Effect of Spacing on Yield and Economics of Varieties of Black gram

(*Vigna mungo* L.)

ABSTRACT-

A field experiment was conducted during *Zaid* 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) to study about the Effect of Spacing on Yield and Economics of Varieties of black gram. The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.36 %), available N (171.48 kg/ha), available P (15.2 kg/ha) and available K (232.5 kg/ha). The experiment was laid out in Randomized Block Design with nine treatments each replicated thrice by keeping three Spacing and Varieties levels, the treatments which are T_1: 25 cm x 20 cm + SHEKHAR 2 Variety, T_2: 25 cm x 20 cm + PANT U-35 Variety, T_3: 25 cm x 20 cm + T9 Variety, T_4: 30 cm x 15 cm + SHEKHAR 2 Variety, T_5: 30 cm x 15 cm + PANT U-35 Variety, T_6: 30 cm x 15 cm + T9 Variety, T_7: 45 cm x 10 cm + SHEKHAR 2 Variety, T_8: 45 cm x 10 cm + PANT U-35 Variety, T_9: 45 cm x 10 cm + T9 Variety used. The results showed that spacing of 45 cm x 10 cm + SHEKHAR 2 Variety was recorded significantly pods/plant (64.64), Seeds/pod (8.20), Test weight (38.50 g) whereas maximum crop growth rate (4.36 g/m^2/day) was recorded with treatment with Spacing of 30 cm x 15 cm + T9 Variety. However, higher Seed yield (1062.86 kg/ha), gross returns (Rs. 63771.6/ha), net return (Rs. 39866.95/ha) and benefit cost ratio (1.66) were obtained with application of 30 cm x 15 cm + SHEKHAR 2 Variety as compared to other treatments. Therefore, I concluded that spacing of 30cm x 15cm + SHEKHAR 2 Variety was produced more grains and economic effective.

Keywords: Spacing, Varieties, yield and Economics.

INTRODUCTION

Blackgram is grown well in moisture retentive light soil, but loamy and clay loam are suitable for the cultivation of Blackgram. Loam to clay loam with neutral PH are best suited for Blackgram cultivation. It is susceptible to waterlogged conditions of the soil. Tamil Nadu leads first in productivity with an average yield of 775 kg/ha. Due to cheaper protein source, it is designated as "poor man's meat" **(Aslam *et al.*, 2010).**

Pulses are imperative protein source for predominately vegetarian populations of our country. It is eaten in the form of "dal" (wholly or split, husked or unhusked) or parched. It is foremost constituent of both "papad" and "bari" (spiced ball) making delightful curry. A good amount of lysine is present in the pulses. It also restores fertility by fixing atmospheric nitrogen, so as to produce reasonable yields of subsequent crops and to meet out the demand of dietary requirement regarding proteins, carbohydrates and other nutrient sources. Among various pulses black gram *(Vigna mungo L.)* belonging to family Leguminosae is of immense importance as it contains 55-60% Carbohydrates, 22-25% Protein, 1-1.3% fat and is the richest among the various pulses in phosphorus being 5-10 times richer than others **(Ali *et al.*, 2002).** Dried black gram contains about 9.7% water, 23.4% protein, 1.0% fat, 57.3% carbohydrate and 3.8% fibre along with 154 mg Calcium, 9.1 mg Iron, 0.37 g riboflavin and 0.42 g Thiamine in each gram of black gram **(Verma *et al.*, 2011).**

India is the largest producer of pulses, producing about 25% of the world's production. Because of their vital role in nutritional protection and soil development, pulses have been an integral part of sustainable agriculture since ancient times. **(Tomar *et al.*, 2011).**

Improved varieties of different pulse crops hold promise to increase productivity by 20-25%, whereas latest technology, which includes improved varieties and integrated nutrient and pest management, showed 25-42% advantage over the farmer's practices in a large number of frontline demonstrations conducted across the country **(Ali and Gupta, 2012).**

It is chief requirement to maintain optimum plant population by maintaining inter and intra row spacing properly. Maximum or minimum plant density may minimize yield of black gram causing physiological change in plant. Hence appropriate fertilizer dose with adequate plant population may increase crop yield of black gram. Similar results were noted by **(Choudhary *et al.*, 2017).**

Plant density can have a major effect on the final yield of most of the legumes and the general response of yield to increasing population is well documented. To realize the maximum yield potential of black gram during summer and rainy season, maintenance of optimum space made available to individual plant is of prime importance. The spacing requirement depends upon the growth behaviour of genotype. So, it is required to maintain spacing for obtaining higher yield **(P Veeramani, 2019).**

MATERIALS AND METHODS

RESEARCH SITE

The present examination was carried out during *Zaid* 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj, UP, which is located at 25.28^{o}N latitude, 81.54^{o}E longitude and 98 m altitude above the mean sea level.

EXPERIMENTAL DESIGN

The experiment laid out in Randomized Block Design which consisting of nine treatments with T_1: 25 cm x 20 cm + SHEKHAR 2, T_2: 25 cm x 20 cm + PANT U-35, T_3: 25 cm x 20 cm + T9, T_4: 30 cm x 15 cm + SHEKHAR 2, T_5: 30 cm x 15 cm + PANT U-35, T_6: 30 cm x 15 cm + T9, T_7: 45 cm x 10 cm + SHEKHAR 2, T_8: 45 cm x 10 cm + PANT U-35, T_9: 45 cm x 10 cm + T9 were replicated thrice.

PROPERTIES OF THE EXPERIMENTAL AREA OF SOIL

The experimental site was uniform in topography and sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in Organic carbon (0.38%), medium available N (225 kg /ha), higher available P (19.50 kg /ha) and medium available K (213.7 kg /ha).

FERTILIZERS

Nutrient sources were Urea, DAP, MOP to fulfill the necessity of Nitrogen, phosphorous and potassium. The application of fertilizers was applied as basal at the time of sowing.

GROWTH PARAMETERS

In the period from germination to harvest several plant growth parameters were recorded at frequent intervals along with it after harvest several yield parameters were recorded those

parameters are growth parameters, plant height, branches per plant, nodules per plant and plant dry weight are recorded.

YIELD PARAMETER

The yield parameters like pods per plant, seeds per pod, test weight (1000 seeds) and seed yield (1062 kg/ha) were recorded and statistically analyzed using analysis of variance (ANOVA) as applicable to Randomized Block Design **(Gomez K.A. and Gomez A.A. 1984).**

RESULTS

Yield attributes and Yield

Pods/Plant

Significantly Maximum Pods/plant (64.64) was recorded with the treatment of application of 45 cm x 10 cm + SHEKHAR 2 over all the treatments. However, the treatments 45 cm x 10 cm + PANT U-35 (64.17) and 45 cm x 10 cm + T9 (63.16) which were found to be statistically at par with 45 cm x 10 cm + SHEKHAR 2.

Seeds/Pod

Significantly highest Seeds/Pod (8.20) was recorded with the with the treatment of application of 45 cm x 10 cm + SHEKHAR 2 over all the treatments. However, the treatments 45 cm x 10 cm + PANT U-35 (8.11) and 45 cm x 10 cm + T9 (7.96) which were found to be statistically at par with 45 cm x 10 cm + SHEKHAR 2.

Test weight (g)

Significantly highest Test weight (36.46 g) was recorded with the treatment application of 45 cm x 10 cm + SHEKHAR 2 over all the treatments. However, the treatments with (36.12 g) in 45 cm x 10 cm + PANT U-35 and (35.42 g) in 45 cm x 10 cm + T9 which were found to be statistically at par with 45 cm x 10 cm + SHEKHAR 2.

Seed yield (kg/ha)

Significantly highest Seed yield (1062.86 kg/ha) was recorded with the treatment application of 30 cm x 15 cm + SHEKHAR 2 over all the treatments. However, the treatments with

(1025.61 kg/ha) in 30 cm x 15 cm + PANT U-35 and (997.39 kg/ha) in 30 cm x 15 cm + T9 which were found to be statistically at par with 30 cm x 15 cm + SHEKHAR 2.

Economics

Gross returns (INR/ha)

Data in Table 2 revealed that Higher Gross returns have been recorded with the 30 cm x 15 cm + SHEKHAR 2 (Rs. 63771.6/ha) over rest of the treatments followed by 30 cm x 15 cm + PANT U-35 (Rs. 61536.6/ha) whereas minimum gross return was recorded with 45 cm x 10 cm + T9 (Rs. 40045.2/ha).

Net returns (INR/ha)

Data in Table 2 revealed that Higher Net returns have been recorded with the treatment 30 cm x 15 cm + SHEKHAR 2 (Rs. 39866.95/ha) over rest of the treatments followed by 30 cm x 15 cm + PANT U-35 (Rs. 37851.95/ha) whereas minimum Net returns was recorded with 45 cm x 10 cm + T9 (Rs. 16560.55/ha).

Benefit Cost ratio (B: C)

Data in Table 2 revealed that Higher Benefit cost ratio have been recorded with the treatment 30 cm x 15 cm + SHEKHAR 2 (1.66) over rest of the treatments followed by 30 cm x 15 cm + PANT U-35 (1.59) whereas lower Benefit cost ratio was recorded with 45 cm x 10 cm + T_9 (0.70).

DISCUSSION

Higher number of pods/plants might have been possible due to more vigour and strength attained by the plants as a result of better photosynthetic activities with sufficient availability of light, and supply of nutrients in balanced quantity of the plants at growing stages. **Jitendrakumar *et al*. (2015**) observed the similar results. The performance of SHEKHAR 2 variety as regard of pods/plant and seeds/pod was found to be superior. The probable reason for this may be the genetic make-up of the variety that has helped in improving the photosynthetic activity due to increased source capacity and efficient translocation of photosynthesis to the sink.

The results were in accordance to **Siddikee *et al.* (2018)** and **Patidar and Singh (2018).** Better availability of moisture and moderation of soil temperature which led to greater uptake of nutrients and reduced number of days taken to meet the required heat units for proper growth and development of plants and ultimately the yield attributes. The results were recorded similar with **Anand *et al.* (2020)**. The optimum spacing 30x15 cm helped plant to receive sufficient amount of heat, water and nutrients from soil which increased number of pods/plants, seeds/pod and test weight which directly helped in increase of seed yield in lentil. The results were similar to **Singh *et al*. (2009).**

The performance of black gram varieties in respect of seed yield was very encouraging and followed a similar trend that of yield attributes. The variety SHEKHAR 2 recorded higher seed yield over other varieties might be due to the higher production efficiency that has been reflected through improvement in different yield attributing characters. Similar findings were reported by **Siddikee *et al.* (2018)** and **Rathode and Gawande (2014).**

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SUMMARY CONCLUSION

The present investigation entitled "**Effect of Spacing on Yield and Economics of Varieties of Black gram (*Vigna mungo* L.)"** was carried out at the Crop Research Farm, Department of Agronomy.

The experiment was laid out in Randomized block design with nine treatments replicated thrice. The important findings of the experiment have been summarized and concluded here under the objectives taken.

Significantly maximum Pods/Plant (64.64), Seeds/pod (8.20), Test weight (38.50 g) were recorded with the treatment Spacing of 45 cm x 10 cm + SHEKHAR-2 Variety, whereas Seed yield (1062.86 kg/ha) was recorded maximum with Spacing of 30 cm x 15 cm + SHEKHAR-2 Variety.

Higher gross returns (Rs. 63771.6/ha), net return (Rs. 39866.95/ha) and benefit cost ratio (1.66) was obtained in the treatment of 30 cm x 15 cm Spacing + SHEKHAR-2 Variety.

CONCLUSION

It is concluded that application of treatment 30 cm x 15 cm + SHEKHAR 2 was recorded significantly higher Seed yield (1062.86 kg/ha), higher gross returns (Rs. 63771.6/ha), net

returns (Rs. 39866.95/ha) and benefit cost ratio (1.66) as compared to other treatments. Since, the findings based on the research done in one season.

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Table1. Effect of Spacing on Yield attributes and Yield of different varieties of Black gram

	Treatments	Pods/Plant	Seeds/Pod	Test weight (g)	Seed yield (Kg/ha)
1.	25 cm x 20 cm + SHEKHAR 2	59.71	7.43	35.40	950.76
2.	25 cm x 20 cm + PANT U-35	58.43	7.22	34.60	921.66
3.	25 cm x 20 cm + T9	57.66	6.92	34.10	868.32
4.	30 cm x 15 cm + SHEKHAR 2	62.37	7.72	37.20	1062.86
5.	30 cm x 15 cm + PANT U-35	61.86	7.58	36.60	1025.61
6.	30 cm x 15 cm + T9	60.69	7.47	35.80	997.39
7.	45 cm x 10 cm + SHEKHAR 2	64.64	8.20	38.50	811.23
8.	45 cm x 10 cm + PANT U-35	64.17	8.11	38.10	733.15
9.	45 cm x 10 cm + T9	63.16	7.96	37.50	667.42
	F test	**S**	**S**	**S**	**S**
	S. EM (±)	0.51	0.09	0.33	22.11
	CD (P = 0.05)	1.52	0.28	1.00	66.28

Table 2. Effect of Spacing on Economics of different varieties of Black gram

Treatments	Cost of cultivation	Gross returns	Net returns	B:C Ratio
1. 25 cm x 20 cm + SHEKHAR 2	24124.65	57045.6	32920.95	1.36
2. 25 cm x 20 cm + PANT U-35	23884.65	55299.6	31414.95	1.31
3. 25 cm x 20 cm + T9	23884.65	52099.2	28214.55	1.18
4. 30 cm x 15 cm + SHEKHAR 2	23904.65	63771.6	39866.95	1.66
5. 30 cm x 15 cm + PANT U-35	23684.65	61536.6	37851.95	1.59
6. 30 cm x 15 cm + T9	23684.65	59843.4	36158.75	1.52
7. 45 cm x 10 cm + SHEKHAR 2	23684.65	48673.8	24989.15	1.05
8. 45 cm x 10 cm + PANT U-35	23484.65	43989	20504.35	0.87
9. 45 cm x 10 cm + T9	23484.65	40045.2	16560.55	0.70