere, so that there is substantial increase in the microbiologically fixed nitrogen for the plant growth. The alliance of Rhizobium and pulse crops enables in enhancing fertility of soil and is a worth effective approach of nitrogen fertilization in legumes. Most of the soils of Rajasthan are low in available phosphorus and organic matter. Seeds of pulses when inoculated with phosphate solubilizing bacteria they secret acidic substances and solubilize the unavailable soil phosphorus. The inoculation with phosphate solubilizing bacteria may increase yield of crops by 10-30 percent (Tilak and Annapurna, 1993) Mung bean (*Vigna radiata L.*) is an important short-duration pulse crop, widely cultivated in India due to its high protein content, soil-enriching ability, and adaptability. However, its yield is often constrained by poor soil fertility and imbalanced fertilizer use. Chemical fertilizers enhance yield quickly, but continuous dependence on them may deteriorate soil health. Bio fertilizers, such as Rhizobium and phosphate-solubilizing bacteria (PSB), not only improve nutrient availability but also enhance soil microbial activity. Hence, combining fertilizers with bio fertilizers can sustain crop productivity while maintaining soil fertility.

2. Materials and Methods

A field experiment entitled "Effect of Fertility Levels and Bio fertilizers on yield of Mung bean [*Vigna radiata (L.*)" was carried out during kharif season of 2023-24 at Research farm, School of Agriculture, Suresh Gyan Vihar University, Jaipur. Geographically, the study area is located at 75º48'84" E longitude and 26º82'47" N latitude and this region falls under agro-climatic zone III A (Semi-arid Eastern Plain Zone) of Rajasthan. Experimental soil was sandy loamy in texture, low in organic carbon (0.23%) and available nitrogen (125.73 kg N/ha), medium in available phosphorus (17.92 kg P2O5/ha) and available potassium (151.76 kg K2O/ha). The soil was non saline with a pH value of 8.25. Treatments:

The four fertility levels *viz.*, (i) control, (ii) 50% RDF, (iii) 75 % RDF and (iv) 100 % RDF were assigned in main plots and nine bio fertilizers X stress mitigating chemicals *viz.*, (i) *rhizobium*, (ii) *rhizobium*+ thiourea 500 ppm, (iii) *rhizobium*+ salicylic acid 200 ppm, (iv) PSB, (v) PSB + thiourea 500 ppm, (vi) PSB+ salicylic acid 200 ppm, (vii) *rhizobium* + PSB (viii) *Rhizobium* + PSB+ thiourea 500 ppm and (ix) *Rhizobium* + PSB+ salicylic acid 200 ppm were assigned in

Correspondence to: ***Vaishali Chaturvedi****, School of Agriculture,* ***Suresh Gyan Vihar University, India***
Corresponding author. E-mail addresses: vishsha84@gmail.com

Available online at https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.12 Issue 1 Page No 179-183

sub plots, respectively. Parameters Recorded: Plant height, branches per plant, pods per plant, and seeds per pod, test weight, seed yield, straw yield, and nutrient uptake. The data were analyzed as per the standard analysis of variance (ANOVA) procedure for the split-plot design given by Gomez and Gomez (1976). CD at 5% level of probability was worked out to determine between treatment means by the following formula:

$$CD = \sqrt{\frac{2Ems}{r}} \times t_{0.05}$$

3. Results and Discussion

3.1.Growth Attributes

Application of Rhizobium and PSB, especially in combination, enhanced plant height and number of branches compared with the untreated control. Increased vegetative growth was due to better nitrogen fixation and phosphorus solubilization. These results are also in close agreement with the findings of Chattopadhyay and Dutta (2003) in cowpea, Choudhary and Yadav (2011) in cowpea, Jagtap et al. (2022) in green gram, Kalsaria et al. (2017) in green gram and Patel et al. (2016) in green gram.

3.2.Yield Components

The combined use of fertilizers and bio fertilizers significantly improved pods per plant and seeds per pod. Test weight showed slight improvement under inoculated treatments. The biological yield is a function of seed and straw yields. Thus, significant increase in biological yield with the application of N and P could be ascribed due to increased seed and straw yield. These results are also in close agreement with the findings of Mathur et al. (2007) in green gram, Meena et al. (2013) in groundnut and Manoj et al. (2014) in green gram

3.3.Yield Performance

Seed Yield: Maximum grain yield (around 1.0–1.1 t/ha) was achieved with 100% RDF + Rhizobium + PSB, which was statistically superior to other treatments.
- Straw Yield: Highest straw yield (>2.0 t/ha) was also recorded under the same treatment.
- Biological Yield: Integrated treatments produced the maximum total biomass. The result of the present investigation is in agreement with the findings of Sasode (2008) in green gram and Rathore et al. (2010) in urdbean.

3.4.Nutrient Uptake

Nutrient uptake (N, P, and K) improved significantly with bio fertilizer application. Rhizobium enhanced nitrogen fixation, while PSB improved phosphorus mobilization, leading to higher nutrient absorption by plants. The nutrient removal is an integrated

Correspondence to: ***Vaishali Chaturvedi****, School of Agriculture,* ***Suresh Gyan Vihar University, India***
Corresponding author. E-mail addresses: vishsha84@gmail.com

Available online at https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.12 Issue 1 Page No 179-183

function of soil-crop environment, together with amounts and source of nutrient suppy and cultivars of the crops (Prasad *et al.*, 2014 and Pramanik *et al.*, 2014).

4. Conclusion

The experiment demonstrated that combining 100% RDF with Rhizobium and PSB inoculation produced the highest mung bean yield and nutrient uptake. This integrated nutrient management approach not only boosts productivity but also promotes sustainable and eco-friendly farming. Farmers are encouraged to adopt this strategy to enhance mung bean yield while maintaining soil fertility.

References

1. Anonymous. Pulses Revolution-From Food to Nutritional Security. Crops Division, Government of India, Department of Agriculture and Cooperation, Ministry of Agriculture and Farmers Welfare; c2022-23a. p. 14.
2. Anonymous. Rajasthan Agricultural Statistics at a Glance. Department of Agriculture, Pant Krishi Bhawan, Jaipur, Rajasthan; c2022-23b. p. 18.
3. Chattopadhyay, A. and Dutta, D. 2003. Response of vegetable cowpea to phosphorus and bio fertilizers in old alluvial zone of West Bengal. Legume Research **26**(1): 196-199.
4. Choudhary, G.L. and Yadav, L.R. 2011. Effect of fertility levels and foliar nutrition on cowpea productivity. *Journal of Food Legumes* **24**(1): 67-68.
5. Jagtap, M., Ghilotia, Y.K. and Singh, A. 2022. Response of Fertility Levels and Bio-fertilizers on Growth of Green gram [*Vigna radiata* (L.)]. *International Journal for Research Trends and Innovation* **7**(8): 955-958.
6. Kalsaria, R.N., Vekariya, P.D, Hadiyal, J.G. and Ichchhuda, P.K. 2017. Effect of spacing, fertility levels and bio-fertilizers on growth and yield of summer greengram (*Vigna radiata* L. Wilczek). *Journal of Pharmacognosy and Phytochemistry* **6**(5): 934-937.
7. Kumar, B., & Nisha. 2024. Fertility levels and bio-fertilizers effect on mung bean productivity. *Journal of Agricultural Sciences*, **7**(10), 1794.
8. Manoj, Singh, R.K., Singh, A.N., Hardev, R. and Prasad, S.R. 2014. Growth, yield attributes and quality of summer green gram (*Vigna radiata* L.) as influenced by nitrogen and irrigation levels. *Annals of Agricultural Research New Series* **35**(1): 47-53.
9. Mathur, N., Singh, J., Bohra, S., Bohra, A. and Vyas, A. 2007. Agronomic evaluation of promising genotypes of mungbean under hyper arid conditions of Indian Thar Desert. *International Journal of Agricultural Research* **2**: 537- 544.
10. Meena, R.S., Yadav, R.S. and Meena, V.S. 2013. Heat unit efficiency of groundnut

Correspondence to: ***Vaishali Chaturvedi****, School of Agriculture,* ***Suresh Gyan Vihar University, India***
Corresponding author. E-mail addresses: vishsha84@gmail.com

Available online at https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.12 Issue 1 Page No 179-183

varieties in scattered planting with various fertility levels. *The Bioscan* **9**(1): 1189-1192.

11. Mondal, M. M. A., & Rauf, C. A. 2006. Impact of Rhizobium inoculation and nitrogen fertilizer on mung bean yield. *International Journal of Agriculture and Biology*. **8**(2), 238–240.
12. Patel, A.R. Patel, D.D., Patel, T.U. and Patel H.M. 2016. Nutrient management in summer greengram (*Vigna radiata* L. Wilczek). *International Journal of Applied and Pure Science and Agriculture* **2**(2):133-142.
13. Patidar, D., Mishra, D., Gurjar, O. P. 2025. Effect of inorganic fertilizer, vermicomposting and bio fertilizer on mung bean. Advances in Research, **26**(1), 378-383.
14. Pramanik, J. K., Chowdhary, A. K. M. S. H. and Uddin, F. M. J. 2014. Effect of Biofertilizer and Weeding on the Growth Characters and Seed Yield of Summer Mungbean. *Journal of Environmental Science & Natural Resources* **7**: 87-92.
15. Prasad, S. K., Singh, M. K. and Singh, J. 2014. Response of rhizobium inoculation and phosphorus levels onmungbean (*Vigna radiata* L.) under guava-based agri-horti system. *The Bioscan* **9**: 557-560.
16. Rathore, D.S., Purohit, H.S. and Yadav, B.L. 2010. Integrated phosphorus management on yield and nutrient uptake of urdbean (*Vigna mungo* L.) under rainfed condition of southern Rajasthan. *Journal of Food Legumes* **23**(2): 128-131.
17. Sasode, D.S. 2008. Response of green gram [*Vigna radiata* (L.) Wilczek] to fertility levels and sulphur sources application. *Agricultural Science Digest* **28**(1): 18 21.
18.

Correspondence to: ***Vaishali Chaturvedi****, School of Agriculture,* ***Suresh Gyan Vihar University, India***
Corresponding author. E-mail addresses: vishsha84@gmail.com