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Effect of Date of Sowing and Planting Geometry on Growth and Yield of Summer Black Gram (*Vigna mungo* L. Hepper)

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ABSTRACT

A field experiment was conducted in the experimental research farm of School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, during the period of February to June 2022 to study the "Effect of date of sowing and planting geometry on growth and yield of summer black gram (*Vigna mungo* L.)". The experiment was laid out in split Plot design with 9 treatments replicated thrice. Three different dates of sowing D_1: 10th February, D_2: 20th February, D_3: 2nd March were used along with three planting geometry i.e., G_1 : 20 cm × 10 cm, G_2 : 30 cm × 10 cm, G_3 : 40 cm × 10 cm. The research was conducted to study the growth, yield as influenced by date of sowing and planting geometry. The study showed that the 3rd date of sowing i.e., 2nd March was found to perform better than the other date of sowing and recorded the highest seed yield at 556.67 kg ha^{-1} and stover yield at 1901.56 kg ha^{-1}. Planting geometry of 40 cm × 10 cm showed highest value of growth attributes such as plant height, leaf area index and crop growth rate closely followed by planting geometry of 30 cm × 10 cm. However, the planting geometry of 20cm × 10cm gave the highest seed yield and stover yield which was at par with yield of planting geometry of 30 cm × 10 cm. It was also observed that sowing at 2nd March with planting geometry 20 cm × 10 cm recorded the highest seed and stover yield and was statistically at par with sowing at 2nd March with planting geometry 30 cm × 10 cm.

Keywords Black gram, Date of sowing, Planting Geometry, Growth, Yield attributes.

INTRODUCTION

Pulses have great importance in Indian agriculture as they are rich source of protein (17 to 25%) as compared to cereals (6 to 10%) their ability to fix atmospheric nitrogen and maintain soil fertility. Among pulses, black gram is one of most important pulses which provides a major share of the protein requirement of the vegetarian population of the country (Shobanadevi *et al.* 2021). The average productivity of the black gram is very low mainly due to its poor

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management among various constraints, optimum date of sowing play important role in the seed yield. Date of sowing is the most important factor influencing the yield of black gram. Too much delay in the time of sowing results in reduction of crop yield (Patidar and Singh 2018). For getting higher production, suitable date of sowing and planting geometry play a vital role in the production of the black gram. Planting geometry affects the growth and development of the plant, plant with wider spacing get more growth attributes than closer planting by suitable planting geometry the production of the black gram can be increased. By optimum date of sowing and planting geometry the plant will get more growth attributes, better development of crop canopy and hence will produce more seed yield.

MATERIALS AND METHODS

A field experiment was conducted in the experimental research farm of School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, during the period of February to June 2022 to study the "Effect of date of sowing and planting geometry on growth and yield of summer black gram (*Vigna mungo* L.)". The soil of the experiment site was sandy loam texture, pH was found strongly acidic (4.09), high in organic carbon (1.2%), low in nitrogen (220.6 kg ha^{-1}), medium in phosphorus (15.6 kg ha^{-1}) and medium in potassium (151.2 kg ha^{-1}). The experiment was laid out in split plot design with 9 treatments replicated thrice. Three different date of sowing D_1: 10th February, D_2: 20th February, D_3: 2nd March were used along with three planting geometry i.e., G_1: 20 cm × 10 cm, G_2 : 30 cm × 10 cm, G_3: 40 cm × 10 cm. The manure and fertilizer were applied and mixed thoroughly each plot through organic manures and chemical fertilizers. Before sowing seed was treated with bavistin 2g kg^{-1} seed. Hand weeding was done twice at 25 and 45 DAS. Harvesting was done with the help of sickles and threshed manually.

RESULTS AND DISCUSSION

Growth attributes

Plant height (cm) from Table 1 it can be seen that D_3 (2nd March) showed the highest plant height at all stages observation where it was found at par with D_2 (20th February) at 45 DAS. The lowest plant height was recorded in D_1 (10th February) at all stages of observation. Appropriate date of sowing is very important so that the existing set of environmental factors can be suitable for plant germination and survival. Similar findings were in conformity with the findings by (Ahmad *et al.* 2014) who reported that sowing dates significantly affected the height of the plant, number of fruit bearing branches, test weight, number of pods $plant^{-1}$ and seed yield. The planting geometry gave significant effect on plant height at all stages. Planting geometry G_3 (40 cm × 10 cm) gave the highest plant height followed by G_2 (30 cm ×10 cm). G_1 (20 cm × 10 cm) recorded the lowest plant height. Under narrow spacing the plant became taller and due to less space for vertical and lateral growth and more competition for growth attributes. Similar finding was found with (Khan *et al.* 2017) who reported that the height of the plant is influenced by appropriate spacing. Number of primary branches $plant^{-1}$ the number of primary branches $plant^{-1}$ had significant influence by different date of sowing as we can see from Table 1. The highest number of primary branches $plant^{-1}$ was recorded in D_3 (2nd March) which was statistically at par with D_2 (20th February). The lowest number of primary branches $plant^{-1}$ was observed in D_1 (10th February) at all stages. The planting geometry gave significant effect on number of primary branches $plant^{-1}$ at 25 and 65 DAS. These findings are in accordance with the findings of (Bhatt *et al.* 2020) where they recorded maximum number of primary branches $plant^{-1}$ with maintaining 45 cm × 10 cm.

Yield attributes

Number of pods $plant^{-1}$ the number of pods $plant^{-1}$ was significantly influenced by different date of sowing. From Table 1 it was seen that D_3 (2nd March) showed the highest number of pods $plant^{-1}$ where it was found to be at par with D_2 (20th February). The lowest number of pods $plant^{-1}$ was recorded in D_1 (10th February). The better growth attributes obtained in D_3 sowing might have ultimately related with better flowering and fruiting capacity which leads to more number of pods $plant^{-1}$. Similar finding was found with (Kumar *et al.* 2009) who reported that sowing time on 25th March significantly gave higher growth and yield

Table 1. Effect of date of sowing and planting geometry on growth, yield attributes and yield of summer black gram.

Treatment	Plant height (cm)			Number of primary branches plant^{-1}			Number of pods plant^{-1}	Length of pods (cm)	Number of seeds pod^{-1}	Seed yield kg ha^{-1}	Stover yield (kg ha^{-1})	Harvest index (%)
Date of sowing	25 DAS	45 DAS	65 DAS	25 DAS	45 DAS	65 DAS						
D_1	14.26	29.19	32.49	0.74	1.30	2.16	19.89	5.60	4.40	405.89	1570.11	20.52
D_2	16.07	32.67	35.12	0.86	1.36	2.26	22.98	5.90	5.63	479.78	1706.78	21.94
D_3	18.42	33.09	36.49	0.87	1.39	2.28	24.44	6.06	5.78	556.67	1901.56	22.77
CD (P= 0.05)	1.59	2.21	1.24	0.05	0.07	0.05	1.80	0.23	0.49	41.98	192.80	NS
Planting geometry												
G_1	15.26	30.51	33.44	0.79	1.32	2.14	20.44	5.57	5.04	538.33	1823.78	22.90
G_2	16.19	31.67	34.83	0.83	1.35	2.26	23.31	5.92	5.36	513.78	1820.56	21.89
G_3	17.30	32.77	35.82	0.85	1.37	2.29	23.56	6.07	5.41	390.22	1534.11	20.43
CD (P= 0.05)	0.79	1.35	0.90	0.04	NS	0.04	1.27	0.20	0.21	29.31	91.92	1.85

attributes. The planting geometry gave significant effect on number of pods plant^{-1}. Planting geometry G_3 (40 cm × 10 cm) recorded highest number of pods plant^{-1} which was statistically at par with G_2 (30 cm × 10 cm). Lowest was found in G_1 (20 cm × 10 cm). (Amanullah *et al*. 2018) who reported that spacing with 35 cm row gave maximum number of pods plant^{-1}. Length of pods (cm) length of pods plant^{-1} had significant effect by date of sowing. As from the Table 1 it can be seen that D_3 (2nd March) showed the highest pod length and it was found at par with D_2 (20th February). The lowest number of seed pod^{-1} was recorded in D_1 (10th February). Sowing time is very important in term of pod length because late sowing reduced the seed yield, test weight, pods plant^{-1} and length of pod. These finding were conformity with the findings by (Singh *et al.* 2011) who reported that planting before March 2nd reduced the seed yield. The planting geometry gave significant effect on pod length. The planting G_3 (40 cm × 10 cm spacing) gave the highest number of seeds pod^{-1} which was statistically at par with G_2 (30 cm × 10 cm). Lowest was recorded on G_1 (20 cm × 10 cm). When the plants get proper light, moisture, water and space the plants have better yield attributing character. Similar findings were reported by (Bhatt 2020) who stated that under wider spacing number of pods was found higher. Number of seets pod^{-1t} he number of seeds pod^{-1} was significantly influenced by different date of sowing. From Table 1 it can be seen that D_3 (2nd March) showed the highest number of seeds pod^{-1} and it was found at par with D_2 (20th February). The lowest number of seed pod^{-1} was recorded in D_1 (10th February). The planting geometry gave significant effect on number of seed pod^{-1}. The planting G_3 (40 cm × 10 cm spacing) gave the highest number of seeds pod^{-1} which was statiscally at par with G_2 (30 cm × 10 cm). Lowest was recorded on G_1 (20 cm ×10 cm). When the plants get proper light and space the plants have better yield attributing character. These findings were reported by (Khan *et al*. 2017) who stated that maximum number of seed pod^{-1} was recorded from 30 cm × 10 cm of spacing. Seed yield kg ha^{-1} the seed yield was significantly influenced by different date of sowing. From Table 1 it was seen that the effect of date of sowing D_3 (2nd March) recorded the highest seed yield which was followed by D_2 (20th February) and the lowest was recorded in D_1 (10th February). These finding were in conformity with the findings (Khot *et al.* 2016) who reported that sowing done on March

1st week i.e., D_3 gave significantly highest yield. The planting geometry gave significant effect on seed yield. It can be seen from Table 1 that planting geometry with G_1 (20 cm × 10 cm) recorded the highest seed yield which was at par with G_2 (30 cm × 10 cm) and the lowest was recorded with G_1 (20 cm × 10 cm). This might be attributed to that fact that in G_1 (20 cm × 10 cm) geometry, there was more number of plants which eventually contributed to more number of seeds resulting in higher seed yield. Even though the G_3 (40 cm × 10 cm) geometry gave higher growth and yield attributes, the lesser number of plants per area could not result in higher number of seeds resulting in lesser seed yield. Similar result was reported by (Subramani *et al.* 2002) who reported 25 cm × 10 cm recorded the highest seeds yield. Stover yield (kg ha^{-1}) the stover yield is significantly influenced by different date of sowing. D_3 (2nd March) recorded the highest stover yield followed by D_2 (20th February) and the lowest was recorded from D_1 (10th February). Similar finding was found with (Miah *et al.* 2009) who reported last date of sowing on 11 April produced higher stover yield. The planting geometry gave significant effect on stover yield. Planting geometry with G_1 (20 cm × 10 cm) recorded the highest stover yield which was at par with G_2 (30 cm × 10 cm) and the lowest was recorded in G_3 (40 cm × 10 cm). This might be due to the fact that in close spacing, there are more number of plants per area which will contribute to higher stover yield compared to lesser plants in wider spacing.

CONCLUSION

On the basis of investigation it was found that among the different date of sowing, the 3rd date of sowing D_3 (2nd March) was found superior than D_2 (20th February) and D_1 (10th February) under Nagaland condition during summer season. Among different planting geometry G_3 (40 cm ×10 cm) had great influenced in the growth attributes but in term of seed yield and stover yield G_1 (20 cm ×10 cm) perfomed better because of closer planting geometry, which was at par with G_2 (30 cm×10 cm). Economic analysis revealed that highest net return was obtained from D_3G_2 treatment which also gave the highest BC ratio.

REFERENCES

Amanullah AS, Jakhro MI, Ahmed M, Sadiq N, Yaqub M, Ahmed S (2018) Influence of row spacing on yield and yield attributes of black gram (*Vigna mungo* L. Hepper) variety Chakwal in Balochistan. *Pure Appl Biol* 7 (2) : 413—418.

Bhatt KR (2020) Effect of plant spacing on yield and yield contributing traits of black gram (*Vigna mungo* L. Hepper) During autumn season at Gokuleshwor, Baitadi, Nepal. *Acta Sci Agric* 4 (3) : 01—04.

Khot AB, Sagvekar VV, Muthal YC, Panchal VV, Dhonde MB (2016) Effect summer black gram (*Phaseolus mungo* L.) to different sowing time and weed management practices with respect to yield, quality and nutrient uptake. *Inter J Trop Agric* 34 (7) : In press.

Kumar R, Nandan R, Kumar V, Prasad S, Singh D (2009) Response of summer mungbean (*Vigna radiata*) cultivars to sowing time and seed rate. *Ind J Agric Sci* 79 (4) : 309—312.

Meena H, Meena PKP, Kumar BL (2017) Effect of sowing dates and weed management practices on the productivity of summer greengram. *Int J Pure Appl Biosci* 5 (3) : 392—397.

Miah MDAK, Anwari MDP, Begum M, Juraimi AS, Islam MDA (2009) Influence of sowing date on growth and yield of summer mungbean varieties. *J Agric Soc Sci* 5 (3) : 73—76.

Patidar K, Singh T (2018) Effect of varieties and dates of sowing on growth, yield and quality of black gram (*Vigna mungo* L.). *Ann Pl Soil Res* 20 (4) : 428—431.

Singh S, Singh N, Kumar R (2019) Effect of dates of sowing and mulching on grain yield, straw yield and harvesting index of summer mash (*Vigna mungo*). *J Pharmacog Phytochem* SP 4 : 138—140.

Shobanadevi C, Elangaimannan R, Vadivel K (2021) Stability analysis for yield and its component characters in black gram (*Vigna mungo* L.). *Ind J Agric Res* DOI :10. DOI: 10.18805/IJARe.A-5638.

Subramani M, Solaimalai A, Velayutham A (2002) Effect of plant population and methods of fertilizer application on yield attributes and yield or irrigated blackgram. *Madras Agric J* 89 (4-6) : 305—306.