Journal of Scientific Research and Reports

Volume 30, Issue 9, Page 27-31, 2024; Article no.JSRR.120752
ISSN: 2320-0227

Effect of Different Plant Spacings on Growth and Yield of Blackgram Varieties (*Vigna mungo* (L.) Hepper)

Bhagavat P. Taksalkar [a], Bhimashankar M. Satale [a*] and Avadhut D. Pawar [a]

[a] Department of Agronomy, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/jsrr/2024/v30i92326

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/120752

Original Research Article

Received: 08/06/2024
Accepted: 12/08/2024
Published: 23/08/2024

ABSTRACT

A field investigation entitled as Evaluation of blackgram varieties (*Vigna mungo* (L.) Hepper) under different plant spacings was conducted at Department of Agronomy, College of Agriculture, Badnapur. The experimental field was levelled and well drained. The soil was clay loam in texture, low in available nitrogen, medium in available phosphorus, very high in available potassium and alkaline in reaction. The environmental conditions were moderately congenial for normal growth and maturity of blackgram crop. The experiment was laid out in a Factorial Split plot Design with and four different spacings, three different varieties which comprised twelve treatment combinations. Each experimental unit was repeated three times 5.4 m x 5.0 m size in gross plot and it was of 4.5 m x 4.6 m size in net plot. Sowing was done on 14th July, 2015 with three varieties BDU-1, TAU-1 and AKU-15. Sowing was done by dibbling method with different spacings of 30 cm x 10 cm, 30 cm

**Corresponding author: E-mail: satalebm92@gmail.com;*

Cite as: *Taksalkar, Bhagavat P., Bhimashankar M. Satale, and Avadhut D. Pawar. 2024. "Effect of Different Plant Spacings on Growth and Yield of Blackgram Varieties (Vigna Mungo (L.) Hepper)". Journal of Scientific Research and Reports 30 (9):27-31. https://doi.org/10.9734/jsrr/2024/v30i92326.*

x 20 cm, 45 cm x 10 cm and 45 cm x 20 cm. The RDF was applied before sowing. The recommended cultural practices and plant protection measures were under taken as per recommendation. Among différent varieties of blackgram, BDU-1 (V_1) produced significantly higher growth characters such as plant height, number of functional leaves, number of branches, number of pods per plant, number of seeds per pod, pod length, pod weight per plant, seed yield per plant and test weight (1000 seed weight g). The interaction effects of varieties x spacings were foundto be non-significant.

Keywords: Plant spacing; blackgram; varieties; growth; yield.

1. INTRODUCTION

Pulses are important component of food grain crops because of their high nutritive value (Protein content ranging from 17 to 27 %) and adaptability to wide range of agro ecological and management variable. Being a leguminous crop, they fix utilize and atmospheric nitrogen and improve the fertility of soil and therefore fit well in crop rotation and cropping systems. The production of pulses is far below the requirement to meet even the minimum level of per capita consumption. The per capita availability of pulses is 45 g/day as against FAO/ WHO recommended level of 104 g /capita/ day. Thus, it is a big challenge for the agricultural scientists to meet the pulse requirement of teeming population of the country. Among pulses, black gram (*Vigna mungo* (L.) *Hepper*) is one of the most important crops grown in India. It is consumed in the form of 'dal' (whole or split or unhusked) or parched. It is chief constituent of 'papad'. It is used as nutritive fodder specially for milch cattle and also used as green manuring crop. It adds 42 kg N/ha in soil. It posses deep root system which binds soil particles and thus, prevent erosion. Black gram contains about 24 per cent protein, 60 per cent carbohydrate, 10.9 per cent moisture, 1.4 per cent fat, 0.9 per cent fiber, 3.2 per cent minerals and vitamin viz. calcium -154 mg, phosphorus -385mg, iron-9.1mg and small amount of vitamin B complex. The delay in planting of black gram results conspious reduction in seed yield parameters that is grain yield per ha^{-1}, number of pods per plant and seed quality parameters i.e 1000 grain weight.

The productivity of black gram in Maharashtra is very low (299 kg ha^{-1}). The low productivity might be due to day by day decreasing in yielding ability and non use of improved varieties and proper spacing. To realize the maximum yield potential of black gram grown during summer and rainy season, maintenance of optimum space made available to individual plant is of prime importance. A compromising balance between the variables of row and plant spacing has to be worked out to get desired spacing. The spacing requirement depends upon the growth behaviour of genotype. So, it is required to maintain spacing and variety for higher yield.

Keeping all these factors in mind, the present experiment was conducted during 2015 to study the adequate plant spacing and to find out an appropriate variety of blackgram under rainfed condition.

2. MATERIALS AND METHODS

The aim of present experiment was to find out suitable plant spacing for blackgram varieties under different plant spacing and to study the interaction effect of plant spacing and varieties of blackgram.

The gross and net plot size of the experiment was 5.4 m x 5.0 m and 4.5 m x 4.6 m, respectively. Sowing was done by adopting dibbling method on 14th July 2015 respectively at a spacing S_1-30 cm x 10 cm, S_2-30 cm x 20 cm, S_3- 45 cm x 10 cm and S_4- 45 cm x 20 cm and the varieties used were, V_1 - BDU-1, V_2 - TAU-1 and V_3 - AKU-15. The Recommended Dose of Fertilizer (RDF) 25:50:00 NPK kg ha^{-1} were applied at the time of sowing.

To evaluate the treatment effect, the various growth observations were recorded in the experiment from 15 DAS up to the harvest at an interval of 15 days, while the observations on yield attributing characters and post-harvest studies were recorded at respective stages. The crop was harvested at the maturity stage on 04th October 2015.

3. RESULTS AND DISCUSSION

The beneficial effect due to different plant spacing on plant height, number of functional leaves, number of branches, number of pods per

plant, number of seeds per pod, pod length, pod weight per plant, seed yield per plant and test weight (1000 seed weight g) were evident during active growth and maturity. In general, plant height of black gram crop was influenced due to spacing from early stage up to harvest (Table 1.). The increase in height was slow initially due to seedling stage. The height was increased very rapidly being active vegetative phase during 15 to 45 DAS and thereafter there was slight increase in height up to harvest. The spacing 30 cm x 10 cm recorded more plant height as compared to 45 cm x 10 cm, 30 cm x 20 cm and 45 cm x 20 cm. In general, height was increased as the row spacing decreased and plant spacings increased and tendency of plant to grow tall under inadequate row space which might be due to more competition for light and CO_2 between plants. The similar results ere reported in green gram crop by Ihsanullah et al. [1]. Black gram varieties viz. BDU-1, TAU-1 and AKU-15 recorded more or less similar height in early stage which might be due to slow growth during seedling stage. During later stage, comparatively more plant height was observed in respect of variety BDU-1. These findings are in line with the earlier findings by Anita et al [2] and Sharma, O.P. [3].

It was evident from data (Table 1.) that increase in number of leaves plant^{-1} was continuous up to 60 DAS because of active vegetative phase and decreased thereafter due to leaf senescence during maturity stage. Number of leaves was increased with 30 cm x 10 cm spacing as compared to 45 cm x 10, 30 cm x 20 cm and 45 cm x 20 cm spacing. This may be due to more plant height in treatments having less row spacing and more plant spacing. These results are similar with findings reported by Saibabu and Garg [4] and Kachare et al [5] in green gram. More number of leaves (Table 1.) was noticed in variety BDU-1 as compared to TAU-1 and AKU-15 during all crop growth stages. The probable reason for this may be the genetical potential of the variety that has helped in producing more number of leaves.

The branches formation (Table 1.) was started from 30 DAS and its rate was faster up to 60 DAS during grand growth period and rate decreased thereafter gradually during maturity due to reproductive phase. Spacing 30 cm x 10 cm (S1) produced maximum number of branches plant-1 than 45 cm x 10 cm, 30 cm x 20 cm and 45 cm x 20 cm. The more plant height in spacing 30 cm x 10 cm create more vertical space for increasing number of branches. The similar results were reported by Sudhanshu singh and Yadav (1994), Verma et al [6] and Tejveer Singh Tomar et al., [7]. In black gram. The formation of branches started from 30 DAS (Table 1.), the

Table 1. Mean plant height (cm), number of leaves per plant, number of branches per plant, number of pods plant^{-1} as influenced by various treatments

Treatment	Plant Height (cm)	Number of Leaves Plant^{-1}	Number of Branches Plant^{-1}	Number of Pods Plant^{-1}
A. Main Plots (Spacings (S))				
S_1 - (30 cm x 10 cm)	35.35	12.33	2.93	15.86
S_2 - (30 cm x 20 cm)	31.00	8.89	2.58	13.04
S_3 - (45 cm x 10 cm)	31.58	10.45	2.75	14.79
S_4 - (45 cm x 20 cm)	26.93	7.06	2.42	11.03
SE ±	**1.19**	**0.54**	**0.01**	**0.42**
CD at 5%	**3.57**	**1.61**	**0.04**	**1.28**
B. Sub Plots (Varieties (V))				
V_1 - (BDU-1)	35.10	11.16	2.83	14.85
V_2- (TAU-1)	31.15	9.70	2.65	13.48
V_3 - (AKU-15)	27.40	8.19	2.53	12.70
SE ±	**1.50**	**0.41**	**0.03**	**0.47**
CD at 5%	**4.50**	**1.23**	**0.22**	**1.43**
Interaction (A x B)				
SE ±	**3.01**	**0.82**	**0.07**	**0.95**
CD at 5%	**NS**	**NS**	**NS**	**NS**
General Mean	**31.21**	**9.68**	**2.67**	**13.68**

Table 2. Mean number of pods per plant, number of seeds per pod, pod length, pod weight per plant, seed yield per plant and test weight (1000 seed weight g) as influenced by various treatments

Treatments	No. of Pods Plant^{-1}	No. of Seed Pod^{-1}	Pod Length (cm)	Pod Weight (g)	Seed Yield Plant^{-1} (g)	Test Weight (g)
A. Main Plots (Spacings (S))						
S_1 -(30 cm x 10 cm)	19.37	7.0	5.86	6.35	5.38	41.57
S_2 -(30 cm x 20 cm)	13.69	5.85	5.03	3.69	2.73	40.28
S_3 -(45 cm x 10 cm)	17.59	6.42	5.37	5.30	4.42	41.05
S_4 -(45 cm x 20 cm)	12.33	5.34	4.31	3.03	2.66	39.34
SE ±	**0.36**	**0.25**	**0.19**	**0.21**	**0.11**	**1.24**
CD at 5%	**1.10**	**0.76**	**0.57**	**0.64**	**0.33**	**3.71**
B. Sub Plots (Varieties (V))						
V_1 -(BDU-1)	16.96	6.93	5.51	5.01	4.24	41.38
V_2- (TAU-1)	15.17	6.00	5.02	4.81	3.95	40.31
V_3 -(AKU-15)	15.11	5.53	4.89	3.96	3.20	39.98
SE ±	**0.45**	**0.17**	**0.13**	**0.14**	**0.14**	**1.76**
CD at 5%	**1.37**	**0.52**	**0.39**	**0.42**	**0.42**	**5.29**
Interaction (A x B)						
SE ±	**0.91**	**0.35**	**0.26**	**0.28**	**0.28**	**3.53**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
General Mean	**15.75**	**6.15**	**5.14**	**4.59**	**3.80**	**40.56**

faster rate of increase of branches was observed between 30-45 DAS. The variety BDU-1 (V_1) produced maximum number of branches plant^{-1} as compared to the varieties TAU-1 (V_2) and AKU-15 (V_3). Similar trends were reported by Gajendra Singh and Rana [8].

The spacing of 30 cm x10 cm proved superior in increasing the number of pods plant$^{-1,}$ seed yield plant^{-1} than other spacings (Table 2.) Considerable variation in number of pods per plant was recorded due to different spacings. The spacing of 30 cm x 10 cm recorded higher number of pods plant^{-1} and seed yield plant^{-1}.The test weight was found to be not influenced by different spacings. This might be due to test weight being a genetically controlled factor and it is least influenced by agronomic practices of spacing. These results fall in line with those obtained by Singh A. et al*.,* (1980), Sudhansu Singh and D.S. Yadav (1994) and Singh et al*.,* [9]. Pod formation started at 45 DAS (Table 2.), continued up to 60 DAS, and development of pod was continued up to maturity.The performance of variety BDU-1 as regard to yield attributing characters viz. number of pods per plant, number of seeds per pod, pod weight per plant, seed yield per plant and test weight (Table 2.) was superior as compared to TAU-1 and AKU-15. The probable reason for this may be the genetic makeup of the variety that has helped in improving the photosynthetic activity due to increased source capacity and efficient translocation of photosynthesis to the sink (Seed). Similarly Yadahalli et al. [10] and Massey (2006) and Veeramani, P. [11], also observed improvement in black gram varieties having different genetic makeup [12].

The interaction effects were not influenced significantly in case of growth, yield and yield attributes [13].

4. CONCLUSIONS

The present investigation was concluded to attempt different varieties under various plant spacings that the plant spacing 30 cm x 10 cm was found more optimum in influencing the growth attributes of the black gram as compared to the spacing 45 cm x 10 cm, 30 cm x 20 cm and 45 cm x 20 cm. While, the black gram Variety BDU-1 found to be more productive under 30 cm x 10 cm spacing against TAU-1 and AKU-15.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

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 writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ihsanullah FH, Habib A, Abdul B, Noor U. Effect ofspacing on agronomic traits and yield of mungbean. Asian J. of Plant Sci. 2002;1(4):328-329.
2. Anitha Y, Vanaja M, Sunitha V, Sowmya P, Sathish P, Vijaykumar G. Performance of black gram genotypes under moisture deficit stress – variability in physiological and yield contributing attributes. Int. J. Cur. Sci. 2015;17:82-89.
3. Sharma OP. Performance of black gram varieties to varying row spacing under Agro-climatic conditions of Vindhyan plateau. M.Sc. (Agri.) Thesis submitted to RVSKVV, Gwalior; 2015.
4. Saibabu KGRS, Garg OK. Effect of row spacing on growth and yield in mungbean. Legume Research.1988;11(2):75-80.
5. Kachare GS, Pol KM, Bhagat AA, Bhoge RS. Effect of spacing and sowing directions on growth, yield and yield attributes of green gram. Bioinfolet. 2009; 6(3):251-252.
6. Verma CK, Yadav RB, Dhyani BP, Tomar, SS. Effect of seed rates and foliar spray of urea on performance of balck gram varieties. Indian J. Agric. Sci. 2001;81(9): 881-882.
7. Tomar TS, Kumar S, Tomar S. Effect of plant density,nitrogen and phosphorus on black gram. Ann. Agric. Res. 2013;34(4): 374-379.
8. Ganjendra Singh, Rana NS. Growth and yield behavior of blackgram varieties as influenced by row spacings. Indian J. Agronomy. 1992;37(4):829-831.
9. Singh V, Gautam RC, Kumar S. Performance of *kharif* Urdbean as influenced by row spacing and weed management practices. Indian J. pulses Res. 2006;19(1):119-120.
10. Yadahalli, G.S., Palled, Y.B. and Hiremath, S.M. (2006).Effect of sowing date and phosphorus levels on growth and yield of black gram genotypes*, Karnataka J. Agric. Sci.*19(3): 682-654.
11. Veeramani P. Effect of plant spacing on the growth and yield of black gram (*Vigna mungo*). J. Krishi. Vignan. 2019;8(1):101-104.
12. Singh, S. and Yadav, D.S., Response of summer black gram to row spacing and seed rate. Indian J. Agron. 1990;39(2): 314-315.
13. Singh RP, Yadav S. Effect of different varieties and row spacings on growth and yield of blackgram. M.Sc. thesis. The Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya (RVSKVV); 2013.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/120752