The Pharma Innovation Journal 2022; 11(4): 623-625

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(4): 623-625

www.thepharmajournal.com
Received: 08-02-2022
Accepted: 15-03-2022

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Influence of spacing and mulching on growth and yield of black gram (*Vigna mungo* L.) in Prayagraj condition

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Abstract
A field experiment was conducted during Zaid 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). 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 on the basis of one year experimentation. The treatments which are T_1: 30 cm x 15 cm + No mulch, T_2: 30 cm x 15 cm + Mustard Straw, T_3: 30 cm x 15 cm + Saw dust/ Dry leaves, T_4: 30 cm x 15 cm + Newspaper/ Brown paper, T_5: 45 cm x 10 cm + No mulch, T_6: 45 cm x 10 cm + Mustard Straw, T_7: 45 cm x 10 cm + Saw dust/ Dry leaves, T_8: 45 cm x 10 cm + Newspaper/ Brown paper, T_9: Control plot used. The results showed that application of 45 cm x 10 cm + Mustard Straw was recorded significantly higher pods/plant (65.09), Seeds/pod (7.66), Test weight (37.18 g). However, higher Seed yield (669.33 kg/ha), gross returns (Rs. 73626.3/ha), net return (Rs. 50741.65/ha) and benefit cost ratio (2.21) were obtained with application of 30 cm x 15 cm + Mustard Straw as compared to other treatments.

Keywords: Spacing, mulching, yield

Introduction
Black gram (*Vigna mungo*) is one of important pulse crop. The food legumes, particularly the grain or pulses are important food stuff in all tropical and subtropical countries (Malik *et al.*, 2007) [6]. It is grown throughout India. Black gram is widely grown grain legume and belongs to the family "Leguminosae" and genus "Vigna" and assumes considerable importance from the point of food and nutritional security in the world. It is also known as urd bean, urad dal or urad. It also acts as cover crop and its deep root system protects the soil from erosion. The crop also improves soil fertility by symbiotic fixation of atmospheric nitrogen in root nodules.
Pulses are commonly known as food legumes with are secondary to cereals in production and consumption in India. The United Nations, declared 2016 as "International Year of Pulses" (IYP) to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed at food security and nutrition. Pulses are an integrated part to many diets across the globe and they have great potential to improve human health, conserve our soil, protect the environment and contribute to global food security. Black gram is scientifically known as *Vigna mungo* (L.) and commonly known as Urd in India. It is a tropical leguminous plant (Renthunglo *et al*., 2018) [7].
Besides, this green fodder of urdbean is very nutritive and is especially useful for mulch cattle. Urd bean being leguminous has the capacity to fix atmospheric nitrogen and thus helps in restoring the soil fertility. Black gram is grown in several parts of Asia and Africa. It is grown in India, Bangladesh, Pakistan, Burma and Ceylon. It is grown all over the country, but the main area of production being Madhya Pradesh, Maharashtra, Karnataka, and west Bengal. It requires warm and humid conditions during growing season. It is generally cultivated as both summer and rainy season crop. Heavy and continuous rains at the time of germination and flowering are harmful for the crop and adversely affects the production.
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. 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 for obtaining higher yield (P Veeramani, 2019) [9].

Abiotic and biotic factors can be overcome by application of mulches and organic manures. Mulches were effective in controlling weeds and also conserving in-situ moisture (Uwah and Iwo, 2011) [8]. Soil organic matter and moisture was found to improve under mulching. Thus, mulching serves as one of the best alternatives to manage both the abiotic and biotic factors like rainfall, soil temperature, weeds, etc. which results in good crop establishment and increase the water use efficiency. Mulching reduces the deterioration of soil, minimizes the weed infestation and checks the water evaporation. Thus, it facilitates more retention of soil moisture and helps in control of temperature fluctuations, improves physical, chemical and biological properties of soil. As it adds nutrients to the soil and ultimately enhances the growth and yield of crops (Komal *et al*., 2018) [4].

Materials and Methods

A field experiment was conducted during Zaid season 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) which is located at 25 degree 39' 42''N latitude, 81 degree 67'56''E longitude and 98 m altitude above the mean sea level, during zaid season 2021. The soil was sandy loam in texture, low in organic carbon and medium in available nitrogen, phosphorous and low in potassium. Nutrient sources were Urea, DAP, MOP to fulfill the requirement of Nitrogen, phosphorous and potassium. The treatment consisted 2 levels of spacing and 4 Mulching materials T1: 30 × 15cm + No mulch, T2: 30 × 15 cm + Mustard Straw, T3: 30 × 15 cm + Saw dust/ Dry leaves, T4: 30 × 15 cm + newspaper/brown paper, T5: 45 × 10 cm + no mulch, T6: 45 × 10 cm + mustard straw, T7: 45 × 10 cm +saw dust/ dry leaves, T8: 45 × 10 cm + newspaper/brown paper, T9: Control used. The Experiment was laid out in Randomized Block Design, with nine treatments which are replicated thrice. Seeds were sown in line manually on 03 April 2021 at a depth of 4-5 cm in furrows with seed rate of 15-20 kg/ha. 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 like pods per plant, seeds per pod, test weight (1000 seeds) and seed yield (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

a) Pods/plant

Significantly Maximum Pods/plant (65.09) was recorded with the treatment of application of 45 cm x 10 cm + Mustard Straw over all the treatments. However, the treatments 45 cm x 10 cm + Saw dust/ Dry leaves (64.59) and 45 cm x 10 cm + Newspaper/ Brown paper (63.88) which were found to be statistically at par with 45 cm x 10 cm + Mustard Straw.

Higher number of pods/plant 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.

b) Seeds/pod

Significantly highest Seeds/Pod (7.66 cm) was recorded with the with the treatment of application of 45 cm x 10 cm + Mustard Straw over all the treatments. However, the treatments 45 cm x 10 cm + Saw dust/ Dry leaves (7.56 cm) and 45 cm x 10 cm + Newspaper/ Brown paper (7.43 cm) which were found to be statistically at par with 45 cm x 10 cm + Mustard Straw.

Increase in the number of seeds/pod under mustard straw mulch is due to the fact that it adds nutrients to soil though decomposition of stover and leads to better moisture availability by reducing the water loss through evaporation and by suppressing weed growth by depriving the germinating weeds, which effected on the yield attributes of black gram. The results were in accordance with Mahale *et al.* (2018) [5].

c) Test weight (g)

Significantly highest Test weight (37.18 g) was recorded with the treatment application of 45 cm x 10 cm + Mustard Straw over all the treatments. However, the treatments with (36.81 g) in 45 cm x 10 cm + Saw dust/ Dry leaves and (36.38 g) in 45 cm x 10 cm + Newspaper/ Brown paper which were found to be statistically at par with 45 cm x 10 cm + Mustard Straw.

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) [1].

d) Seed yield (kg/ha)

Significantly highest Seed yield (669.33 kg/ha) was recorded with the treatment application of 30 cm x 15 cm + Mustard Straw over all the treatments. However, the treatments with (656.53 kg/ha) in 30 cm x 15 cm + Saw dust/ Dry leaves, (645.50 kg/ha) in 30 cm x 15 cm + Newspaper/ Brown paper and (652.57 kg/ha) in 45 cm x 10 cm + Mustard Straw which were found to be statistically at par with 30 cm x 15 cm + Mustard Straw.

The beneficial effect of mulch on seed yield might be due to favourable soil moisture regime and its better utilization in production of large number of seeds possibly by reducing floral abortion, maintenance of a steady flux of assimilates during grain filling, reducing the rate of leaf senescence and maintenance of photosynthetic activity of surviving leaves and enhanced remobilization of pre anthesis assimilates to seed during seed filling which helped in higher seed yield, Bochliya *et al*. (2020) [2].

Table 1: Influence of Spacing and Mulching on Yield attributes and Yield of Black gram

S. No	Treatments	Pods/Plant	Seeds/Pod	Test weight (g)	Seed yield (Kg/ha)
1.	30 cm x 15 cm + No mulch	59.86	6.38	33.82	577.00
2.	30 cm x 15 cm + Mustard Straw	62.97	7.18	35.70	669.33
3.	30 cm x 15 cm + Saw dust/ Dry leaves	62.05	7.04	35.21	656.53
4.	30 cm x 15 cm + Newspaper/ Brown paper	61.47	6.94	34.63	645.50
5.	45 cm x 10 cm + No mulch	60.74	6.59	34.34	563.23

6.	45 cm x 10 cm + Mustard Straw	65.09	7.66	37.18	652.57
7.	45 cm x 10 cm + Saw dust/ Dry leaves	64.59	7.56	36.81	612.40
8.	45 cm x 10 cm + Newspaper/ Brown paper	63.88	7.43	36.38	592.07
9.	Control plot	58.79	6.09	33.24	549.37
F- test		S	S	S	S
S. EM (±)		0.43	0.15	0.38	8.08
C. D. (P = 0.05)		1.30	0.46	1.15	24.22

Economics

Data in table 2 tabulated Experimental results revealed that treatment 30 cm x 15 cm + Mustard Straw recorded higher gross returns (73626.30 INR) net returns (50741.65 INR) and benefit: cost ratio (2.21) and minimum gross returns (60430.70 INR), minimum net returns (38246.05 INR) and minimum benefit: cost ratio (1.62) were recorded with control plot.

Table 2: Influence of Spacing and Mulching on Economics of Black gram

S. No	Treatments	Cost of Cultivation (INR/ha)	Gross return (INR/ha)	Net Return (INR/ha)	B:C ratio
1.	30 cm x 15 cm + No mulch	22184.65	63470	41285.35	1.86
2.	30 cm x 15 cm + Mustard Straw	22884.65	73626.3	50741.65	2.21
3.	30 cm x 15 cm + Saw dust/ Dry leaves	22684.65	72218.3	49533.65	2.18
4.	30 cm x 15 cm + Newspaper/ Brown paper	22484.65	71005	48520.35	2.15
5.	45 cm x 10 cm + No mulch	22184.65	61955.3	39770.65	1.79
6.	45 cm x 10 cm + Mustard Straw	22884.65	71782.7	48898.05	2.13
7.	45 cm x 10 cm + Saw dust/ Dry leaves	22684.65	67364	44679.35	1.96
8.	45 cm x 10 cm + Newspaper/ Brown paper	22484.65	65127.7	42643.05	1.89
9.	Control plot	22184.65	60430.7	38246.05	1.72

Acknowledgment

I express gratitude to my advisor Dr. Rajesh Singh and all the faculty members of Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, (U.P.) India for constant support and guidance to carry out the whole experiment research study.

References

1. Anand DD, Sumarjit Singh M, Jamkhogin Lhungdim N, Devi S, Gopimohan Singh N. Effect of Mulching on Growth and Yield of Soybean (*Glycine max* L.) Merrill). International Journal of Current Microbiology and Applied Sciences. 2020;9(9):3313-3318.
2. Bochliya R, Reager ML, Swetha C. Effect of Mulches and Varieties on Yield Attributes and Yield of Green Gram (*Vigna radiata* L.). International Journal of Current Microbiology and Applied Sciences. 2020;9(6):2280-2286.
3. Jitendra Kumar, Sarvesh Kumar, Brajesh Prajapati, Amar Kant Verma, Awadhesh Kumar. Yield and yield attributes of plant geometry of Gram (*Cicer arietinum* L.) under rainfed conditions in Uttar Pradesh. Research Environmental Life Science. 2016;9(9):1087-1089.
4. Komal D, Bhakar SR, Lakhawat SS, Chhipa BG, Manjeet Singh. Response of Chickpea (*Cicer arietinum* L.) Productivity under Different Irrigation Frequencies and Mulching. Int. J Curr. Microbiol. App. Sci. 2018;7(09):3638-3642.
5. Mahale CY, Bhakar SR, Lakhawat SS, Kothari M, Chhipa BG. Effect of plastic mulch and supplemental irrigation on growth and yield of black gram (*Vigna mungo* L.). Green Farming. 2018;9(2):301-305.
6. Malik MA, Hussain EA, Warraich A, Habib Ullah S. Effect of seed inoculation and phosphorus application on growth, seed yield and quality of mungbean (*Vigna radiata* L.) CV. NM-98. International Journals Agriculture Biology. 2002;4:515-516.
7. Renthunglo Tungoe, Gohain T, Noyingthong Kikon. Response of Black gram [*Vigna mungo* (L.) Hepper] to spacing and fertilizer doses under Rainfed Conditions. Journal Agricultural Research Communication Centre Agric. Sci. Digest. 2018;38(1):27-31.
8. Uwah DF, GA Iwo. Effectiveness of organic mulch on the productivity of maize (*Zea mays* L.) and weed growth. The Journal of Animal and Plant Sciences. 2011;21(3):525-530
9. Veeramani P. Effect of plant spacing on the growth and yield or Black gram (*Vigna mungo*). J Krishi Vignan. 2019;8(1):101-104.