Research Article

Influence of row spacing on yield and yield attributes of black gram (*Vigna mungo* L. Hepper) variety Chakwal in Balochistan

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Abstract

The experiment was carried out in Balochistan Agricultural Research and Development Centre Brewery Road, Quetta during Kharif 2016 to check the effect of four different row spacings i.e., 25, 30, 35 and 40 cm on influence of row spacing on yield and yield attributes of black gram (*Vigna mungo* L. Hepper) variety Chakwal in Balochistan under semi-arid climate. Results revealed that except of total dry matter all the parameters including yield and yield components were significant at ($P>0.05$) influenced by different row spacing. Maximum (709) grain yield kg ha^{-1} was received from the treatment-3 (35cm row spacing) followed by treatment-4 (40 cm row spacing) which produced (663) grain yield kg ha^{-1} while the minimum (429) grain yield kg ha^{-1} was gave by the treatment-1 (25 cm row spacing) respectively. Results more revealed that treatment-3 (35 cm row spacing) and treatment-4 (40cm row spacing) produced (16) and (12) total pods was recorded per plant vastly significantly and nice preformed simultaneous with grain yield. Therefore, researchers obtained differential response in relation to row spacing and selecting high yielding cultivars of mash bean.

Keywords: Black gram; Chakwal; Row spacing; Variety

Introduction

Black gram (*Vigna mungo* L. Hepper) is an important pulse crop, which belongs to popular plant family papilionaceae. This crop is origin from India, and is famous by the name of black gram. The black gram not only fixing free atmospheric Nitrite, but also supplement the soil with Nitrogen for the

growth of future crops [1]. The economic product of black gram is seed grain, which is a good source of dietary protein. This crop can be successfully grown on loam soil [2]. Furthermore this crop improve the plant essential nutrients in soil and it is a great source of protein for human health. Chemical analysis of black gram seed shown

that it contains 20-24% protein, 2.1% oil, 1-2% fats, carbohydrates and a fair amount of vitamin-A and B [3]. It has an excessive potential to improve protein deficiency in human beings by providing a low cost protein. In Balochistan 1700 ha black gram is grown as a Kharif crop with a total yield of production 1200t/ 706 kg per ha. Black gram grow in Pakistan 75.4 percentage and the Punjab is major gram producing province contribution about 80 percent. While in Balochistan 5.12 percentage in cultivated black gram. [4]. Balochistan is the largest province of Pakistan. Grounded on climatic conditions, researchers obtained differential response of Black gram in relation to row spacing. In Balochistan Black gram is grown as a Kharif of area is 798 ha with a maximum production of 639t [4]. The variance in seed rates is of excessive significance for the crop and further yield characteristics. It has been evaluated that farmers use lesser seed rates especially for Black gram and chickpea. Scientist studied also discovered that supreme of the growth and yield contributing characteristics are considerably and clearly correlated with the seed grain yield of various crop plants viz., Black gram [5, 6], chickpea [7], mung bean [8], soybean [9] and sunflower [10]. Close row spacing improved dry matter yield compared with the far row spacing. A benefit of closed row spacing is extra medium plant positioning that leads to augmented canopy leaf area enlargement and more light capture earlier in the season [11]. These variations in canopy development rise crop progress level and dry matter increase [12]. The finest seed level in pulses is the greatest essential feature for getting better yields. However, [13, 14]. Therefore, this study was began to determine the most favorable seed rate in order to high the seed yield of Black gram.

Materials and methods

This field trial on Black gram (*Vigna mungo*

L. Hepper) was established out in 3rd June in Kharif season, 2016 at Quetta Balochistan. Four treatments of different row spacing i.e. 25, 30, 35 and 40 cm were kept. Experiment was laid out in a Randomized Complete Block Design (RCBD) with a plot size of 10 x 20 m with three replications. Used Di-ammonium phosphate (DAP) at the sowing time and Nitrogen in the form Urea at the flowering and pod formation stages. An improved Black gram variety Chakwal were sown with hand drill machine @ 15 kg per ha then imbedded deepness of 3-4 cm. First irrigation was applied after 20 days and Second irrigation at the time of flower initiation and Third irrigation was applied at the pod formation. All the recommended cultural practices were equally followed to maintain a healthy crop stand in the trial. The data in terms of Plant height, number of branches plant⁻¹, number of pods plant⁻¹, number of seed pod⁻¹ and Plant density was recorded at the maturity and three samples of 1m² from each treatment were randomly collected in terms of total dry matter, grain yield at the harvesting [15]. All observations were analyzed by using the Fisher's analysis of variance techniques and difference among treatments means were compared by using the statistical package named Statistix 8.1 computer software LSD test at $p < 0.05$ [16].

Results and discussion

Plant height

Results showed in table 1 that in response to effect of row spacing, the plant height values were statistically significant with each other. Maximum (18) cm plant height was recorded in treatment-3 (35cm row spacing) whereas minimum (13) cm plant height was produced by treatment-1 (25 cm row spacing). In this connection, [17, 18] observed plant height increase with high densities and early planting dates in their experiments. However, moderate row spacing viz., 30 and 35 cm numerically produced the highest plant height. Similar

results were also obtained by [19], but are in contradiction with those explained by [20].

They stated that increase in row spacing decreases the plant height in black gram.

Table 1. Effect of row spacing on yield and yield attributes of Black gram variety Chakwal

Treatments	Plant height (cm)	No. branches /plant	No. pods/plant	No. seed/pod	Plant density	TDM kg/ ha ⁻¹	Grain Yield kg/ha
T1=25 cm row spacing	13C	3C	6C	4C	20A	2406	429C
T2=30cm row spacing	16B	4B	9B	6B	17AB	2275	564B
T3=35 cm row spacing	18A	6A	16 A	7A	14B	2170	709A
T4=40 cm row spacing	17AB *	5AB *	12AB **	6AB *	12C *	2023 NS	663AB *

Values followed by different letters within same column are significant at alpha =0.050

Number of branches plant⁻¹

Results indicated in table 1 that in response to effect of row spacing, the Number of branches /plan were statistically significant with each other. Maximum (6) Number of branches /plan was produced by treatment-3 (35cm row spacing) whereas minimum (3) Number of branches /plan was gave by treatment-1 (25 cm row spacing finding and also obtained by [21, 22].

Number of pods plant⁻¹

Results showed in table 1 that in response to effect of row spacing highly significant increased the quantity of pods each plant. Maximum (16) Amount of pods/plant was observed in treatment-3 (35cm row spacing) however least (6) Sum of pods plant⁻¹ was produced by treatment-1 (25 cm row spacing). It might be due to greater number of plants per unit row length, which might have adversely affected the pod development, hence, pods formation were comparatively less than that of low seeding rate which resulted in greater competition for light, space and nutrients. Similar results were obtained by [23] who reported that all the yield contributing characters were favorably affected by planting geometry.

Number of seeds pod⁻¹

Number of seeds per pod in table 1 showed significant response to effect of row spacing, the maximum (7) number of seeds per pod was recorded from the treatment-3 (35cm row spacing) while the minimum (4) number of seeds/pod gave by the treatment-1 (25 cm row spacing).

Plant density

The data on plant density are subjected to analyzed and significant found among the treatments. The table 1 revealed that maximum (20) Plant density was obtained by treatment-1 (25 cm row spacing) whereas the minimum (12) Plant density was produced by treatment-4 (40 cm row spacing). Seed yield and yield components of mungbean are markedly influenced by planting density. The farmers usually grow mungbean without maintaining proper planting density. They hesitate to grow mungbean in rows, although row planting facilitates easy intercultural operations resulting in higher yield [24]. Row planting with appropriate planting density can help ensure optimum plant population unit⁻¹ area of mungbean thereby increasing the yield [25].

Total Dry Matter kg/ha

Data on Total dry matter (TDM) kg/ha

showed nonsignificant in table 1. Maximum (2406) total dry matter kg/ha was recorded from treatment- 1 (25cm row spacing) followed by treatment-2 (30 cm row design) gave 2275 kg per ha whereas the minimum 2023 kg ha⁻¹ was obtained in treatment-4 (40 cm row spacing) respectively. Contracted row spacing improved dry matter yield equated with the broader row spacing. A benefit of slim row spacing is extra internal plant typography that principals to amplified canopy leaf range advance and superior light interruption former in the period. [26]. These variations in canopy foundation upturn crop development proportion and dry matter amassing [27-29].

Grain yield kg ha⁻¹

Data regarding mean values of that grain yield kg ha⁻¹ responded in significant in response to effect of row spacing in table 1. However, numerically a maximum (709) grain yield kg ha⁻¹ were obtained from treatment-3 (35 cm row spacing) while the minimum 429 grain yield kg ha⁻¹ were observed in treatment-1 (25 cm row spacing). [29-31] believe that yield of chickpea increases with increasing density from 33 to 54 plants m⁻². Row space arrangement had noteworthy consequence on yield modules. Generating expressively upper seed yield components in broader spacing is in accordance with the outcomes of best of the former research. [31]. There is a trend that as row spacing increases, grain yield also increases. In this respect present results are in conformity with the results obtained by some workers [32, 33].

Conclusions

Concluded that Chakwal variety of black gram 35 cm row spacing and 40 cm row spacing producing very greatly significantly and better performing simultaneous with grain yield. The current revision designated that row spacing affected yield mechanisms of Black gram in environmental climatic of Quetta Balochistan.

Authors' contributions

Designed & idea the experiments: Amanullah, Implemented the experiments: S Ahmed, M Ahmed & N Sadiq, Analyzed the Data: Amanullah & M Yaqoob, Contributed reagents/Materials/Analysis tools: S Ahmed, Wrote the paper: Amanullah & MI Jakhro.

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