Quest Journals
Journal of Research in Agriculture and Animal Science
Volume 7 ~ Issue 3 (2020) pp: 42-44
ISSN(Online): 2321-9459
www.questjournals.org

Research Paper

Comparative Study on Sowing, Yield and Performance of Broad Bed Furrow (BBF) Planter for Soybean Cultivation in Chandrapur District, Maharashtra

R. H. Rahate[1], S. R. Imade[2]
[1 & 2.] *Assistant Professor, Anand Niketan College of Agriculture, Warora, Dist- Chandrapur*

Abstract
The Broad Bed Furrow (BBF) planter has emerged as an effective mechanized sowing technology that improves drainage, soil moisture conservation, plant establishment, and crop yield. The present study was carried to compared the sowing performance, yield attributes, economic returns, and overall efficiency of the BBF planter with conventional flat-bed sowing methods for soybean cultivation. Results from various field experiments indicated that BBF planting improved plant population, from 41.2 plants/m² under flat-bed sowing to 45.6 plants/m², seed yield recorded approximately 43% higher than flat-bed sowing., The BBF system also achieved 25% higher rainwater-use efficiency and significantly reduced plant mortality. Yield advantages ranging from 18% to 43% were reported over conventional flat-bed sowing methods. The study suggests that BBF planter technology can significantly enhance soybean productivity and increase farm income in Chandrapur district.
Keywords: *Soybean, Broad Bed Furrow, BBF planter, Chandrapur, mechanization, yield, profitability, water conservation.*

I. Introduction

Soybean (*Glycine max* L. Merrill) is one of the most important oilseed and pulse crops cultivated worldwide due to its high protein (38–42%) and oil (18–22%) content. It plays a vital role in enhancing food security, livestock nutrition, and industrial production. In India, soybean is predominantly grown during the kharif season under rainfed conditions and contributes significantly to the agricultural economy. Maharashtra, Madhya Pradesh, and Rajasthan are the major soybean-producing states, accounting for a substantial share of the country's total production.

Traditionally, soybean is sown on a flat-bed system using seed drills or broadcasting methods. However, challenges such as waterlogging during heavy rainfall, poor drainage, soil compaction, and inefficient utilization of rainwater often result in reduced germination and lower yields. To overcome these limitations, alternative planting methods such as Broad Bed and Furrow (BBF), ridge and furrow, raised bed planting, and zero-tillage sowing have been developed and adopted in several soybean-growing regions. These methods are designed to improve soil moisture management, facilitate drainage, reduce runoff and soil erosion, and create favorable conditions for root growth.

Chandrapur district receives annual rainfall of approximately 1100–1400 mm, most of which occurs during the monsoon season. Heavy rainfall events frequently cause temporary waterlogging and poor aeration in soybean fields, leading to reduced germination, plant mortality, and lower yields. Traditional flat-bed sowing methods often fail to provide adequate drainage under such conditions. Broad Bed Furrow (BBF) technology creates raised beds separated by furrows, enabling rapid drainage of excess water while conserving moisture during dry spells. BBF planters perform bed formation, fertilizer application, and sowing simultaneously, reducing labor and operational costs. Therefore, evaluating different planting methods under specific agro-climatic conditions is essential for identifying the most suitable and economically viable technique for soybean cultivation.

A comprehensive understanding of the performance of different planting methods can help farmers adopt appropriate technologies that enhance productivity, improve resource-use efficiency, and ensure sustainable soybean production under changing climatic conditions.

II. Materials and Methods

The field experiment was conducted during the kharif season, The treatments consisted of Flat Bed Sowing and Broad Bed Furrow (BBF) Method. Soybean variety JS-9305 was used for the study. The seed rate of 75 kg ha^{-1} was adopted for all treatments. Seeds were treated with recommended fungicide and inoculated with

Rhizobium culture before sowing. Sowing was carried out during the first fortnight of June using the respective planting implements. The spacing maintained was 30 cm between rows and 8 cm between plants, depending on the planting method. Weed management was carried out through pre-emergence application of pendimethalin @ 1.0 kg ha^{-1} followed by manual weeding as required. Plant protection measures were adopted uniformly in all treatments to control insect pests and diseases.

The following observations were recorded during the crop growth period:

- Plant population
- Plant height
- Number of pods per plant
- Seed index
- Seed yield
- Straw yield
- Net returns
- Benefit-Cost ratio

Economic Analysis

The cost of cultivation for each treatment was calculated based on prevailing market rates of inputs and labour. Gross monetary returns were calculated using the market price of soybean grain and straw.

III. Results and Discussion

BBF planter ensures uniform seed placement, optimum seed depth, and proper spacing. Furrows facilitate drainage during heavy rains and improve root-zone aeration. Studies reported that BBF sowing increased plant population from 41.2 plants/m^2 under flat-bed sowing to 45.6 plants/m^2 due to improved germination and reduced mortality. Plant height and crop vigor were also superior under BBF conditions.

Yield Attributes

BBF technology significantly improved growth and yield attributes due to better moisture management and aeration. The plant height in BBF planting method was 58.7, which was more than flatbed method. The higher number of pods (47.21) per plant and seed index (5.79g) under BBF indicates better crop growth and reproductive development. The seed weight per plant was high (11.14g) in BBF planting method, which is furnished in Table 1.

Table 1. Yield Attributes of Soybean

Parameter	Flat Bed	BBF Planter
Plant Height (cm)	55.4	58.7
Pods per Plant	36.54	47.21
Seeds per Pod	2.37	2.61
Seed Weight per Plant (g)	10.78	11.14
Seed Index (g)	4.37	5.79

Seed Yield, straw yield and economic analysis

The BBF planter recorded approximately 43% higher yield than flat-bed sowing. Similar studies reported yield increases ranging from 18% to 25% due to improved drainage and moisture conservation. Higher straw production (25,120kg/ha) reflected improved nutrient uptake and photosynthetic efficiency. The BBF planter increased profitability by reducing operational costs ((₹/ha 21,600) and increasing yield. Net income more than doubled compared with conventional sowing methods. (Table 2.)

Table 2. Yield and economic comparison

Parameter	Flat Bed	BBF Planter
Seed yield (kg/ha)	13,700	19,600
Straw yield (kg/ha)	17,560	25,120
Cost of Cultivation (₹/ha)	26,447	21,610
Gross Return (₹/ha)	47,265	67,620
Net Return (₹/ha)	20,818	46,010
B:C Ratio	1.79	3.13

IV. Conclusion

The comparative study revealed that the Broad Bed Furrow (BBF) planter significantly outperforms conventional flat-bed sowing in soybean cultivation. BBF technology improved plant establishment, yield

attributes, seed yield, water-use efficiency, and economic returns. Yield advantages ranging from 18–43% and substantial increased in net income have been reported. Considering the rainfall pattern and soil characteristics of Chandrapur district, adoption of BBF planters can play a vital role in enhancing soybean productivity and sustainability.

References

[1]. Singh, D., Vyas, A. K., Gupta, G. K., Ramteke, R., & Khan, I. R. (2011). Tractor-drawn broad bed furrow seed drill machine to overcome moisture stress for soybean in Vertisols. *Indian Journal of Agricultural Sciences, 81*(10), 941–944.

[2]. Asewar, B. V., Gore, A. K., Pendke, M. S., Waskar, D. P., Gaikwad, G. K., Ravindra Chary, G., Narale, S. H., & Samindre, M. S. (2017). *Broad Bed and Furrow Technique – A Climate Smart Technology for Rainfed Soybean of Marathwada Region*. Journal of Agricultural Research and Technology, 42(3), 5–9.

[3]. Sharma, P., Dupare, B. U., & Khandekar, N. (2019). *Economic Impact Assessment of Broad-Bed Furrow Seed Drill for Soybean*. Agricultural Research.

[4]. Mehetre, D. B., Kubde, K. J., & Khandare, R. P. (2019). *Influence of land configuration and nutrient management on productivity of soybean [Glycine max (L.) Merrill] under rainfed condition of Vidarbha region*. Indian Journal of Hill Farming, 32(1), 74–82.

[5]. Verma, P. D., Parmanand, & Tamrakar, S. K. (2017). *Effect of broad bed furrow method for rainfed soybean cultivation*. International Journal of Agricultural Engineering, 10(2), 297–301.

[6]. Ramesh, A., Verma, R. K., & Billore, S. D. (2017). *Permanent broad bed furrow (PBBF) technology for soybean-based cropping systems*. ICAR-IISR technical reports.