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**Prashant G Shete**  
Ph.D. Scholar,  
Department of Agronomy,  
Bhagwant University, Ajmer,  
Rajasthan, India

**Digvijay Dubey**  
Assistant Professor, Department  
of Agronomy, Bhagwant  
University, Ajmer, Rajasthan,  
India

## Study of soybean (*Glycine max* L. Merill) to planting method and fertilizers levels with and without FYM under western Maharashtra condition

**Prashant G Shete and Digvijay Dubey**

### Abstract

A field experiment was conducted during 2020 and 2021 on medium black soil of Instructional farm, Krishi Vigyan Kendra, Narayangaon to find out the response of planting methods, nutrient management and FYM levels on Soybean Sowing on ridges and furrow recorded significantly the highest plant height at 45 and 60 days after harvest, length of pods, text weight, seed yield (2122.36 kg/ha) and stover yield (5330.87). There were 12.68% higher over flat bed. Among the different levels of fertilizers 100% RDF out rightly dominated and established its significant performance in respect of all the growth and yield attributes. Application of 100% RDF produced significantly the highest plant height, length of pods, text weight, seed (2098.31 kg/ha) and stover yield (5317.33 kg/ha). The result further revealed that seed yield as well as most of the growth and yield attributes were significantly increased by application of FYM @ 7.5 t/ha with rhizobium and PSB. Significantly the highest seed (2155.29 kg/ha) yield was recorded with the application FYM @ 7.5 t/ha. This was 15.28% higher seed yield over control.

**Keywords:** Soybean, planting method, inorganic fertilizer, farm yard manure

### Introduction

Poor soil management is one of the major factors responsible for low productivity of crops. Therefore planting method can play an important role for easy and uniform germination as well as growth and development of plant. In these circumstances, ridges and furrow method of sowing under such situation is advantageous as compared to flat bed sowing as it provides better aeration, root development and also protects the crop from water logging condition. Balanced use of organic and inorganic fertilization is advocated for the maximum return and maintenance of soil fertility. Fertilizer is costly but important input in crop productivity. In plant nutrition, organic matter of a soil is the key property that decides the availability status of essential nutrients. Plant nutrients can be supplied from different sources viz. organic manures, crop residues and chemical fertilizers. For better utilization of resources and to produce crops with less expenditure, integrated nutrient management is the best approach. With this background information the present experiment is planned.

### Materials and Methods

The Field experiment were conducted during 2020 and 2021 on medium black soil of Instructional farm, Krishi Vigyan Kendra, Narayangaon. The soil of experimental field was clay in texture, low in total nitrogen, medium in available potash and fairly rich in available potassium. The experiment was conducted in factorial randomized block design with three replication. Having two levels of planting method viz. flat bed (P1), Ridges and furrow (F2), two levels of Inorganic fertilizers, 75% RDF (F1), 100% RDF (F1) and three levels of of FYM namely, control (M1), FYM @ 7.5 t/ha and FYM @ 7.5 t/ha + Rhizobium + PSB. The experiment was started from *kharif* season of 2020 with sowing of soybean cv. MACS-1188 at the spacing of 30x10 cm. sowing is done in the month of June. The land was cross cultivated by tractor drawn by cultivator during the month of June. The big clods were crushed and then field was leveled with the help of planking. Thereafter, the experiment was laid out and seed beds were prepared. The sequence of field operations was carried out as per recommendation.

### Results and Discussion

#### Growth Attributes

The plant height (45 and 60 DAS), length of pods, text weight were significantly highest under ridges and furrow over flat bed sowing.

**Corresponding Author:**  
**Prashant G Shete**  
Ph.D. Scholar,  
Department of Agronomy,  
Bhagwant University, Ajmer,  
Rajasthan, India

This might be due to maintenance of proper air moisture regimes under ridges and furrow sowing which might have improved the drainage in good supply of available nutrients, soil aeration, soil environment and better growth and development. The results are conformity with reported by Prajapati *et al.* (2018) [5] and Verma *et al.* (2020) [6] in soybean.

Inorganic fertilizers also had significant effect on growth attributes. The plant height at 45 and 60 DAS, length of pods text weight of soybean were maximum under treatment receiving 100% RDF over the other treatment. This was because of nitrogenous fertilizers inducing the growth of the plants through active protein metabolism, transportation of photosynthates and synthesis of nucleic acid and proteins. Hence during the vegetative stage, N nutrition of the plant to a large extent controls the growth of the plants. Phosphorous has important role in conversion of solar energy in to chemical energy and it has also beneficial effect on root proliferation that increases the absorption of plant nutrients from the soil. This is obvious as phosphorus is closely associated with cell division and development of meristematic activities of the tissue in the plant system is bound to increase morphological organs of the plants. These results confirm the findings of Geetha *et al.* (2018) [1] and Ghodake *et al.* (2018) [2]. Application of FYM with rhizobium and PSB was found significant effect on growth parameters. Plant height, length of pods, text weight was recorded significantly higher under treatment FYM @ 7.5 t/ha with rhizobium and PSB application over control. This might be due to multifarious role of FYM in supply of nutrients as well as improvement in physical, chemical and biological properties of soil. Finally, it was reflected in better growth of the plants with FYM. The results are in close conformity with those of Singh (2018) [8] and Raghuwanshi *et al.* (2018) [7] in soybean.

### Seed and Stover yield

Planting method has significant effect on seed and Stover

yield. Sowing on ridges and furrow method recorded the highest text weight (Table 1). This might be due to better growth of plants in terms of dry matter accumulation under ridges and furrow sowing which might have adequately supplied more photosynthates for development of sink. Significantly the highest seed (2122.36 kg/ha) and stover (5330.87 kg/ha) was obtained under ridges and furrow sowing over flat bed sowing. There were 12.68% higher seed yield over flat bed sowing. This might be due to cumulative effect exerted from better improvement in drainage, soil environment, aeration, root development optimum moisture air equilibrium throughout the crop growth besides supply of available nutrients to the crops resulting in better growth and development ultimately reflected in better seed and stover yield. The present findings are in accordance with those of Motwani and Ashish (2018) [4], Verma *et al.* (2020) [6] in soybean.

Appreciably highest values of yield attributes test weight, seed (2098.31 kg/ha) and stover (5317.33 kh/ha) yield (Table 1) were noted with the application of 100% RDF than rest of levels. The increase in seed and stover yield might be due to remarkable improvement in the yield attributes such as length of pods, pods per plant and text weight, better development of various growth parameters such as plant height, number of branches per plant which resulted in higher seed yield. The results were supported by the findings of Vyas and Kushwah (2015) [9] and Ghodake *et al.* (2018) [2] in soybean.

Application of FYM @ 7.5 t/ha with rhizobium and PSB recorded significantly highest plant height, length of pods, text weight, seed (2155.29 kg/ha) and stover (5473.76 kg/ha) yield over control. Significantly highest number of pods per plant and seed and stover yield were due to favourable effect of FYM with rhizobium and PSB Biofertilizers in improvement of growth attributes such as plant height, length of pods and text weight. Similar results were obtained by Koushal, S, (2017) [3] and Geetha *et al.* (2018) [1] in soybean.

**Table 1:** Ridges and furrow method recorded the highest text weight

Treatment	Plant height 45 DAS (cm)	Plant height 60 DAS (cm)	Length of pod (cm)	Text weight (gm)	Seed yield (kg/ha)	Stover yield (kg/ha)
<b>Planting method (P)</b>						
P <sub>1</sub> - Flat bed	34.02	58.31	3.04	57.43	1883.47	4659.68
P <sub>2</sub> - Ridges & furrow	36.63	62.85	3.31	60.00	2122.36	5330.87
SE+	0.58	0.62	0.02	0.51	41.69	118.90
CD%	1.66	1.75	0.07	1.45	118.83	338.87
<b>Inorganic Fertilizer levels (F)</b>						
F <sub>1</sub> – 75% RDF	34.04	60.53	3.04	57.46	1883.47	4673.22
F <sub>2</sub> – 100% RDF	36.62	60.63	3.31	59.97	2122.36	5317.33
SE+	0.58	0.62	0.02	0.51	41.69	118.90
CD%	1.66	NS	0.07	1.45	118.83	338.87
<b>FYM levels (M)</b>						
M <sub>1</sub> - No FYM (Control)	34.13	58.16	3.12	56.65	1869.47	4551.95
M <sub>2</sub> - FYM @ 7.5 t ha <sup>-1</sup>	34.33	59.10	3.11	59.10	1984.00	4960.11
M <sub>3</sub> - FYM @ 7.5 tha <sup>-1</sup> +Rhizobium +PSB	37.52	64.48	3.29	60.41	2155.29	5473.76
SE+	0.71	0.75	0.03	0.62	51.06	145.62
CD%	2.03	2.15	0.08	1.78	145.54	415.04

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