**Agronomic response of greengram (*Vigna* *radiata* L.) varieties to varied sowing windows during late *rabi* season**

**ABSTRACT**

The present field experiment was conducted during late *rabi*, 2024-25 at dryland farm of S.V. Agricultural College, Tirupati Campus of Acharya N.G. Ranga Agricultural University, Andhra Pradesh. The experiment was laid out in spit-plot design with three sowing windows under main plots and four varieties under subplots.The greengram variety LGG 630 sown during II Fortnight of December recorded significantly higher growth attributing characters like plant height, leaf area index, number of branches, dry matter production of greengram.

**Keywords:** Greengram, split-plot, sowing window, Late *rabi*, varieties.

**1.INTRODUCTION**

Greengram (*Vigna radiata* L.), commonly known as mungbean, is an important short-duration pulse crop cultivated extensively in India for its nutritional richness, soil-enriching properties and adaptability to diverse agro-climatic conditions. As a source of high-quality plant protein and also contributes significantly to sustainable agriculture by fixing atmospheric nitrogen, thereby improving soil fertility.

Greengram is traditionally cultivated as a *kharif* and summer seasons, but its cultivation is increasingly being adopted in the late *rabi* season. However, productivity in this season is highly influenced by the optimal sowing time and varietal selection. To address the agronomic performance of promising greengram varieties across different sowing windows in late *rabi* is essential. This will help identify suitable variety-sowing time combinations that enhance yield and stability. Ultimately, the findings will inform location-specific recommendations for optimizing sowing time and varietal choice, thereby improving greengram cultivation in non-traditional areas.

**2.MATERIAL AND METHODS**

The experiment was conducted during late *rabi*, 2024-25 at dryland farm of S.V. Agricultural College, Tirupati Campus of Acharya N.G. Ranga Agricultural University, Andhra Pradesh. The experimental site was sandy loam in texture, low in organic carbon and available nitrogen, medium in available phosphorus and high in available potassium. The treatments comprised of three sowing windows *i.e.,* II Fortnight of December (S1), I Fortnight of January (S2) and II Fortnight of January (S3) were allotted to main plots and four varieties *viz.,* LGG 607 (V1), LGG 630 (V2), LGG 574 (V3) and IPM-2-14 (V4) were allotted to subplots and replicated thrice.The crop was supplied with 20 kg of nitrogen ha-1 and 50 kg of phosphorus ha-1 through urea and single super phosphate uniformly to all the plots as basal. Healthy and sound seeds of four greengram varieties @ 10-12 kg ha-1 were sown as per the treatments with a spacing of 30 cm between the rows and 10 cm within a row. Pre-emergence herbicide Valore -32 @ 4ml litre-1 of water was sprayed on the next day after sowing followed by manual weeding at 25 DAS. Growth parameters like plant height, leaf area, number of branches plant-1 and dry matter production, nodule number and nodule weight plant-1 were recorded. Recorded and calculated data from the experiment were subjected to statistical analysis has been presented and briefly discussed.

**3.RESULTS AND DISCUSSION**

The data pertaining to growth parameters of greengram *viz.,* plant height, leaf area, number of branches plant-1 and dry matter production, nodule number and nodule weight plant-1 were recorded and presented in the Table 1.

**3.1 Plant height**

The main shoot was taken to represent the height of the plant. Plant height was measured from the base of the plant to the tip of the growing point and the mean values were expressed in cm. Among the different sowing windows, taller plants were recorded when the crop was sown during II Fortnight of December (S1) (Table1). This was followed by the crop sown during I Fortnight of January (S2), which was statistically similar with the crop sown during II Fortnight of January (S3). Early sown crop recorded higher plant height might be due to the fact that favourable climatic conditions. These results were in consonance with the findings of Mandal *et al*. (2004) and Mukherjee *et al*. (2013). Pertaining to varieties, LGG 630 (V2) recorded taller plants which was significantly superior over other varieties tried. The next best varieties were LGG 607 (V1) and IPM-2-14 (V4) in producing taller plants in the order of descent with significant disparity between them. Shorter plant height was recorded with LGG 574 (V3) variety of greengram. Similar results were reported by Ram and Dixit (2001) and Mondal and sengupta (2019).

**3.2 Leaf area index**

Leaf area index was calculated by diving leaf area with ground area. Leaf area index was increases with increase in the age of crop upto 60 DAS followed by decline toward harvest. The crop sown during II Fortnight of December (S1) recorded significantly higher leaf area index, followed by the crop sown during I Fortnight of January (S2) and II Fortnight of January (S3) (Table1). The latter sowing window recorded significantly lower leaf area index. With respect to varieties, LGG 630 (V2) recorded significantly higher leaf area index followed by LGG 607 (V1). Lower leaf area index was recorded with LGG 574 (V3) which was significantly inferior to IPM-2-14 (V4). These results were in line agreement with the findings of Gill *et al*. (2018) and Ali *et al*. (2021).

**3.3 Number of branches plant-1**

At all growth stages of greengram, number of branches plant-1 was increases with increase in the age of crop. Greengram sown during II Fortnight of December (S1) recorded more number of branches plant-1. The next best sowing window was the crop sown during I Fortnight of January (S2) and II Fortnight of January (S3), the latter two sowing windows were statistically similar. However, late sown crop *i.e.,* II Fortnight of January (S3) recorded lower number of branches plant-1. These results were in conformity with the findings of Ahmed *et al*. (2023) and Himanshu *et al*. (2024). Among the different varieties tried, LGG 630 (V2) variety of greengram registered with higher number of branches plant-1. This was followed by were LGG 607 (V1) and IPM-2-14 (V4) in the order of descent with significant disparity between them (Table1). Lower values were registered with LGG 574 (V3). Similar results were obtained by Bhise *et al*. (2010) and Bankar *et al*. (2020).

**3.4 Dry matter production**

Early sown crop *i.e.,* II Fortnight of December (S1) significantly registered higher dry matter accrual. The next best sowing window was the crop sown during I Fortnight of January (S2), which was however comparable with II Fortnight of January (S3) sown crop, which was recorded lower dry matter accrual. Higher dry matter accrual with early sown crop might be due to the fact that timely sowing that allowed better interception of solar radiation resulted in better vegetative growth under congenial environmental conditions. These results were supported by Reddemma (2018) and Gupta *et al*. (2024). Regarding varieties, higher dry matter accrual was recorded with LGG 630 (V2), which was significantly superior over LGG 607 (V1), which was significantly at par with IPM-2-14 (V4) and both the varieties were significantly superior over LGG 574 (V3), which the latter variety recorded lower dry matter accrual (Table1). A similar genotypic variation in dry matter accumulation was also reported by Tejaswini *et* *al*. (2023) and Vignesh *et al*. (2024).

**3.5 Nodule number and nodule weight plant-1 at 60 DAS**

Higher nodule number and nodule weight plant-1 was recorded with the crop sown during II Fortnight of December (S1) and lower values were recorded with late sown crop *i.e.,* II Fortnight of January (S3). With respect to varieties, LGG 630 (V2) variety recorded higher values of above parameters and lower with LGG 574 (V3) variety of greengram (Table1).

**Table 1: Growth parameters of greengram as influenced by sowing window and varieties**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatments** | **Plant height (cm)** | | **Leaf area index** | | **Number of branches plant-1** | | **Dry matter production (kg ha-1)** | | **Nodule number** | **Nodule weight (mg) plant-1** |
|  | **60 DAS** | **Harvest** | **60 DAS** | **Harvest** | **60 DAS** | **Harvest** | **60 DAS** | **Harvest** | **60 DAS** | **60 DAS** |
| **Main plots: Sowing window (3)** |  |  |  |  |  |  |  |  |  |  |
| S1 : II Fortnight of December | 42.2 | 51.6 | 1.98 | 1.63 | 6.19 | 6.23 | 2705 | 3411 | 2.00 | 0.22 |
| S2 : I Fortnight of January | 39.1 | 50.1 | 1.65 | 1.39 | 5.28 | 5.53 | 2422 | 2826 | 1.83 | 0.21 |
| S3 : II Fortnight of January | 38.6 | 49.4 | 1.50 | 1.18 | 5.26 | 5.38 | 2093 | 2466 | 1.75 | 0.20 |
| SEm± | 2.08 | 0.36 | 0.050 | 0.052 | 0.048 | 0.105 | 61.1 | 73.8 | 0.192 | 0.011 |
| CD (P=0.05) | 1.4 | 1.4 | 0.20 | 0.21 | 0.19 | 0.41 | 240 | 290 | NS | NS |
| **Sub plots: Varieties (4)** |  |  |  |  |  |  |  |  |  |  |
| V1: LGG 607 (V1) | 41.2 | 52.4 | 1.72 | 1.42 | 5.80 | 6.07 | 2436 | 3077 | 1.77 | 0.21 |
| V2: LGG 630 (V2) | 44.1 | 54.7 | 2.37 | 2.06 | 6.36 | 6.52 | 2642 | 3372 | 2.33 | 0.24 |
| V3: LGG 574 (V3) | 36.2 | 46.2 | 1.22 | 0.93 | 4.84 | 4.90 | 2179 | 2285 | 1.44 | 0.19 |
| V4: IPM-2-14 (V4) | 38.4 | 48.3 | 1.54 | 1.19 | 5.31 | 5.37 | 2370 | 2869 | 1.88 | 0.20 |
| SEm± | 0.51 | 0.48 | 0.047 | 0.059 | 0.138 | 0.138 | 63.2 | 86.7 | 0.210 | 0.014 |
| CD (P=0.05) | 1.5 | 1.5 | 0.14 | 0.18 | 0.41 | 0.43 | 188 | 258 | NS | NS |
| **Sowing window (3) X Varieties (4)** |  |  |  |  |  |  |  |  |  |  |
| **S at V** |  |  |  |  |  |  |  |  |  |  |
| SEm± | 0.88 | 0.81 | 0.087 | 0.103 | 0.212 | 0.240 | 112.8 | 150.2 | 0.370 | 0.024 |
| CD (P=0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **V at S** |  |  |  |  |  |  |  |  |  |  |
| SEm± | 0.84 | 0.84 | 0.082 | 0.102 | 0.238 | 0.249 | 109.4 | 149.5 | 0.385 | 0.023 |
| CD (P=0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

**CONCLUSION**

From the present study, it can be concluded that greengram variety LGG 630 sown during II Fortnight of December recorded significantly higher growth parameters with respect to plant height, leaf area index, number of branches plant-1, dry matter production, nodule number and nodule weight than other sowing windows as well as varieties.

**Disclaimer (Artificial intelligence)**

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

**REFERENCES**

1. Ahmed, P., Saikia, M., Pathak, K., Choudhury, M and Rahman, B. 2023. Effects of sowing date and nitrogen management on growth and yield of greengram (*Vigna radiata* L.) of Assam, India. *Bangladesh Journal of Botany*. 52(2): 323-329.
2. Ali, A., Arooj, K., Khan, B. A., Nadeem, M. A., Imran, M., Safdar, M. E and Ali, M. F. 2021. Optimizing the growth and yield of mungbean (*Vigna radiata* L.) cultivars by altering sowing dates. *Pakistan Journal of Agricultural Research*. 34(3): 559-568.
3. Bankar D. S., Pawar S. B and Raut G. B. 2020. Studies on effect of weather parameters on greengram (*Vigna radiata* L.) varieties under different sowing dates. *International Journal of* *Chemical Studies*. 8(6): 2529-2532.
4. Bhise, A.B., Solunke, S.S., Pawar. S.V., Alse. U.N and Kadam, G.T. 2010. Effect of varieties and plant geometry on yield attributes of summer greengram. *Advanced Journal of Crop Improvement*. 2: 221-223.
5. Gill, K. K., Sandhu, S. S and Bhatt, K. 2018. Performance of moong under different methods and dates of sowing. *Journal of Agricultural Physics*. 18(1): 82-87.
6. Gupta, V., Shrivastava, G. K., Yadav, R., Deewan, S. K and Ekka, S. 2024. Effect of date of sowing and genotypes on productivity and profitability of urdbean (*Vigna mungo* L.). *International Journal of Research in Agronomy*. 7(9): 341-347.
7. Himanshu, R. S. B., Choudhary, K., Thakur, M and Bala, J. 2024. Effect of sowing dates on growth characters of chickpea cultivars in mid hills of Himachal Pradesh. *International Journal of Research in Agronomy*. 7(8): 618-622.
8. Mandal, J., Sharma, B. R and Kiran R. 2004. Effect of changed meteorological regimes on yield, its attributes and powdery mildew incidence of garden pea (*Pisum sativum* L.). *Indian Agriculturist*. 48 (3-4): 211–214.
9. Mondal, R and Sengupta, K. 2019. Study on the performance of mungbean varieties in the new alluvial zone of West Bengal. *Journal of Crop and Weed*. 15(1): 186-191.
10. Mukherjee, D., Sharma, B. R and Mani, J. K. 2013. Influence of different sowing dates and cultivars on growth, yield and disease incidence in garden pea (*Pisum sativum*) under mid hill situation. *Indian Journal of Agricultural Sciences*. 83(9): 918-923.
11. Ram, S.N and Dixit, R.S. 2001. Growth, yield attributing parameters and quality of summer greengram (*Vigna radiata* L. Wilczek) as influenced by dates of sowing and phosphorus. *Indian Journal of Agricultural Research.* 35(4): 275-277.
12. Reddemma, K. 2018. Performance of *rabi* blackgram (*Vigna mungo* L.) under different sowing windows. *M.Sc (Ag.) Thesis.* Acharya N. G. Ranga Agricultural University, Guntur.
13. Tejaswini, B., Sekhar, D., Amarajyothi, P and Madhu Vani, P. 2023. Growth and yield of blackgram (*Vigna mungo* L.) as influenced by sowing windows and varieties in North Coastal Zone of Andhra Pradesh. *Biological Forum – An International Journal*. 15(9): 505-510.
14. Vignesh, H. M., Girijesh, G. K., Kumar Naik, A. H., Salimath, S. B and Nandish, M. S. 2024. Effect of varieties and sowing windows on the dry matter production, partitioning and yield of chickpea. *International Journal of Advanced Biochemistry Research*. 8(10): 1408-1413.