Original Research Article

EFFECT OF VARIETIES AND SPACING ON GROWTH AND YIELD OF GREEN GRAM (*VIGNA RADIATA* L.)

ABSTRACT

Aim : This research was conducted to evaluate the effect of varieties and spacing on growth and yield of green gram (*Vigna radiate L.*)

Study Design : Split Plot Design

Place and Duration of Study : The experiment was conducted during kharif season of 2021 at G.H. Raisoni University Student Research Farm, Saikheda.

Methodology : The experiment consisted of three main treatments of varieties Kopargaon(V_1), Sindhu (NVL-605)(V_2) and PDM-139 (Samrat)(V_3)and four sub treatments of spacing 30 cm x 10 cm(S_1), 30 cm x 15 cm(S_2),45 cm x 10 cm(S_3) and 45 cm x 15 cm(S_4) were evaluated.The significantly maximum number of branches per plant, number of leaves per plant, number of pods per plant, pod length, number of grains per pod, test weight, seed and stover yield per hectare, protein content.

Result:maximum number of branches per plant(8.60), number of leaves per plant(21.00), number of pods per plant(15.53), pod length(8.55 cm), number of grains per pod(9.80), test weight(37.66 g), seed(9.06q/ha) and stover yield(18.49q/ha), protein content(22.78%)

Conclusion: Showed that green gram variety PDM-139 (Samrat) when sown with spacing level of 30 cm x 10 cmrecorded the maximum and significantly higher values of growth and yield parameters.

Keywords: Green gram, varieties, branches, pods, test weight, stover yield.

UNDER PEER REVIEW

INTRODUCTION

Green gram (*Vigna radiata* L.) is an important pulse crops in our country after chickpea and pigeon pea. It is important short duration grain legume crops with wide adaptability, low input requirement and has the ability to improve soil fertility by fixing atmospheric nitrogen by

adding 20-25 kg N /ha well suited to small holder production under adverse climatic conditions (Vijayalakshmi and Bhattacharya, 2006). Green gram is grown on about 3.70 million hectares with annual production of 1.57 million tons. India is the largest producer of green gram and account for 54% of the world production and covers 65% of the world acreage.During 2017-2018, 1.9 MT of mung bean was produced from 4.07 M ha area (DES, 2018) distributed over different seasons. While Madhya Pradesh contributes 5.47 per cent of total mung bean area in India i.e., 2.97 lakh hectare area with 2.20 lakh tons of production which contributes 11.57 per cent of total mung bean production in India in 2017-18 (Anonymous, 2018).

It is a drought resistant crop and suitable for Dryland farming and predominantly used as an intercrop with other crops.It is an important grain legume of the country, has wider adaptability throughout the year and is growing during Kharif & Zaid in north India and Rabi season in south India.

In order to fulfil the requirement of country sometimes import of pulses is the usual process of food seed trade of India. A number of high yielding varieties have been developed at different research station of the state. These varieties yield two to three times more than the older varieties These varieties also differ in their yielding potential under different climate and edaphic conditions Different varieties of green gram have varying nutrient demand and climate adaptability. Therefore, selection of appropriate adoptable variety requires immediate and large efforts in the direction of an improved varieties for a particular tract and its distribution.

In production of green gram, it is more desirable and essential to achieve simultaneously the twin objective of maximum yield as well as best quality seeds. This could be achieved by providing the most optimum plant population per unit area and balanced nutrient under field conditions which could be provided by optimizing the spacing and fertilizer levels. It is essential to provide optimum plant population density per unit area by adjusting the spacing levels in green gram. Unlike the normal spacing, the plants grown in closer spacing exhibit more vertical growth, but tend to give less yield and poor- quality seeds due to stiff competition for space, light, nutrient and moisture in view of heavier plant population pressure (Dhanraj *et al*.,2001). Keeping these points in view, the present investigations were under taken.This studyevaluate the effect of varieties and spacing on growth and yield of green gram (*Vigna radiate L.*).

MATERIALS AND METHODS

UNDER PEER REVIEW

at the student instructional field, department of Agronomy, School of Agricultural sciences, G. H. Raisoni University, Saunsar, Distt- Chhindwara (M.P.) during *kharif* season of year 2020- 21. A set of 12 treatment combinations including three green gram varieties as main plot treatment *viz*., Kopargaon (V_1), Sindhu (NVL-605) (V_2) and PDM-139 (Samrat) (V_3) and four spacing levels as sub plot treatment *viz*., 30 cm x 10 cm (S_1), 30 cm x 15 cm (S_2), 45 cm x 10 cm (S_3) and 45 cm x 15 cm (S_4) were evaluated. Treatments were replicated thrice as per Split plot design. Full recommended dose of nitrogen, phosphorus and potassium at the rate of 25 kg N/ha, 50 kg P_2O_5/ha and 40 Kg K_2O /ha, respectively was uniformly applied to each plot as basal dose before sowing. Each fertilizer i. e. nitrogen,phosphorus and potassium were applied in each plot as basal at the time of sowing as 100 % fertility levels. Fertilizers were applied by placement i.e., 5 cm away from seed row and of 5 cm below the seed zone. All the other agronomic practices were applied uniformly to all the treatments.

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RESULTS AND DISCUSSION

GROWTH PARAMETERS

Number of branches as well as leaves per plant are important growth parameters contributing to seed yield of any crop. Number of leaves and branches per plant represents index of growth and development indicating the infrastructure build-up of plants.

It is evident from the data that number of leaves as well as branches per plant (Table- 1) increased successively under different varieties. Among different varieties, PDM-139 (Samrat) produced significantly maximum number of branches as well as leaves per plant(7.12 and 17.85) than others. Among the spacing levels, crop sown with 30 cm x 10 cm spacing, produced significantly maximum number of branches and leaves per plantwith the respective value of 7.07 and 17.47,then others.

Interactions between green gram varieties and spacing levels, green gram variety PDM-139 (Samrat) sown with spacing level of 30 cm x 10 cm produced significantly maximum number of branches as well as leaves per plant(8.60 and 21.00).

Performance of any crop in respect of growth, yield and quality are highly influenced by various factors like genetic constitution of variety, micro-climate of the area and crop management. The wide variation in growth parameters of all the genotypes might be due to their

UNDER PEER REVIEW

genetic makeup, which indirectly govern the morphology of the plant. Since all the varieties were grown under the same climatic condition. Similar result was reported by Tripathi *et al*. (2012), Akhila*et al*., (2017) and Govardhan *et al*. (2017). The differences among the varieties with respect to branches formation may be owing to inheritance of genetic divergence of the varieties. The present findings have been supported by many workers like Verma *et al*. (2011). Further, the differential behaviour among the varieties could be explained by the variation in their genetic makeup and their differential behavior under different climatic conditions. Govardhan *et al*. (2017) at different locations also obtained similar variation in green gram varieties in terms of plant height, number of branching dry matter accumulation and nodules.

The number of branches and leaves per plant were more in spacing of 30 ×10 cm when compared to other spacing. It may be ascribed to the better growth of plants under this spacing and it exhibited better vegetative growth due to less plant population density and competition which resulted in more horizontal growth and plant canopy area compared to those under this spacing. So, the branch and leaf bearing capacity increased. The similar results are agreement with Satodiya*et al*., (2015).

YIELD ATTRIBUTES AND YIELD

It is evident from the data that number of number of pods per plant, pod length, number of grains per pod, test weight, seed and stover yield per hectare (Table- 1) increased successively under different treatments. Among different varieties, PDM-139 (Samrat) produced significantly maximum number of pods per plant, pod length, number of grains per pod, test weight, seed and stover yield per hectare (13.03, 6.57 cm, 8.05, 34.44 g, 7.67 q/ha and 17.08q/ha, respectively) than others. Among the spacing levels, crop sown with 30 cm x 10 cm spacing, produced significantly number of pods per plant, pod length, number of grains per pod, test weight, seed and stover yield per hectare (12.91, 6.29 cm, 7.64, 34.03 g, 7.46 q/ha and 17.14q/ha, respectively).

Interactions between green gram varieties and spacing levels, green gram variety PDM-139 (Samrat) sown with spacing level of 30 cm x 10 cm produced significantly number of pods

UNDER PEER REVIEW

per plant, pod length, number of grains per pod, test weight, seed and stover yield per hectare (15.53, 8.55 cm, 9.80, 37.66 g, 9.06 q/ha and 18.49 q/ha, respectively) then others.

Varieties registered significant differences for various yield attributes. The number of pods per plant, length of pod, number of grains per pod, test weight, seed yield, straw yield and harvest index was recorded maximum with green gram variety PDM-139 (Samrat). These results have attributed mainly because of maximum number of branches which in turn has resulted in maximum number of pods per plant, pod length, fresh weight of pod and test weight in PDM-139 (Samrat) as compared to all other varieties tested. Higher vegetative growth especially more number of branches helped in synthesis of greater amount of food material which might have increased yield attributes. Similar result was reported by Mondal and Sengupta (2019) These results are in close conformity with the findings of Akhila*et al*., (2017), Dash and Rautary (2017) and Mondal and Sengupta (2019).

Increase in grain yield and its parameters may be due to increase in the number of leaves which worked as an efficient photosynthesis structure and produced high amount of carbohydrates in the plant system. More number of branches which borne more number of flowers, which resulted higher fruits/plant and fruit yield and their attributes. Similar findings also reported by Kudi*et al*. (2017) and Narendra *et al*., (2019).

The maximum yield and yield attributes were registered under the plant geometry 30 × 10 cm. These superior values under this spacing may be attributed to better growth and development of plants under less plant density which leads into better source to sink relationship due to availability of balanced and adequate nutrients and better light, space and moisture unlike in narrow spacing. recorded maximum seed yield, straw yield, biological yield and harvest index. It may be due to accommodation of more plant population per unit area. Similar results were also reported by Tiwari *et al*., (2016), Ravi*et al*., (2018) and Veeramani, (2019).

PROTEIN CONTENT

Among different varieties, PDM-139 (Samrat) produced significantly highest protein content(22.38%). Among the spacing levels, crop sown with 30 cm x 10 cm spacing, produced significantly highest protein content of 22.10%, then others.

UNDER PEER REVIEW

Interactions between green gram varieties and spacing levels, green gram variety PDM-139 (Samrat) sown with spacing level of 30 cm x 10 cm produced significantly highest protein content of 22.78%.

The uptake of a nutrient is a product of yield and its concentration in plant, the significant increase in total uptake of nitrogen, phosphorus and iron of variety PDM-139 (SAMRAT) might be the result of cumulative effect of higher content of these nutrients in grain and straw along with its higher yield. The results of the present investigation regarding differential behaviour of green gram varieties with respect to nutrient concentration, their uptake and protein content are in close conformity with findings of other workers like Dash and Bherva (2018) and Patidar and Singh (2018).

In the present study, the protein content was varied significantly with different plant spacing. Maximum protein content was registered with plant spacing of 30 cm x 10 cm. Similar results were also reported by Kumar et al. (2015).

CONCLUSION

From the results, it was highlighted that under the agro-climatic condition of Chhindwara(M.P.), the sowing of green gram variety PDM-139 (Samrat) with the spacing level of 30 cm x 10 cm found to be the best for growth and yield attributing characters as well as seed yield.

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UNDER PEER REVIEW

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UNDER PEER REVIEW

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UNDER PEER REVIEW

TABLE 1: EFFECT OF DIFFERENT VARIETIES AND SPACING LEVELS ON GROWTH ANDYIELD OF GREEN GRAM

Treatment	**Number of branches per plant**	**Number of leaves/ plant**	**number of pods per plant**	**Pod length (cm)**	**Number of grains per pod**	**Test weight (g)**	**Seed yield (q/ha)**	**Stover yield (q/ha)**	**Protein content (%)**
	Effect of varieties								
V_1	6.42	15.58	11.52	5.36	6.85	32.56	5.54	15.40	21.87
V_2	5.45	11.84	8.90	3.74	5.07	28.27	4.91	14.00	19.68
V_3	7.12	17.85	13.03	6.57	8.05	34.44	7.67	17.08	22.38
S. Em±	0.21	0.29	0.32	0.20	0.24	0.24	0.09	0.22	0.15
C. D.	0.83	1.16	1.28	0.81	0.97	0.96	0.40	0.89	0.61
	Effect of spacing								
S_1	7.07	17.47	12.91	6.29	7.64	34.03	7.46	17.14	22.10
S_2	6.40	16.85	12.18	5.59	7.06	32.81	7.00	16.67	21.83
S_3	6.27	13.71	10.16	4.62	6.20	30.47	5.07	14.36	20.75
S_4	5.58	12.33	9.35	4.38	5.71	29.71	4.59	13.78	20.56

S. Em±	0.15	0.33	0.33	0.24	0.19	0.27	0.16	0.29	0.16
C. D.	0.44	0.99	0.99	0.71	0.57	0.82	0.49	0.89	0.47
	Interaction effect between varieties and spacing levels								
S_1V_1	6.67	18.73	13.27	6.19	7.73	33.84	7.81	17.98	22.40
S_1V_2	5.93	12.67	9.93	4.12	5.40	30.60	5.54	14.97	21.13
S_1V_3	8.60	21.00	15.53	8.55	9.80	37.66	9.06	18.49	22.78
S_2V_1	6.60	17.27	12.33	5.86	7.58	33.75	7.42	17.55	22.31
S_2V_2	5.80	12.60	9.13	3.68	5.20	29.95	4.82	14.42	20.51
S_2V_3	6.80	20.67	15.07	7.23	8.40	34.74	8.78	18.05	22.66
S_3V_1	6.33	13.60	10.27	4.80	6.40	31.52	3.50	13.40	21.47
S_3V_2	5.87	11.80	9.00	3.58	5.00	26.72	4.79	13.65	18.62
S_3V_3	6.60	15.73	11.20	5.49	7.20	33.18	6.94	16.04	22.17
S_4V_1	6.07	12.73	10.20	4.58	5.67	31.13	3.42	12.65	21.29
S_4V_2	4.20	10.27	7.53	3.56	4.67	25.82	4.48	12.97	18.47
S_4V_3	6.47	14.00	10.33	5.00	6.80	32.17	5.89	15.72	21.91
S. Em±	0.11	0.43	0.45	0.21	0.17	0.29	0.09	0.32	0.11
C. D.	0.23	0.87	0.91	0.43	0.36	0.59	0.19	0.65	0.21

UNDER PEER REVIEW