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Effect of spacing, farm yard manure and neemcake on growth and yield of Greengram (*Vigna radiata* L.)

V Theeshnavi and Dr. Joy Dawson

Abstract

A field experiment was conducted at the SMOF (SHUATS Model Organic Farm) during *zaid* season, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad), (U.P). The SMOF is situated at 25°24'41.27" N latitude, 81°50'56" E longitude (Google, 2019) and 98 m altitude above the mean sea level. The soil in the experimental plot had a sandy loamy texture, was virtually neutral in soil reaction (pH 7.6), had low organic carbon (0.51percent), available N (188 kg/ha), available P (17.80 kg/ha), and available K (245.10 kg/ha). Spacing (30cmx10cm), farmyard manure (2.5t/ha), and neem cake (250kg/ha) were the treatments, which had an effect on Greengram (var. SAMRAT). The study used a Randomized Block Design with nine treatments that were replicated three times. The application of Spacing (30cmx10cm), farmyard manure (2.5t/ha), and neem cake (250kg/ha) significantly influenced the maximum plant height (42.77cm), number of branches (10.83), plant dry weight (6.07 g/plant), pods per plant (27.16), seeds per pod (13.64), Test weight (34.55g), seed yield (1.65t/ha), stover yield (5.15t/ha), and Harvest index (30.39%). As a result, the application of Spacing (30cmx10cm), farmyard manure (2.5t/ha), and neem cake can be most productive and cost-effective.

Keywords: FYM, neem cake, spacing, growth, yield and green gram

Introduction

Pulses play an important role in all farming systems, including main, catch, cover, green manure, intercrop, and mix crops. Green gram (*Vigna radiata* L. Wilczek) is a self-pollinated leguminous crop produced in desert and semiarid regions of India during the *zaid* and *kharif* seasons. Green gram has an extremely low average yield (763.5 kg/ha) as compared to its potential production of 2 to 4 tons/ha. The low yield of green gram in our country is due to a variety of causes. The most important factors for such a drop in green gram production have been observed to be improper nutrition management.

Because a dense plant population will not receive enough light for photosynthesis and will be more susceptible to disease infestation, spacing plays a significant part in contributing to a high yield. A low plant population, on the other hand, will result in a lower yield. As a result, a typical population is required for good production (Singh, V. and Singh, V. 2021) [10]. The advantage of optimum spacing under irrigated conditions is that there is less competition for light, as light is no longer a limiting factor when moisture is scarce, and the advantage of uniform spacing is gone (Ihsanullah *et al.*, 2002) [2]. By controlling plant density and, in turn, moisture, nutrients, and space availability, spacing plays a significant role in growth and development by maintaining an optimal plant population (Panwar and Sharma, 2004) [6]. The role of organic manure is well recognized and considered as balance manures which supplies macro and micro nutrients essential to plants. Farm yard manure (FYM) is one of the important organic manures, which supplies a suitable mineral balance and improves nutrient availability by enzymes. The importance of organic manure is well understood, and it is regarded as a balanced manure that provides macro and micro nutrients to plants. Farm yard manure (FYM) is an important organic manure that provides a balanced mineral balance and enhances nutrient availability through enzymes (Rekha *et al.*, 2018) [8]. Neemcake can be used to make organic manure. As a fertiliser, neem has shown to have a lot of potential. Neemcake also reduces soil alkalinity by producing organic acid during decomposition. Because it is completely natural, the Neemcake we provide ensures soil fertility. It also improves the organic matter content of the soil, aiding in soil texture, water holding capacity, and soil aeration for better root development.

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In addition to reducing soil borne pathogens, the addition of Neemcake improved accessible soil organic carbon, N P K, and Mn content, leading in improved mung bean growth and grain output. Neemcake has 5.2 percent nitrogen, 1.0 percent phosphorus, and 1.4 percent potassium. Neemcake reduces nitrification by acting as a nitrogen inhibitor. It keeps available nitrogen in the soil for a long time.

Material and Methods

The current experiment was conducted at the SMOF (SHUATS Model Organic Farm) during *zaid* season, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad), (U.P). The SMOF is situated at 25°24'41.27" N latitude, 81°50'56" E longitude (Google, 2019) and 98 m altitude above the mean sea level. The experiment was set up in a Randomized Block Design with nine treatments and three replicates to study the effect of different levels of spacing and quantity of potassium application - T1: 20cm x 10 cm+ FYM (100%) 5t/ha, T2:

20cmx10cm + Neemcake (100%)500kg/ha, T3: 20cmx10cm + FYM (50%) 2.5t/ha + Neemcake (50%) 250kg/ha, T4: 30cmx10cm + FYM (100%) 5t/ha, T5: 30cmx10cm + Neemcake (100%) 500kg/ha, T6: 30cmx10cm + FYM (50%) 2.5t/ha+ Neemcake (50%) 250kg/ha,T7:40cmx10cm + FYM (100%) 5t/ha, T8: 40cmx10cm + Neemcake (100%) 500kg/ha, T9: 40cmx10cm + FYM (50%) 2.5t/ha+ Neemcake (50%) 250kg/ha. The cultivated land had a sandy loam soil with virtually neutral pH, had low organic carbon (0.51percent), available N (188 kg/ha), available P (17.80 kg/ha), and available K (245.10 kg/ha). Respectively). Various plant growth metrics were measured at equal intervals from germination through harvest, and several yield characteristics were measured after harvest. Plant Height (cm), Number of branches per Plant, and Dry weight (g/plant) were measured in growth parameters, and yield parameters such as number of pods/plant, number of seeds per pod, Seed yield, stover yield and harvest index (%). were measured and statistically analysed using analysis of variance (ANOVA).

Table 1: Effect of spacing, farm yard manure and neemcake on growth parameters of green gram.

S. No.	Treatment combinations	Plant Height (cm)	Dry weight (g/plant)	Number of branches per plant
1	20x10 cm + FYM (100%) 5 t /ha	29.53	3.33	7.07
2	20x10 cm + Neem cake (100%) 500 kg/ ha	33.67	3.81	10.07
3	20x10 cm + FYM (50%) 2.5 t /ha + Neem cake (50%) 250 kg/ ha	40.20	4.18	10.27
4	30x10 cm + FYM (100%) 5 t /ha	40.53	4.47	8.51
5	30x10 cm + Neem cake (100%) 500 kg/ ha	38.57	4.45	10.13
6	30x10 cm + FYM (50%) 2.5 t /ha + Neem cake (50%) 250 kg/ ha	42.77	6.07	10.83
7	40x10 cm + FYM (100%) 5 t /ha	36.60	3.50	9.00
8	40x10 cm + Neem cake (100%) 500 kg/ ha	33.33	3.40	8.13
9	40x10 cm + FYM (50%) 2.5 t / ha + Neem cake (50%) 250 kg /ha	42.10	5.46	10.53
	F- test	S	S	S
	S.Em(±)	2.617	0.217	0.647
	C. D. (P = 0.05)	7.845	0.650	1.941

Table 2: Effect of spacing, farm yard manure and neemcake on yield and yield attributes of green gram

S. No.	Treatments Combination	Number of Pod /plant	Number of seeds /Pod	Test weight(g)	Seed yield (t/ ha)	Stover yield (t/ ha)	Harvest index (%)
1	20x10 cm + FYM (100%) 5 t /ha	16.07	10.04	17.89	1.04	3.83	21.94
2	20x10 cm + Neem cake (100%) 500 kg/ ha	19.33	10.91	25.66	1.38	4.72	22.83
3	20x10 cm + FYM (50%) 2.5 t /ha + Neem cake (50%) 250 kg /ha	20.58	11.65	24.90	1.37	4.73	28.78
4	30x10 cm + FYM (100%) 5 t /ha	20.92	11.96	22.85	1.43	4.63	23.80
5	30x10 cm + Neem cake (100%) 500 kg/ ha	22.27	11.53	22.18	1.59	4.28	25.42
6	30x10 cm + FYM (50%) 2.5 t /ha + Neem cake (50%) 250 kg /ha	27.16	13.64	34.55	2.26	5.15	22.17
7	40x10 cm + FYM (100%) 5 t /ha	23.81	11.50	23.78	1.86	4.28	30.00
8	40x10 cm + Neem cake (100%) 500 kg/ ha	20.50	12.19	25.05	1.37	5.04	22.55
9	40x10 cm + FYM (50%) 2.5 t /ha + Neem cake (50%) 250 kg /ha	24.19	12.43	32.17	1.92	5.09	30.39
	F- test	S	S	S	S	S	S
	S.Em(±)	0.828	0.294	2.981	0.066	0.185	1.358
	CD. (P = 0.05)	2.481	0.880	8.936	0.199	0.554	4.070

Results and Discussion

Effect of spacing, farm yard manure and neemcake on Growth parameters of green gram

Plant Height (cm): There was a substantial difference between the treatments at 45DAS. Plant height was significantly greater (42.77cm) with spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250 kg/ha. However, spacing 30cmx10cm + FYM 5t/ha (40.53cm) and spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250 kg/ha (42.10cm) were statistically comparable to spacing 30cmx10cm + FYM

2.5t/ha + neem cake 250 kg/ha. Similar findings were obtained by Khan *et al.* (2017)^[4].

Dry weight (g/plant): The treatments differed significantly at 45 DAS. In the spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250 kg/ha, the plant dry weight was much higher (6.07g). However, spacing 30cmx10cm + FYM 5t/ha (4.47g) and spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250 kg/ha (5.46g) were statistically equivalent to spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250 kg/ha.

Number of Branches per plant

The treatments differed significantly at 45 DAS. There were significantly more branches per plant (10.83) with a 30cmx10cm spacing, FYM 2.5t/ha, and neem cake 250kg/ha. However, spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (10.53) and spacing 20cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (10.27) were statistically equal to spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (10.53).

Effect of spacing, farm yard manure and neemcake on Yield and Yield attributes of green gram

Number of pods per plant

The results showed that there was a significant difference between the treatments, with the maximum number of pods per plant (27.16 per plant) observed in the application of spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha. However, spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (24.19) being statistically equal to spacing 30cmx10cm + FYM 2.5t/ha. Higher number of pods per plant may have been feasible due to the plant's increased vigour as a result of improved photosynthetic activities with enough light availability and balanced food supply during the growing stages. As a result, number of seed per pod with the combination of spacing and organic manures. Similar findings were obtained by Patel (2005) and Nadeem *et al.* (2003)^[5].

Number of Seeds per pod

The results showed that there was a significant difference between the treatments, with the maximum number of seeds per pod (13.64) observed in the application of spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha. However, spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (12.43) is statistically comparable to spacing 30cmx10cm + FYM 2.5t/ha. Similar findings were obtained by Patel (2005).

Test weight (g)

The results showed that there was a statistically significant difference between the treatments, with the maximum test weight (34.55g) being observed when spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha was used. However, spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (32.17g) is statistically comparable to spacing 30cmx10cm + FYM 2.5t/ha. Similar findings were obtained by Patel (2005).

Seed Yield (t/ha)

The maximum seed production (1.65t/ha) was recorded in the application of spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha, indicating that there was a substantial difference between the treatments. However, a spacing of 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (1.59t/ha) is statistically equivalent to a spacing of 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha. Similar findings were obtained by Patel (2005).

Stover yield (t/ha)

The maximum Stover yield (5.15 t/ha) was recorded in the application of spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha, indicating that there was a substantial difference between the treatments. Spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (5.09 t/ha), on the other hand, is statistically equivalent to spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha. Greengram planted at

spacing 30x10 cm² significantly produced the highest seed yield as well Stover yield Sarkar (2004)^[9].

Harvest index (%)

The results demonstrated a significant difference between the treatments, with the highest Harvest index (30.39%) seen in the application of spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha. However, statistically, spacing 30cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha (30.00%) is comparable to spacing 40cmx10cm + FYM 2.5t/ha + neem cake 250kg/ha. The likely reason for increased yield attributing characters like seed yield, stover yield, biological yield, and harvest index due to under spacing 30 x 10 cm with less intra row spacing higher seed yield as compared to 40 x 10 cm spacing could be due to a higher number of plants per hectare in the case of 30 x 10 cm row spacing. These findings are supported by these findings.

Conclusion

Based on one season of research, it was determined that the treatment combination of spacing 30x10cm + Fym2.5t/ha + neem cake 250 kg/ha (T6) produced the maximum plant height, dry weight, and harvest index in Greengram during the *zaid* season. The maximum Gross return, Net return, and Benefit cost Ratio were also recorded.

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