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Studies on green gram (*Vigna radiata* L. Wilczek) cultivars for yield and yield contributing characters under rainfed condition

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Abstract

Among the pulses, green gram is considered the most important pulse crop. In India, Maharashtra is one of the leading pulses-growing states. In this study three green gram genotypes were used viz., BM-2003-02 collected from VNMKV, Parbhani, AJIT-11 from local market of Kandhar and Farmers Variety from local farmer of Bahaddarpura, Tq. Kandhar, Dist. Nanded. The present investigation was carried out at experimental farm of Kandhar tahsil during June-2024. This estimated statistical evaluation recorded significant difference among the treatments. All characters viz., Germination (%), Days to 50% flowering, Days to maturity, Plant height (cm), Number of pods per plant, Number of pods per plot, 100-seed weight (g), Pod length (cm), Pod length (cm), Number of grains per pod, Number of branches per plant, Seed yield per plant (g) and Seed yield per plot (g). Studied all characters were found significant at both 5 and 1% except characters viz., Germination (%), Days to maturity and Seed yield per plant (g). Investigation reported that BM-2003-02 cultivar is performed superior in germination, day to 50% flowering, days to maturity, pod per plant, pod per plot, pod length, pod girth, number of branches per plant, seed yield per plant and seed yield per plot. Farmers variety was found superior in plant height and 100 seed weight.

Keywords: Early, pod length, seed weight, maturity and yield

Introduction

A member of the Leguminaceae family, green gram originated in India and is primarily cultivated in South-East Asia. Botanically, green gram is characterized by its trifoliate compound leaves, this species exhibits a growth form that can be either erect or climbing, depending on the cultivar. This legume has reportedly been grown for more than 4,000 years in Asia, where it was first introduced for both agricultural and culinary purposes, according to archaeological and genetic data. Green Gram was an essential part of traditional agricultural practices and a main source of ancient Indian diets, according to historical records. The crop has high nutritional value. In the sense of adaptability of this crop green gram is widely cultivated in different agro-climatic zones of India.

Among the pulses green gram is a highly nutritional source of protein, carbohydrate, mineral and vitamin. Green gram is the richest source of proteins. Green gram contains 22 to 26% protein. Green gram plant contains near about 50 to 56% carbohydrate and it is also the richest source of minerals, their percentage being 4%. In this crop 2.5 to 3% vitamins are contained. In this crop near about more than three times greater protein contain than the other pulses crop. Comprehensive research was conducted in experimental farm of Kandhar tahsil.

Materials and Methods

In this study, experiment was conducted at the research farm of Kandhar tehsil during the kharif 2024. BM-2002-3, Farmers variety, and Ajeet-11 genotypes were used. The experiment was conducted in the RBD design. The experimental field was prepared, ridges and furrows were made with a wooden plough. Plot size was 5 x 2.25 M. The method of sowing was hand dibbling. All agronomical package of practices of green gram followed during growing season.

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Results and Discussion

Analysis of variance was very systematically conducted for determination of treatment effect. This estimated statistical evaluation recorded significant difference among the treatments reported in Table 1. All characters viz., Germination (%), Days to 50% flowering, Days to maturity, Plant height (cm), Number of pods per plant, Number of pods per plot, 100-seed weight (g), Pod length (cm), Pod length (cm), Number of grains per pod, Number of branches per plant, Seed yield per plant (g) and Seed yield per plot (g). Studied all characters were found significant at both 5 and 1% except characters viz., Germination (%), Days to maturity and Seed yield per plant (g).

1. Germination (%)

A detail of germination character for treated plot recorded in Table No. 2. Germination percentage of green gram varieties ranged from 89.63% to 93.30%. Variety BM-2003-02 (93.30%) was found higher in germination followed by Ajit-11 (91.03%). Farmer variety (89.63%) was poor in germination compared to other varieties.

One variety of green gram viz., BM-2003-02 (93.30%) was higher in germination compared to general mean (91.32%). In this result coefficient of variation (CV) was 1.32%, standard error of the mean (S.E.m) was 0.70 and critical difference (CD) at the 5% was recorded to be 2.73. Similar result recorded by Yadav *et al.* (2024)^[11].

2. Days to 50% Flowering (Days)

The character is days took by variety to come for fifty percent flowering. Fifty per cent flowering ranged from 30.56 to a maximum of 33.96. Variety BM-2003-02 (30.56 DAS) was found early in flowering than other varieties viz., Ajit-11 (31.47) and Farmers Variety (33.96). For this character Farmers Variety was late in flowering, requiring 33.96 days for fifty per cent flowering.

Among them two varieties of green gram viz., BM-2003-02 (30.56) and Ajit-11 (31.47) were early to fifty percent flowering than the average mean (32.00). Study mentioned coefficient of variation (CV) was 2.23%, SE (m) was 0.41 and critical difference (CD) at the 5% was 1.62. Similar result reported by Chauhan and Williams (2018)^[14].

3. Days to Maturity (Days)

The maturity of green gram varieties was recorded in days at the time of physiological maturity. Maturity ranged from 60.43 days to a maximum of 64.25 days. Variety BM-2003-02 (60.77 DAS) was found early in maturity than Ajit-11 (63.46) and Farmers Variety (64.58). Farmers Variety was late in maturity, requiring 64.58 days.

Study reported, BM-2003-02 (60.43) and Ajit-11 (62.83) were early in maturity compared to average mean (62.50). This study recorded that coefficient of variation (CV) was 1.95%, SE (m) was 0.70 and critical difference (CD) at the 5% was recorded to be 2.77. Similar result reported by Chauhan and Williams (2018)^[14].

4. Plant Height (cm)

Plant height was positively desirable character in green gram crop; detailed analysis data mentioned in the table No.2. Plant height among cultivated three green gram varieties ranged from minimum 61.89 cm to 64.47 cm. Result recorded that Farmer variety (64.47 cm) was taller

than Ajit-11 (62.33 cm) and BM-2003 (61.58 cm). among three BM-2003 (61.58 cm) was dwarf in plant height. Farmer variety (64.47 cm) reported taller than the general mean (62.79 cm). For plant height CV was 0.90%, calculated standard error of the mean was 0.33, and critical difference (CD) at the 5% was 1.29. Similar study reported by Muzibul, *et al.* (2014)^[4] and Asari, *et al.* (2019)^[1].

5. Number of Pods per Plant (Numbers)

The analysed data of number of pods per plant was mentioned in table no. 2. The mean value for number of pods per plant ranged from 40.20 to 57.70. Among green gram varieties BM-2003-02 (54.70) was ranked first, followed by Ajit-11 (41.25) and Farmer variety (40.20).

In this study, BM-2003-02 (54.70) was higher in pod per plant over the average mean value 45.38. CV value for number of pods per plant was 2.04%, calculated SE (m) and CD was 0.53 and 2.09 respectively. Similar findings reported by Rao, *et al.* (2006)^[8] and Prasanna, *et al.* (2013)^[7].

6. Number of Pods per Plot (Number)

Number of pods per plot ranged from minimum 1,314.22 to max 1,314.22 mentioned in table number 2. Among the green gram variety, BM-2003-02 (1,314.22) was superior contains large number of pods per plot which followed by Farmer variety (1,117.33) and Ajit-11 (1,149.89). Ajit-11 variety recorded inferior in this character.

Analysis reported, BM-2003-02 (1,314.22) were superior over average mean value 1,193.81. For this character CV, SE and CD was 2.19, 15.09 and 59.25, respectively. Similar findings reported by Rao, *et al.* (2006)^[8] and Prasanna, *et al.* (2013)^[7].

7. 100 Seed Weight (g)

The 100 seed weight measured in gram was ranged from 5.48 gram to max 6.48 gram. Farmer variety (6.48 g) grain was heavy in weight than the Ajit-11 (6.37 g), and BM-2003-02 (5.48 g). Across cultivated variety grain of BM-2003-02 (5.48 g) variety was lighter in weight.

This study showed that two varieties viz., Farmer variety (6.48 g) and Ajit-11 (6.37 g) were outstanding over average mean 6.11. For 100 seed weight CV, SE and CD was 1.58, 0.06 and 0.22, respectively. Study agreed with Rao, *et al.* (2006)^[8].

8. Pod Length (cm)

Length of pods ranged from minimum 10.91 cm to max 12.77 cm mentioned in table no. 2. BM-2003-02 (12.77 cm) variety recorded longer in pod length which followed by Ajit-11 (11.54 cm) and Farmer variety (10.91 cm).

Analysis data showed that only one variety viz., BM-2003-02 (12.77 cm) variety was superior over the average mean 11.74. For pod length CV, SE and CD was 1.61, 0.11 and 0.43, respectively. Study agreed with Rao, *et al.* (2006)^[8].

9. Pod Girth (cm)

Pod girth is diameter of pod and it is considered as important yield contributing character in green gram crop. Value for pod girth was ranged from 1.98 cm to 2.09 cm. BM-2003-02 (2.09 cm) was superior in pod girth followed by Farmer variety (2.03 cm) and Ajit-11 (1.98 cm). Among green gram variety Ajit-11 (1.98 cm) variety was inferior in pod girth.

BM-2003-02 (2.09 cm) and Farmer variety (1.03 cm) was superior in pod girth than the average mean (1.03 cm). Value of CV (%), SE (m) and CD @5% for pod girth was 0.59, 0.01 and 0.03. Similar findings reported by Muzibul, *et al.* (2014)^[4].

10. Number of Branches per Plant (Numbers)

Number of branches per plant is positively associated with the yield. Value of number of branches per plant was ranged from minimum 17.24 to 19.11. BM-2003-02 (19.11) was best performer for number of branches per plant followed by Farmer variety (18.19) and Ajit-11 (17.24). Across variety Ajit-11 (17.24) was inferior in number of branches per plant. BM-2003-02 (19.11) and Farmer variety (18.19) was superior in number of branches per plant over the average mean (18.18). Value of CV (%), SE (m) and CD @5% for pod girth was 0.47, 0.05 and 0.19. Similar findings reported by Parameswarappa (2005)^[5], Rao, *et al.* (2006)^[8], Tabasum, *et al.* (2010)^[10], Prasanna, *et al.* (2013)^[7], Muzibul, *et al.* (2014)^[4] and Kate, *et al.* (2017)^[3].

11. Yield per Plant (g): Yield is the ultimate aim of any

research programme, which is affected by many characters. Yield per plant was ranged from 27.57 gram to 29.58 gram. BM-2003-02 (29.58) was outstanding performer for yield per plant followed by Ajit-11 (28.50) and Farmer variety (27.57). Across variety Farmer variety (27.57) was inferior in yield. BM-2003-02 (29.58) was superior in yield per plant over the average mean (28.55). Value of CV (%), SE (m) and CD @5% for pod girth was 2.05, 0.34 and 1.33. Similar result recorded by Jain *et al.* (2024)^[2] and Shingade *et al.* (2025)^[9].

12. Yield per Plot (g)

Yield per plot was ranged from 1,088.00 gram to 1,351.67 gram. BM-2003-02 (1,351.67) was outstanding performer for yield per plot followed by Farmer variety (1,163.67) and Ajit-11 (1,088.00). Across variety Ajit-11 (1,088.00) was inferior in yield over plot. BM-2003-02 (1,351.67) was superior in yield per plant over the average mean (1,201.11). Value of CV (%), SE (m) and CD @5% for pod girth was 1.81, 12.56 and 49.30. Similar result recorded by Rao, *et al.* (2006)^[8], Prasanna, *et al.* (2013)^[7], Jain *et al.* (2024)^[2] and Shingade *et al.* (2025)^[9].

Table 1: Analysis of variance for different characters over three varieties of Green Gram.

Source	DF	GER	D50F	DM	PHT	PODP	PODPLOT	100WT	PL	PG	NBPP	YPP	YPPLOT
Replication	2	0.448	1.976	2.074	0.378	0.164	150.126	0.03	0.04	0	0.016	0.239	477.778
Treatments	2	10.271*	9.284**	11.16*	10.05**	240.583**	33417.056**	0.908**	2.674**	0.008**	2.632**	3.036*	55295.534**
Error	4	1.449	0.511	1.489	0.315	2.489	683.113	0.009	0.036	0	0.007	0.343	472.928

*, ** significant level at 5 & 1%, respectively

Table 2: Mean performance of variety for different characters in green gram.

Treatment	GER	D50F	DM	PHT	PODP	PODPLOT	100WT	PL	PG	NBPP	YPP	YPPLOT
BM-2003-02	93.30	30.56	60.43	61.89	57.74	1,314.22	5.48	12.77	2.09	19.11	29.58	1,351.67
Ajit-11	91.03	31.47	62.83	62.96	43.97	1,149.89	6.37	11.54	1.98	17.24	28.50	1,088.00
Farmer variety	89.63	33.96	64.25	65.45	40.94	1,117.33	6.48	10.91	2.03	18.19	27.57	1,163.67
Mean	91.32	32.00	62.50	63.43	47.55	1,193.81	6.11	11.74	2.03	18.18	28.55	1,201.11
CV (%)	1.32	2.23	1.95	0.88	3.32	2.19	1.58	1.61	0.59	0.47	2.05	1.81
SE (m)	0.70	0.41	0.70	0.32	0.91	15.09	0.06	0.11	0.01	0.05	0.34	12.56
CD @5%	2.73	1.62	2.77	1.27	3.58	59.25	0.22	0.43	0.03	0.19	1.33	49.30
CD @1%	4.53	2.69	4.59	2.11	5.93	98.25	0.36	0.71	0.05	0.32	2.20	81.75

GER- Germination, D50F- Days to 50% Flowering, DM- Days to Maturity, PHT- Plant Height, PODP- Pods Per Plant, PODPLOT- Pods Per Plot, 100WT- 100 Seed Weight, PL- Pod Length, PG- Pod Girth, NBPP- Number of Branches Per Plant, YPP- Yield Per Plant and YPPLOT- Yield Per Plot.

Conclusion

In the present investigation BM-2003-02 performed superior in germination, day to 50% flowering, days to maturity, pod per plant, pod per plot, pod length, pod girth, number of branches per plant, seed yield per plant and seed yield per plot. Farmers variety were found superior in plant height and 100 seed weight. BM-2003-02 and Farmers variety were the best performers in rainfed condition.

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