IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

Effect of varieties and biofertilizers on growth and yield of green gram (*Vigna radiata* L.)

Kanishk Tiwari[1]*, T. Singh[2], Amit Singh Tiwari[3] and Rajeev Kumar Tiwari[1]

[1]M.Sc. Scholar, Department of Agronomy, AKS University, Satna 485001 Madhya Pradesh India

[2]Professor and Head, Department of Agronomy, AKS University, Satna 485001 Madhya Pradesh India

[3]Assistant Professor, Department of Agronomy, AKS University, Satna 485001 Madhya Pradesh India

ABSTRACT

During the *Kharif* season 2020-2021, an investigation was set up at the Research plot, Department of Agronomy, AKS University, Satna (M.P.) to behold the effect of cultivars and biofertilizers on the growth and yield of green gram. The experiment was designed using a Factorial Randomized Block Design with two factors: varieties and biofertilizers. Four varieties which were tested under investigation were Shikha (V_1), Virat (V_2), PM-5 (V_3) and PDM 139 (V_4) and three biofertilizers were *Rhizobium* (B_1), ZSB (B_2) and PSB (B_3) each @ 20 g/kg seed. Results from the investigation revealed that maximum plant height (67.56 cm), number of leaves per plant (15.80), number of branches per plant (6.16), number of root nodules per plant (17.42), number of pods per plant (19.16), pod length (6.55 cm), number of seeds per pod (9.36), test weight (38.06 g), grain yield (11.02 q/ha) and stover yield (21.84 q/ha) were noted in variety 'Shikha'. In the case of biofertilizers, inoculation with *Rhizobium* resulted in significantly better plant height (64.29 cm), number of leaves per plant (14.42), number of branches per plant (4.82), number of root nodules per plant (14.63), number of pods per plant (15.10), pod length (4.70), number of seeds per pod (7.55), test weight (34.61 g), grain yield (8.64 q/ha) and stover yield (18.50 q/ha). Therefore, the variety 'Shikha' and inoculation with *Rhizobium*can be adopted to fetch a higher yield of green gram.

Keywords: Biofertilizers, Cultivars, Green gram, Mung bean, varieties

INTRODUCTION

Pulses play a crucial role in maintaining soil health and employ a distinctive mechanism to harness the atmospheric Nundersymbiosis with *Rhizobium*.Green gram (*Vigna radiata* L.) is a vital pulse crop in tropical and subtropical regions of India, known as "Moong bean". It contains 24.3% protein, is rich in carbs, with low riboflavin and thiamine. It's a good source of phosphorus and iron, high in tryptophan and lysine. Easily digestible, it's popular as whole grains or Dal. Mung bean sprouts are a good source of Vitamin C (ascorbic acid).In India, the crop contributes to 30.85 lakh tonnes in pulse production from an area of 51.30

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

lakh ha, however, the average yield of the crop is 601 kg ha^{-1}. In the state of Madhya Pradesh, green gram boasts a total production of 6.42 lakh tonnes from 5.44 lakh hectares area. The average yield in Madhya Pradesh is 1179 kg ha^{-1} (Anonymous, 2021) [1].Modern green gram varieties typically produce substantially greater yield, and nutrient levels significantly affect their yield components. Farmers often avoid using optimal fertilizer doses, but new varieties with the right amount of fertilizers and inoculation with biofertilizers can boost production. Varieties from different parent origins display significant variations in yield attributes, which are genetically determined. Researchers such as Mondal and Sengupta (2019) [2], have also noted such variations in yield attributes of green gram cultivars.Biofertilizers are employed to boost the microbial population in the rhizosphere, thereby improving nutrient availability for easy absorption by plants [3]. Biofertilizers, also known as microbial inoculants, typically consist of live or dormant cells of efficient strains of nitrogen-fixing, zinc-solubilizing microorganisms, and phosphate-solubilizing microorganisms. These strains have the capability to convert essential nutrients from an unavailable to an available form through biological processes, benefiting soil treatment. Biofertilizers can inhabit the rhizosphere, promoting plant growth by increasing nutrient availability and supply or providing growth stimuli to crops.

MATERIALS AND METHODS

The experiment was conducted at the Research Plot, Department of Agronomy, AKS University, Satna (M.P.). The location was at 24.56680° N,80.79218° E. A composite soil sample was collected randomly to a depth of 0-30 cm before crop sowing in the experimental field. This sample was air-dried in the shade, passed through a 2 mm sieve, and used for analysis. Soil analysis confirmed that the experimental field's soil was clay loam (with 37.26 % sand, 29.53 % silt and 33.21 % clay). The soil had an electrical conductivity of 0.21 dSm^{-1}, soil organic carbon content of 0.43 %, and available nitrogen, phosphorus, and potassium levels of 173.5 kg ha^{-1}, 12.5 kg ha^{-1}, and 200.00 kg ha^{-1}, respectively.During the *Kharif* season of 2020-2021, the mean temperature fluctuated between a maximum of 32.39°C and a minimum of 21.71°C. The mean maximum and minimum relative humidity ranged between 70.67 % and 55.33 %, respectively. A total of 1306.70 mm of rainfall was recorded during the crop season. The experiment consisted of 12 treatment combinations, involving four varietiesviz., Shikha (V_1), Virat (V_2), PM-5 (V_3) and PDM 139 (V_4) and three biofertilizers i.e., *Rhizobium* (B_1), ZSB (B_2) and PSB (B_3) each @ 20 g/kg seed. The experiment was

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

arranged in a factorial randomized block design with three replications. For the green gram crop, a full dose of nitrogen, phosphorus and potassium @ 20:40:20 kg N: P_2O_5: K_2O $ha^{-1}$was applied before sowing through Urea, SSP and MOP.

RESULT AND DISCUSSION

Effect of varieties

Data in Table 1 manifest that varieties had a significant response towards growth-defining components. Among four varieties tested under investigation, 'Shikha' outperformed the other varieties *viz*., Virat, PM-5 and PDM-139 and recorded the highest plant height (67.56 cm), number of leaves per plant (15.80), number of branches per plant (6.16) which was followed by the variety 'Virat'. The cultivar 'Shikha' had the highest number of root nodules per plant (17.42) followed by 'Virat'. Whereas, plants containing the lowest number of root nodules were seen under 'PM-5'.Variations in plant height, branch formation and leaf production among the different varieties may be attributed to the inheritance of genetic distinctions among these varieties.High variability for these traits was reported by Langpei*et al*. (2020) [4].

The findings related to factors influencing yield, such as the number of pods per plant, length of pod, number of seeds per pod, and test weight, clearly indicated that Shikha outperformed Virat, PM-5 and PDM-139. Plants with the highest number of pods per plant (19.16), length of pod (6.55 cm), number of seeds per pod (9.36) and test weight (38.06 g) were observed in the variety 'Shikha' while 'PM-5' appeared to be least effective in terms of these aforementioned yield attributes.The notable variability in yield-contributing traits among various varieties is primarily a result of genetic factors. Several researchers, including Ashwini *et al*. (2021) [6], Awadhiya*et al*. (2021) [7], have similarly observed these variations in yield attributes among green gram varieties.

The highest grain yield (11.02 q/ha) and stover yield (21.84 q/ha) were recorded under 'Shikha' followed by Virat with grain and stover yield of 8.22 and 18.96 q/ha. Significantly highest harvest index (33.41 %) was obtained under 'Shikha' and 'PDM-139'. The enhanced grain yield and its associated factors can be attributed to the proliferation of branches, leaves, and root nodules, which function as highly efficient photosynthesis structures, resulting in substantial production of carbohydrates within the plant system.Similar findings were also reported .

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

Effect of biofertilizers

The beneficial effects of biofertilizers were seen during the active growth stage of the mung bean crop. Among different biofertilizers, seed treatment with *Rhizobium*registered substantially higher plant height (64.29 cm), number of leaves per plant (14.42) and number of branches per plant (4.82) as compared to ZSB and PSB.While application of ZSB resulted in the lowest mean values of these traits.Enhanced growth under *Rhizobium* application might be attributed to more N fixation which led to the production of taller plants with more count of leaves and branches. These results confirm the findingsof Tyagi and Singh (2019) [11], Katiyar *et al*. (2020) [12]. The variety 'Shikha' had considerably higher root nodules (14.63) than other varieties. It may be due to the genetic composition of the cultivar.

Seed treatment with *Rhizobium*enhanced the yield-defining component with maximum values for the number of pods per plant (15.10), length of pod (4.7 cm), number of seeds per pod (7.55) and test weight (34.61 g) in comparison to ZSB and PSB.However, all the yield-definingcomponents (except test weight) were at par with the inoculation with PSB. The grain yield (8.64 q/ha) and stover yield (18.50 q/ha) were obtained to be maximum under inoculation with *Rhizobium*; however, grain yield was at par with the value obtained under PSB. There was no considerable difference in variation in harvest index among the varieties tested under investigation. A similarfinding has been recorded by Reddy*et al*. (2020) [14] and Chahal*et al*. (2022) [15].

CONCLUSION

On the basis of the results summarized above, it can be stated that among the cultivars, 'Shikha' appeared to be most effective for enhanced growth and fetching higher yield (11.02 q/ha). Likewise, in the case of biofertilizers, inoculation with *Rhizobium* led to better results in terms of growth and yield (8.64 q/ha)of green gram.

ACKNOWLEDGEMENT

The authors are thankful to the Dean, Faculty of Agriculture Science and Technology, AKS University, Satna (M.P.) for providing the necessary facilities and inputs during this venture.

REFERENCES

[1] Anonymous. Crop-wise Area, Production and Productivity of Pulses from 2010-11 to 2020-21, DPD, GoI, Bhopal Pp: 12. 2021.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

[2] Mondal R, Sengupta K. Study on the performance of mung bean varieties in the New Alluvial Zone of West Bengal. Journal of Crop and Weed, 2019;15(1):186-191.

[3] LangpeiP, Jamkhogin L, Gogoi M, Devi YS,Korav S. Effect of different dates of planting and varieties on the growth and yield of summer mung (*Vigna radiata* L.) under Manipur valley condition. The Pharma Innovation Journal, 2020;9(4):87-90.

[4] Ashwini M, Mavarkar NS, Girijesh GK, and Sridhara CJ. Effect of different varieties, spacing, fertilizer levels and their interactions on grain yield and yield components (*Vigna radiata* L.) in rainfed situation under southern transitional zone of Karnataka. Journal of Pharmacognosy and Phytochemistry, 2021;10 (2):1094-1099.

[5] Awadhiya P, Singh T, and Yadav T. Effect of Phosphorous Levels and Varieties on Growth, Yield and Quality of Black Gram (*Vigna mungo* L.). Ind. J. Pure App. Biosci. 2021;9(2):47-50.

[6] Tyagi PK, Singh VK. Effect of integrated nutrient management on growth, yield and nutrients uptake of summer green gram (*Vigna radiata*). Annals of Plant and Soil Research, 2019;21(1):30-35.

[7] Katiyar D, Kumar S, Singh N. Effect of Rhizobium and PSB inoculation on growth, yield attributes and yield of chickpea (*Cicer arietinum* L.). International Journal of Chemical Studies, 2020;8(4):3729-3734.

[8] Reddy DB, Ganesh V,Dhanuka D. Effect of integrated nutrient management on growth and yield in green gram (*Vigna radiata* L. Hepper) under Doon Valley condition. Journal of Pharmacognosy and Phytochemistry, 2020;9(5):2928-2932.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

Table 1. Effect of varieties and biofertilizers on growth, yield attributes and yield of green gram

Treatments	Plant height (cm) at harvest	Number of leaves per plant at harvest	Number of branches per plant at harvest	Number of root nodules per plant	Number of pods per plant	Length of pod (cm)	Number of seeds per pod	Test weight (g)	Grain yield (q/ha)	Stover yield (q/ha)	Harvest index (%)
Varieties											
V_1	67.56	15.8	6.16	17.42	19.16	6.55	9.36	38.06	11.02	21.84	33.41
V_2	63.66	13.89	4.53	15.2	14.78	4.4	7.53	34.73	8.22	18.96	30.2
V_3	57.77	11.76	2.62	9.2	10.58	3.32	5.09	27.92	6.4	12.79	33.41
V_4	61.4	12.71	3.53	12.38	11.91	3.55	6.22	32.23	6.85	16.45	29.46
S.Em±	**0.35**	**0.3**	**0.19**	**0.21**	**0.37**	**0.22**	**0.18**	**0.29**	**0.25**	**0.34**	**0.78**
C.D. (*P*=0.05)	**1.02**	**0.87**	**0.55**	**0.62**	**1.08**	**0.65**	**0.54**	**0.84**	**0.73**	**0.99**	**2.29**
Biofertilizers											
B_1	64.29	14.42	4.82	14.63	15.1	4.7	7.55	34.61	8.64	18.5	31.67
B_2	61.17	12.9	3.65	12.43	12.87	4	6.52	31.82	7.44	16.78	31.01
B_3	62.34	13.3	4.17	13.58	14.35	4.66	7.08	33.29	8.28	17.25	32.19
S.Em±	**0.3**	**0.26**	**0.16**	**0.18**	**0.32**	**0.19**	**0.16**	**0.25**	**0.22**	**0.29**	**0.68**
C.D. (*P*=0.05)	**0.88**	**0.75**	**0.47**	**0.53**	**0.94**	**0.56**	**0.47**	**0.73**	**0.63**	**0.86**	**NS**

V_1: Shikha, **V_2**: Virat, **V_3**: PM-5 and **V_4**: PDM-139 and **B_1**: *Rhizobium*, **B_2**: ZSB and **B_3**: PSB

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

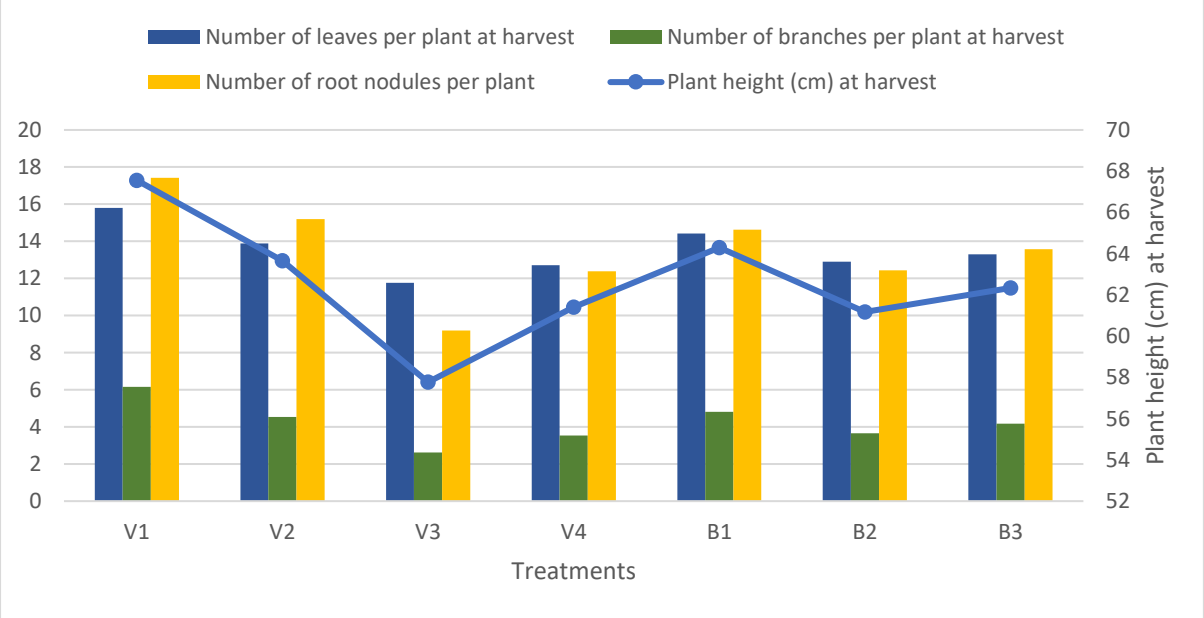
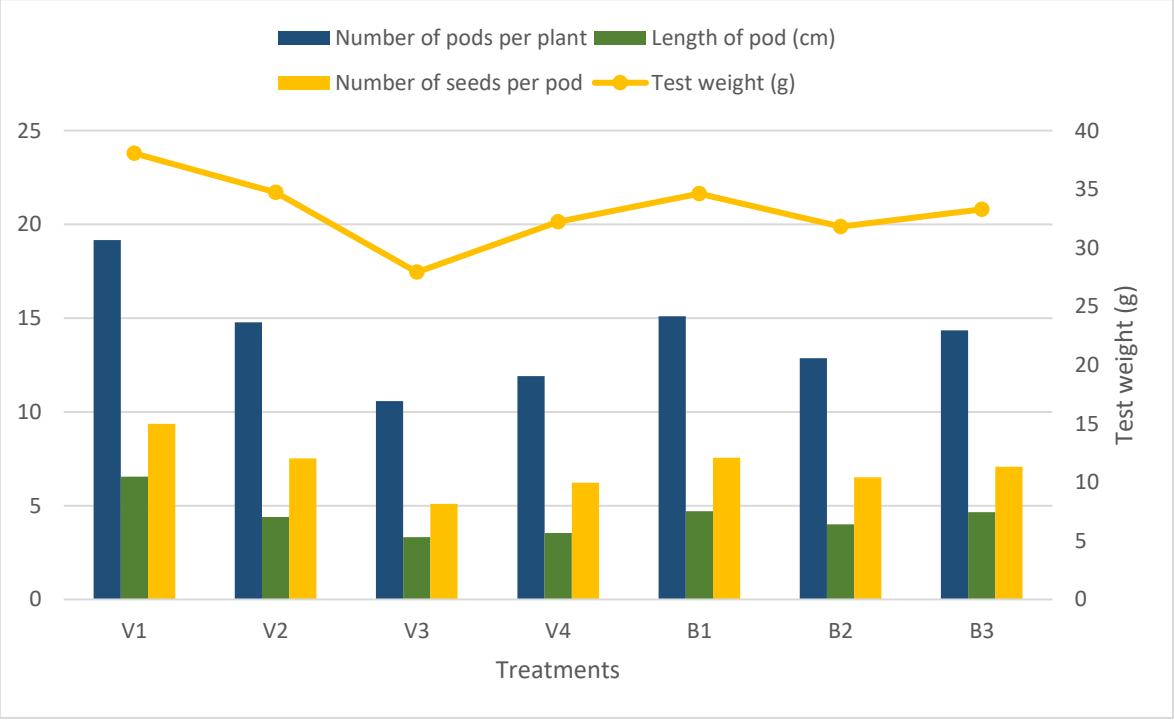


Fig 1: Effect of varieties and biofertilizers on growth characters of green gram.



ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, 2022

Fig 2: Effect of varieties and biofertilizers on yield attributes of green gram

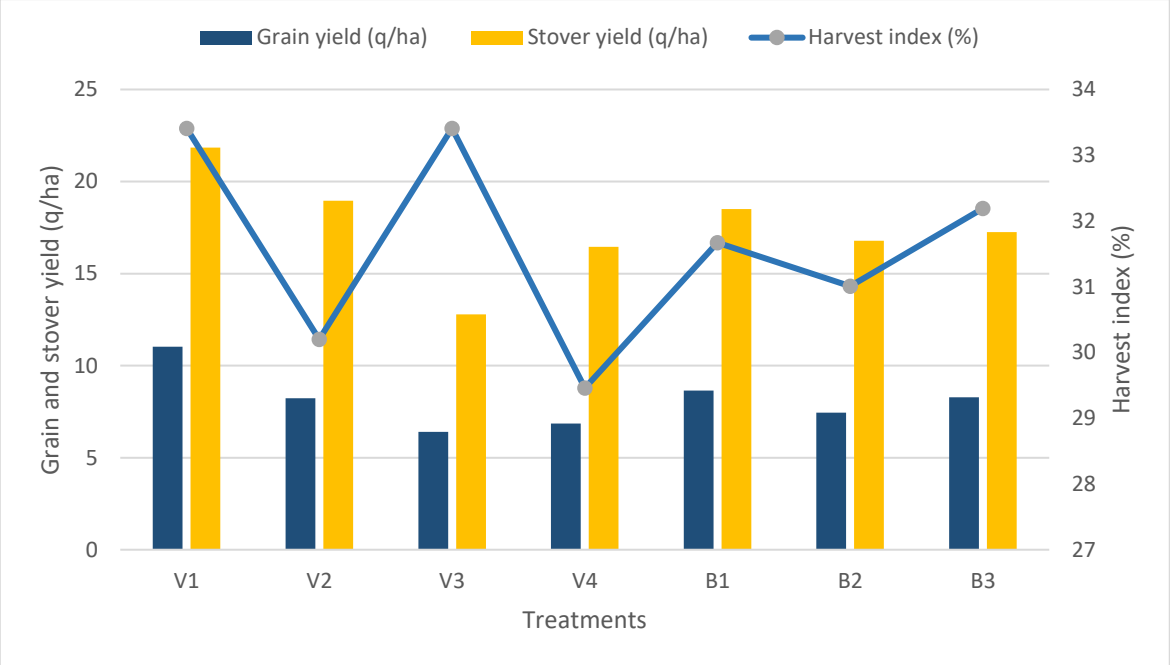


Fig 3: Effect of varieties and biofertilizers on grain yield (q/ha), stover yield (q/ha) and harvest index (%) on green gram