

Effect of Sowing Methods and Nutrient Management on Growth and Yield of Soybean (*Glycine max* L.)

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ABSTRACT: A field experiment was conducted at PGI farm, Mahatma Phule Krishi Vidyapeeth, Rahuri, during *Kharif* season of 2022-23. The experiment was laid out in split plot design with three replication and twelve treatments. The main plot treatments consist of three sowing methods viz., M₁-Broad bed furrow, M₂-Ridges and furrows, M₃-Flat bed furrow and sub-plot treatments includes four nutrient management viz., N₁- Control (No fertilizer treatment), N₂- Fertilizer as per soil test (62.5:75:22.5 Kg N:P₂O₅:K₂O ha⁻¹), N₃- GRDF (50:75:45 Kg N:P₂O₅:K₂O ha⁻¹ + FYM 10 t ha⁻¹) and N₄- GRDF + Foliar spray 2% DAP at 45 DAS. The result revealed that in main plot broad bed furrow sowing method recorded significantly the maximum growth characters, yield attributes, grain and straw yield as well as net monetary return also in sub plot GRDF + Foliar spray 2% DAP at 45 DAS method of nutrient management method recorded significantly the maximum growth characters, yield attributes, grain and straw yield.

Keywords: Soybean, sowing methods, nutrient management, foliar, yield.

INTRODUCTION

Soybean (*Glycine max* L.) is a “Golden bean” which occupies an important position in agricultural economy of India and claims premier position among the major oil producing countries in the world. Besides being an important oil seed crop, it also plays a major role in atmospheric nitrogen fixation. In present study, the crop will be subjected to different land layouts i.e., flatbed, ridges and furrow and broad bed furrow. Broad bed furrow, ridges and furrow will certainly facilitate higher infiltration of water and thereby increasing the maximum water storage. The beneficial effect of land layouts will certainly accelerate the process of growth and development of soybean resulting in better yield. Similarly, the excess water during rainy days will be drained out from the field through the furrow sand thereby saving the crop from water logged condition. Fertilizer is one of the most important inputs for successful crop production. A sustainable increase in production can be obtained by using balanced fertilizers. More scientific efforts are needed to increase the productivity of soybean per unit area and per unit time with soil moisture conservation and optimum fertilizer dose. Therefore, it is necessary to study the behavior of soybean under various nutrient management.

MATERIAL AND METHODS

The experiment was conducted at Mahatma Phule Krishi Vidyapeeth, Rahuri, during *kharif* 2022-23. The experiment was laid out in split plot design with three replication and twelve treatments. The main plot treatments consist of three sowing methods viz., M₁-Broad bed furrow, M₂-Ridges and furrows, M₃-Flat bed furrow and sub-plot treatments includes four nutrient management viz., N₁- Control (No fertilizer treatment), N₂- Fertilizer as per soil test (62.5:75:22.5 Kg N:P₂O₅:K₂O ha⁻¹), N₃- GRDF (50:75:45 Kg N:P₂O₅:K₂O ha⁻¹ + FYM 10 t ha⁻¹) and N₄- GRDF + Foliar spray 2% DAP at 45 DAS. The gross and net plot size were 4.00 m × 3.60 m and 3.60 m × 2.70 m, respectively. The variety was used ‘Phule Sangam’. The soil was low in available nitrogen (240 kg ha⁻¹), medium in available phosphorus (19 kg ha⁻¹) and very high in available potassium (380.50 kg ha⁻¹). The soil was slightly alkaline in reaction (pH 7.8) with normal in electrical conductivity of 0.31 dsm⁻¹. The fertilizer dose of 50 kg N, 75 kg P₂O₅ and 45 kg K₂O ha⁻¹ was applied with FYM 10 t ha⁻¹.

RESULT AND DISCUSSION

Plant height. Broad bed furrow sowing method recorded significantly the maximum plant height 91.54 cm at harvest. Whereas, the lowest plant height

recorded by flat bed sowing method. Similarly in case of nutrient management GRDF + Foliar spray 2 % DAP at 45 DAS recorded the maximum plant height 93.75 cm at harvest and control (No fertilizer) treatment recorded the lowest plant height. Similar results were reported by More *et al.* (2006); Imkongtoshi and Gobain (2009); Chaturvedi *et al.* (2010); Khaim *et al.* (2013).

Number of branches plant⁻¹. Broad bed furrow sowing method recorded significantly the maximum number of branches plant⁻¹ 12.51 at harvest. Whereas, the lowest number of branches plant⁻¹ recorded by flat bed sowing method. Similarly in case of nutrient management GRDF + Foliar spray 2 % DAP at 45 DAS recorded the maximum number of branches plant⁻¹ 13.31 at harvest and control (No fertilizer) treatment recorded the lowest number of branches plant⁻¹. Similar results were obtained by Rudrawar (2007); Kinge *et al.* (2020); Kadam *et al.* (2020).

Total dry matter plant⁻¹ (g). Broad bed furrow sowing method recorded significantly the maximum dry matter plant⁻¹ 37.87 (g) at harvest. Whereas, the lowest number of branches plant⁻¹ recorded by flat bed sowing method. Similarly in case of nutrient management GRDF + Foliar spray 2 % DAP at 45 DAS recorded the

maximum dry matter plant⁻¹ 38.51 (g) at harvest and control (No fertilizer) treatment recorded the lowest number of branches plant⁻¹. These findings confirm the results of Pathan (1990); Kinge *et al.* (2020); Kadam *et al.* (2020).

Grain yield. The significantly higher grain yield (2411 kg ha⁻¹) was recorded in broad bed sowing method. Whereas, the lowest grain yield was recorded in flat bed sowing method. Similarly in case of nutrient management GRDF + Foliar spray 2% DAP at 45 DAS recorded the maximum grain yield (2900 kg ha⁻¹) and control (No fertilizer) treatment recorded the lowest grain yield. The results confirmed the findings of Bhadre *et al.* (2018); Kinge *et al.* (2020); Kadam *et al.* (2020).

Straw yield. The significantly higher straw yield (3377 kg ha⁻¹) was recorded in broad bed sowing method. Whereas, the lowest straw yield was recorded in flat bed sowing method. Similarly in case of nutrient management GRDF + Foliar spray 2% DAP at 45 DAS recorded the maximum straw yield (4100 kg ha⁻¹) and control (No fertilizer) treatment recorded the lowest straw yield. Similar finding was reported by Bodkhe and Ismail (2014); Begum *et al.* (2015); Jamliya and Vyas (2017).

Table 1: Plant height, number of branches plant⁻¹, dry matter plant⁻¹, grain and straw yield as influenced by different treatment.

No.	Treatment	Plant height (cm)	Number of branches plant ⁻¹	Dry matter plant ⁻¹ (g)	Grain yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)
A.	Sowing method (M)					
M ₁	Broad bed furrow	91.54	12.51	37.87	2411	3377
M ₂	Ridges and furrows	88.41	11.45	35.94	2237	3097
M ₃	Flat bed	85.33	10.56	34.34	2118	2929
	S.E.m. ±	0.73	0.16	0.40	17.80	24.19
	CD at 5 %	2.88	0.64	1.57	69.92	95.01
B.	Nutrient management (N)					
N ₁	Control (No fertilizer treatment)	82.47	9.36	32.77	1216	1630
N ₂	Fertilizer as per soil test (62.5:75:22.5 Kg N:P ₂ O ₅ :K ₂ O ha ⁻¹)	87.14	11.01	35.63	2100	2898
N ₃	GRDF (50:75:45 Kg N:P ₂ O ₅ :K ₂ O ha ⁻¹ + FYM 10 t ha ⁻¹)	90.35	12.34	37.29	2806	3909
N ₄	GRDF + Foliar spray 2 % DAP at 45 DAS	93.75	13.31	38.51	2900	4100
	S.E.m. ±	0.55	0.18	0.36	23.32	30.45
	CD at 5 %	1.64	0.54	1.07	69.28	90.47
C.	Interaction (M × N)					
	S.E.m. ±	0.95	0.31	0.63	40.39	52.74
	CD at 5 %	2.84	0.93	1.87	120.01	156.70
	General Mean	88.43	11.51	36.05	2255	3134

CONCLUSIONS

The broad bed furrow sowing method recorded significantly higher growth characters, grain and straw yield. Similarly in case of nutrient management GRDF (50:75:45 Kg N:P₂O₅:K₂O ha⁻¹ + FYM 10 t ha⁻¹) +

Foliar spray 2 % DAP at 45 DAS recorded the maximum growth characters, grain and straw yield.

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