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# Response of green gram (Vigna radiata L.) to varieties and different dates of sowing

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**ABSTRACT**

The experiment was conducted at the Research plot, department of Agronomy, AKS University, Satna (M.P.) during kharif season of year 2020-21. The experiment was laid out in Randomized block design having factorial concept (FRBD). Treatment combinations consisting of four varieties (viz., $V_1$ - Virat, $V_2$ - Shikha, $V_3$ - PM-5, $V_4$ - PDM-139) of green gram and three date of sowing (viz., $D_1$ - 1st week of July, $D_2$ - 2nd week of July, $D_3$ - 3rd week of July) thus making 12 treatment combinations with 3 replications was employed in this study. The plant growth parameters were taken at 20,40 DAS and at harvest. Plant height, no of leaves per plant, no of pods per plant, no. of branches per plant, length of roots, root nodules, yield of grain and stoves were maximum found in Shikha under sowing time is 1st week of July ($V_2D_1$) found at par with other treatments.

**Keywords**: green gram, variety, branches, plant, grains, stover root nodules.

## INTRODUCTION

Green gram (Vigna radiata L.) is an important pulse crop of kharif season in India. It is locally called as moong or mung and belongs to the family Leguminoseae. It fixes atmospheric nitrogen and improves soil fertility by adding 20-25kg N /ha. Mung bean has originated in India and is a native of India and central Asia. Pulses are the important sources of protein, vitamins and minerals for the predominantly vegetarian population and are popularly known as ‘’poor man‘s meat“and ‘’rich man’s vegetable”. Green gram (Vigna radiata L.) is a good source of high-quality protein. Green gram can also be used as a cattle feed. After harvesting the pods, green plants are uprooted or cut from ground level and chopped into small pieces and fed to cattle. India ranks first in the world concerning area as well as production of mung bean. In India, mung bean occupies 51.30 Lakh hectares area and contributes to 30.85 lakh tonnes in pulse production, however, productivity of mung bean is just 601 kg/ha. In Madhya Pradesh mung bean occupies 5.44 lakh hectare area with the total production of about 6.42 lakh tonnes, average yield of mung bean in MP is 1179Kg/ha (Directorate of economic & statistics 2020-21).

The release of high yielding varieties has contributed a great deal towards the improvement of greengram yields. Many improved varieties viz., KKM-3, Pusa Baisaki, PS-16, TAP-7, BGS-9, DGGV-2 and Chaina Mung has been developed and released for general cultivations in Karnataka, the yield potential of these high yielding varieties can be further exploited through better agronomic practices. The gap between potential and existing yield of greengram can be bridged by using optimized spacing of various greengram varieties to improve its production by achieving optimum plant population (Sathyamoorthiet al., 2012)

Sowing time, a non-monetary input, is the single most important factor to obtain optimum yield. Hence determination of optimum sowing time for green gram is inevitable. Optimum time of sowing of green gram may vary from genotype to genotype. Therefore, there must be a specific sowing period during the relevant season for different genotypes to obtain maximum yield, as opined by Kalra et al. (2008). Sowing time affects plant physiological and morphological specifications like effect on vegetative and reproductive periods, harvest index, yield and its quality. To achieve good yield, crop must be sown at appropriate time (Ahmed et al.2014).

The optimum time of sowing ensures the complete harmony between the vegetative and reproductive phases on one hand, and the climatic rhythm on the other and helps in realizing the potential yield. Time of sowing determines time of flowering and it has great influence on dry matter accumulation, seed set and seed yield. The climatic parameters like rainfall and temperature are the major determinants of pulse productivity besides other factors like quality seed availability and associated biotic stresses (Dubey et al., 2011).

The optimum time of sowing may vary with different varieties of mung bean however, information about response of newly developed mung bean cultivar to different sowing date is lacking. Therefore, an experiment was planned and conducted on different dates of sowing on kharif mung bean genotypes, so that these indices can be used as tools for characterizing thermal response in different cultivars of mung bean.

## MATERIALS AND METHODS

Experiment was carried out at the Research plot, department of Agronomy, AKS University, Satna (M.P.) during kharif season of year 2020-21. The experiment was laid out in Randomized block design having factorial concept (FRBD). The experiment was conducted in randomize block design. Treatment combinations consisting of four varieties (viz., $V_1$ - Virat, $V_2$ - Shikha, $V_3$ - PM-5, $V_4$ - PDM-139) of green gram and three date of sowing (viz., $D_1$ - 1$^{st}$ week of July, $D_2$ - 2$^{nd}$ week of July, $D_3$ - 3$^{rd}$ week of July) thus making

12 treatment combinations with 3 replications was employed in this study. The gross and net plot size was 5.0× 3.0 m = 15 $m^2$ and 4.5m × 2.4 m = 10.8$m^2$ respectively. The experimental plots were fertilizers as per recommended dose.

## RESULTS AND DISCUSSION

The result shows that growth, yield, quality and economics was influenced significantly due to green gram varieties and date of sowing.

**Influence on growth characters**

Plant growth attributes like plant height (cm) (Table 1.1) is considered to be an important factor to judge the vigor in green gram. The vegetative growth is an essential prerequisite for higher yield. Result revealed from the Table 1.1. Those differences among the various varietiesx dates of sowingand their interaction were found significant for plant height (cm) at Harvest stage of Green Gram.

Result revealed from table that differences among the various Varieties x dates of sowingand their interaction were found significant for number of trifoliate leaves per plant at Harvest stage (Table 1.1) maximum trifoliate leaves of per plant recorded under the treatment $V_2D_1$ (cv. Shikha exhibited greater plant height under 1$^{st}$ week of July).

Analysis data of Number of branches per plant (Table 1.1) showed that effect of Varieties gave significant result whereas; effect of dates of sowingand their interaction gave significant result. Treatment $V_2D_1$ (cv. Shikha exhibited greater plant height under 1$^{st}$ week of July) gave maximum Number of branches per plant at 30, 60 and Harvest, respectively).

Analysis data of Number of nodules per plant (Table 1.1) showed that effect of Varieties x dates of sowing and their interaction gave significant result. Treatment $V_2D_1$ (cv. Shikha exhibited greater plant height under 1$^{st}$ week of July) gave maximum Number of nodules per plant at harvest respectively.

Similar findings were also recorded by Dhobleet al. (1990), Parvez (2013), Bobade et al., (2018), Mondal and Sengupta (2019),Bankar et. al, (2020).

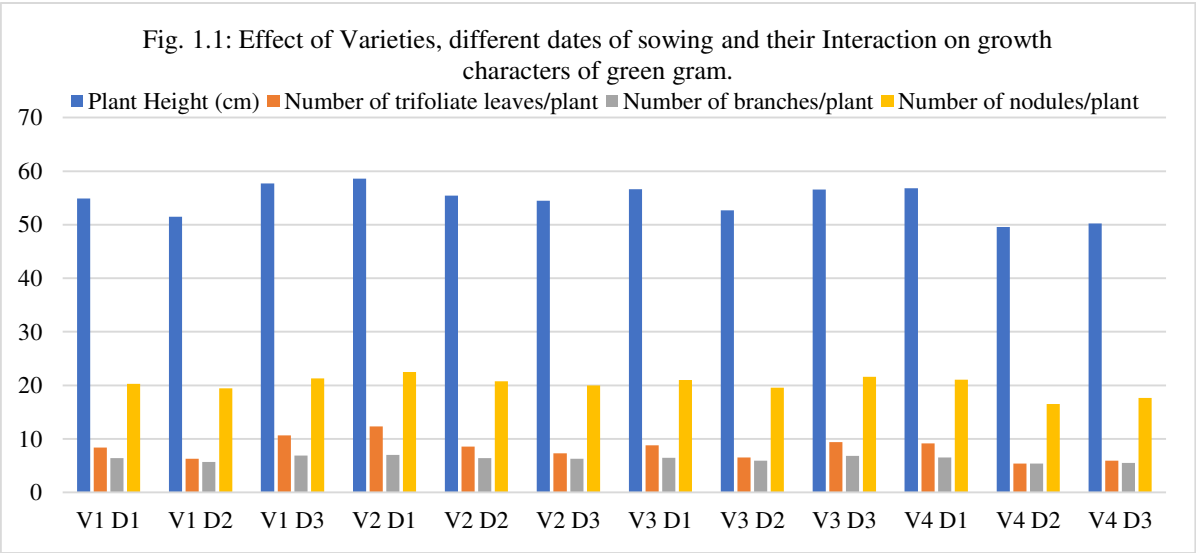
**Table 1.1 Effect of Varieties, different dates of sowing and their Interaction on growth charactersof green gram.**

| Treatments | Plant Height (cm) | Number of trifoliate leaves/plant | Number of branches/plant | Number of nodules/plant |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **$V_1 D_1$** | 54.90 | 8.42 | 6.39 | 20.28 |
| **$V_1 D_2$** | 51.47 | 6.28 | 5.73 | 19.45 |
| **$V_1 D_3$** | 57.73 | 10.67 | 6.89 | 21.28 |
| **$V_2 D_1$** | 58.60 | 12.31 | 7.03 | 22.50 |
| **$V_2 D_2$** | 55.44 | 8.54 | 6.44 | 20.79 |
| **$V_2 D_3$** | 54.50 | 7.29 | 6.31 | 19.99 |
| **$V_3 D_1$** | 56.64 | 8.79 | 6.49 | 20.99 |
| **$V_3 D_2$** | 52.68 | 6.54 | 5.95 | 19.59 |
| **$V_3 D_3$** | 56.58 | 9.42 | 6.84 | 21.61 |
| **$V_4 D_1$** | 56.78 | 9.19 | 6.55 | 21.07 |
| **$V_4 D_2$** | 49.57 | 5.38 | 5.39 | 16.49 |
| **$V_4 D_3$** | 50.24 | 5.94 | 5.55 | 17.64 |
| **S Em±** | **0.35** | **0.24** | **0.07** | **0.34** |
| **C.D. (P+=0.05)** | **1.01** | **0.69** | **0.22** | **0.99** |

Fig. 1.1: Effect of Varieties, different dates of sowing and their Interaction on growth characters of green gram.




**Influence on yield attributes**

Number of pods per plant(Table 1.2) showed that effect of Varieties and dates of sowing gave significant result whereas, interaction effect of Varieties x dates of sowing showed significant result.

Seed yield per plant (g) (Table 1.2) showed significant result for Varieties, dates of sowing and their interaction. Maximum Seed yield per plant (g) was recorded under treatment $V_2D_1$ (cv. Shikha exhibited greater plant height under 1$^{st}$ week of July) showed significant result for Varieties, dates of sowing and their interaction.

Analysis data for Seed yield per plot (kg) (Table 1.2) showed that effect of Varieties, dates of sowing gave significant result and their combinations showed significant result.

Maximum Seed yield per plot (kg) with treatment $V_2D_1$ (cv. Shikha exhibited greater plant height under 1st week of July).

Analysis data for Seed yield (q/ha) per hectare (Table 1.2) showed that effect of Varieties, dates of sowing and their combinations showed significant result. $V_2D_1$ (cv. Shikha exhibited greater plant height under 1st week of July) (7.82 q/ha) gave maximum Seed yield (q/ha) respectively. Higher seed yield of Green Gram was obtained mainly due to improvement in yield components.

Analysis data for straw yield (q/ha) (Table 1.2) showed that effect of Varieties, dates of sowing and their combinations showed significant result. $V_2D_1$ (cv. Shikha exhibited greater plant height under 1st week of July) gave maximum straw yield (q/ha) respectively.

Analysis data for Test Weight (g) (Table 1.2) showed that effect of Varieties, dates of sowing gave significant result and their combinations showed significant result. Maximum Test Weight (g) with treatment $V_2D_1$ (cv. Shikha exhibited greater plant height under 1st week of July).

Similar findings were also recorded by Choudhary et al. (1989), Monem et al. (2012), Singh et al. (2013), Kaulage and Pawar (2016), Bobade et al., (2018), Srinivasa raoet al., (2018), Mule et al., (2020).

**Influence on quality parameters**

Analysis data for Protein content (%) (Table 1.2) showed that effect of Varieties, dates of sowing and their combinations showed significant result. $V_2D_1$ (cv. Shikha exhibited greater plant height under 1st week of July) gave maximum Protein content (%) respectively.

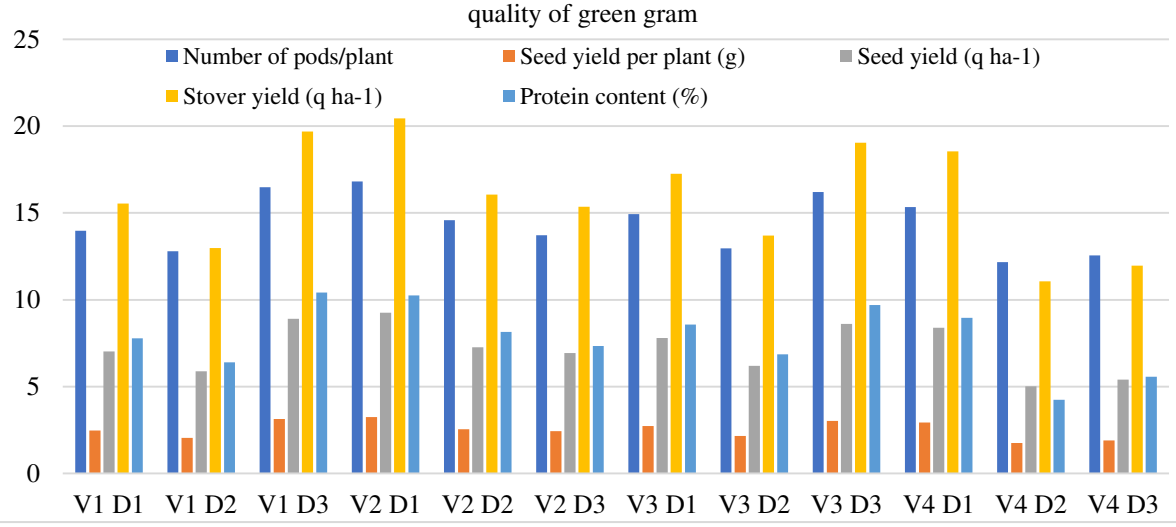
Similar findings were also recorded by Monem et al. (2012) and Singh et al. (2013).

**Table 1.2 Effect of Varieties, different dates of sowing and their Interaction on yield and quality of green gram**

| Treatments | Number of pods/plant | Seed yield per plant (g) | Seed yield (q $ha^{-1}$) | Stover yield (q $ha^{-1}$) | Protein content (%) |
|---|---|---|---|---|---|
| $V_1$ $D_1$ | 13.98 | 2.47 | 7.03 | 15.54 | 7.79 |
| $V_1$ $D_2$ | 12.79 | 2.06 | 5.88 | 12.98 | 6.40 |
| $V_1$ $D_3$ | 16.48 | 3.13 | 8.91 | 19.69 | 10.42 |
| $V_2$ $D_1$ | 16.82 | 3.25 | 9.25 | 20.45 | 10.26 |
| $V_2$ $D_2$ | 14.59 | 2.55 | 7.26 | 16.05 | 8.16 |
| $V_2$ $D_3$ | 13.71 | 2.44 | 6.94 | 15.35 | 7.34 |
| $V_3$ $D_1$ | 14.93 | 2.74 | 7.81 | 17.26 | 8.58 |

| | | | | | |
|---|---|---|---|---|---|
| **$V_3$ $D_2$** | 12.97 | 2.17 | 6.19 | 13.69 | 6.87 |
| **$V_3$ $D_3$** | 16.21 | 3.02 | 8.62 | 19.05 | 9.69 |
| **$V_4$ $D_1$** | 15.33 | 2.94 | 8.39 | 18.54 | 8.96 |
| **$V_4$ $D_2$** | 12.16 | 1.76 | 5.01 | 11.07 | 4.25 |
| **$V_4$ $D_3$** | 12.56 | 1.90 | 5.41 | 11.96 | 5.58 |
| **S Em±** | **0.33** | **0.16** | **0.18** | **0.33** | **0.37** |
| **C.D. (P+=0.05)** | **0.96** | **0.46** | **0.54** | **0.98** | **1.08** |

Fig. 1.2: Effect of Varieties, different dates of sowing and their Interaction on yield and quality of green gram




**Influence on Economics**

The economics in terms of gross and net returns for different combinations of Varieties, dates of sowing were worked out and presented here in 4.18. The different treatment combinations were registered more or less a good value of benefit: cost ratio. This indicated that the sowing of Green Gram with proper variety and date of sowing is economical.

The effect of Varieties cv. Shikha and dates of sowing at the 1$^{st}$ week of July ($V_2D_1$) achieve the higher yield of 7.82 q/ha and recorded the highest benefit: cost ratio of 2.35 with net realization of 39862.40 Rs/ha.

Similar findings were also recorded by Monem et al. (2012) and Srinivasa raoet al., (2018).

**Table 1.3: Effect of Varieties, different dates of sowing and their Interaction on Economic of green gram**

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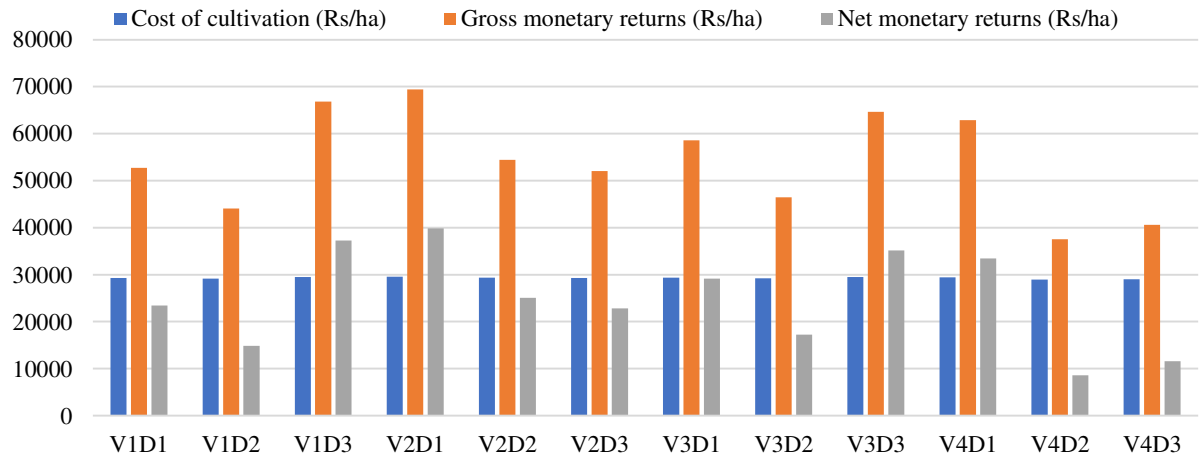
| Treatments | Cost of cultivation (Rs/ha) | Gross monetary returns (Rs/ha) | Net monetary returns (Rs/ha) | Benefit: cost ratio |
|---|---|---|---|---|
| $V_1D_1$ | 29320.00 | 52727.85 | 23407.85 | 1.80 |
| $V_1D_2$ | 29180.00 | 44063.85 | 14883.85 | 1.51 |
| $V_1D_3$ | 29520.00 | 66806.85 | 37286.85 | 2.26 |
| $V_2D_1$ | 29550.00 | 69412.40 | 39862.40 | 2.35 |
| $V_2D_2$ | 29350.00 | 54453.75 | 25103.75 | 1.86 |
| $V_2D_3$ | 29280.00 | 52078.05 | 22798.05 | 1.78 |
| $V_3D_1$ | 29390.00 | 58576.05 | 29186.05 | 1.99 |
| $V_3D_2$ | 29240.00 | 46446.45 | 17206.45 | 1.59 |
| $V_3D_3$ | 29470.00 | 64640.85 | 35170.85 | 2.19 |
| $V_4D_1$ | 29430.00 | 62908.05 | 33478.05 | 2.14 |
| $V_4D_2$ | 28980.00 | 37565.85 | 8585.85 | 1.30 |
| $V_4D_3$ | 29030.00 | 40593.75 | 11563.75 | 1.40 |

Fig. 1.3: Effect of Varieties, different dates of sowing and their Interaction on Economic of green gram




## SUMMARY AND CONCLUSION

Based upon this experiment it is concluded that be concluded that according to mean data. Application of different Varieties and Dates of sowing of green gram $V_2D_1$ (Shikha under 1st week of July) significantly increased the Growth parameter at all growth stage. The higher seed yield (q/ha) showed that effect of Varieties, dates of sowing and their

combinations showed significant result. $V_2D_1$ (cv. Shikha exhibited greater plant height under 1st week of July) (7.82 q/ha) gave maximum Seed yield (q/ha) respectively. The highest net income (39862.40 Rs/ha) with highest benefit: cost ratio (2.35) was recorded under treatment combination $V_2D_1$ (Shikha under 1st week of July).

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