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The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(1): 585-588

www.thepharmajournal.com
Received: 09-11-2021
Accepted: 19-12-2021

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Effect of planting methods and nutrient management on economics of kharif soybean (*Glycine max* L. Merrill)

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Abstract
A field experiment on "Effect of planting methods and nutrient management on growth, yield and quality of *kharif* soybean (*Glycine max* L. Merrill)" was conducted during *kharif* season, 2020 at Post Graduate Research Farm, Agronomy Section, College of Agriculture, Dhule (Maharashtra). The experiment was laid out in split plot design with four replications. Among the planting methods treatment, number of pods plant^{-1}, weight of seed plant^{-1},100 seed weight, seed yield (kg ha^{-1}), straw yield (kg ha^{-1}), gross monetary returns and net monetary returns was observed higher with the broad bed furrow (BBF) planting method. Among the nutrient management treatments, application of 100 per cent RDF (50:75:45 N:P_2O_5:K_2O kgha^{-1}) was observed higher number of pods plant^{-1}, weight of seed plant^{-1},100 seed weight, seed yield (kg ha^{-1}), straw yield (kg ha^{-1}), gross monetary returns and net monetary returns. However, B:C ratio were maximum under (2.46) Broad bed furrow planting method and (2.86) 100 per cent RDF (50:75:45 N:P_2O_5:K_2O kg ha^{-1}) as compared to others.

Keywords: Planting methods, Nutrient management, Economics, soybean etc.

Introduction
Soybean [*Glycine max* (L.) Merrill] is called as the "golden bean" of the 21st century. It belongs to the *Leguminaceae* family and also the *Papilionaceae* sub family. Though, soybean could be a legume crop, yet it's widely used as an oilseed. It's the third largest oilseed crop of India after rapeseed, mustard and groundnut and ranks first in edible oil within the world. Soybean is assumed to possess originated in Southeast Asia, and it's been widely farmed in China from prehistoric times *i.e.* 2838 B.C. Soybean is named as "poor man's meat" because it's the most affordable type of protein. It's called the "Wonder crop" since it's the richest, cheapest, and easiest source of high-quality protein and lipids, also as having numerous applications in food and industry. Due to its ability to fix atmospheric nitrogen within the soil, it's referred to as the "Golden Bean" or "Gold of Soil" because of its beneficial influence on subsequent crops (Hildebrand *et al.*, 1986) [8].

BBF (Broad bed furrow) approach is known for its water conservation, automated weeding, fertilizers placement, available moisture conservation, decreased lodging, and enhanced crop stand (Astatke *et al.*, 2002) [2]. In-situ conservation makes the moisture available for the sown crop. The land treatments (ridges and furrows, broad bed and furrows, raised sunken bed system) increased in place soil moisture conservation, minimized runoff, erosion and increased the yield of principal crops grown within the region. In rainfed farming, appropriate equipment to conserve rain water *in-situ* is required to keep up adequate moisture during the various developing stages of the crop (Singh *et al.*, 1999 and Nagavallemma *et al.*, 2005) [13, 11]. Although animal-drawn wide bed –furrow formers are available, their efficiency is exceedingly low; therefore, to overcome this problem, it is important to design a tractor-operated BBF planter (Srinivas, 2005) [14].

Now a day, the inorganic fertilizers are producing very hazardous effects on soil properties. Therefore, it is essential to utilize various sources of nutrients in order to enhance the production of crop by maintaining soil fertility. While chemical fertilizers are important in meeting the crop's nutritional requirements, continuous nutrient depletion is posing a greater challenge to long-term agriculture sustainability. As a result, it is critical to limit the use of chemical fertilizers while increasing the use of organics. Organic manure, either alone or in combination with chemical fertilizers, enhances the physico-chemical qualities of the soil, as well as the efficient utilization of applied fertilizers, resulting in improved seed yield and quality.

Material and Methods

The field experiment on "Effect of planting methods and nutrient management on growth, yield and quality of *kharif* soybean (*Glycine max* L. Merrill)" was conducted out during *kharif* season, 2020 at Post Graduate Research Farm, Agronomy Section, College of Agriculture, Dhule (Maharashtra). The experiment was laid out in split plot design with four replications. The treatments consisted of three planting methods *viz*., M_1- Broad bed furrow, M_2- Ridges and furrow, M_3- Flat bed furrow and five nutrient management levels *viz*., N_1- 100 per cent RDF (50:75:45 $N:P_2O_5:K_2O$ kg ha^{-1}), N_2- 75 per cent RDF + 25 per cent N from FYM + PSB + *Rhizobium*, N_3- 50 per cent RDF + 50 per cent N from FYM + PSB + *Rhizobium*, N_4- 25 per cent RDF + 75 N from FYM + PSB + *Rhizobium* and N_5- 100 per cent N from organic manure (50 per cent N from FYM + 25 per cent N from vermicompost + 25 per cent N from Neem cake + Phosphorous *Solubilizing* Bacteria + *Rhizobium*). The sowing was done at spacing of 30 cm × 7.5 cm for broad bed furrow and 30 cm × 10 cm for ridges and furrow and flat bed. The gross and net plot sizes were adopted 5.00 × 3.60 $m^2$and 4.60 x 3.60 m^2, respectively.

Results and Discussion

Effect of planting methods on yield and yield contributing characters

The important yield contributing character like no. of pods $plant^{-1}$, weight of grain $plant^{-1}$, 100 seed weight, seed yield (kg ha^{-1}) and straw yield (kg ha^{-1}) were significantly more in Broad bed furrow (BBF) as compared to other planting method and lowest under the flat bed planting method. This could be because, in comparison to other planting methods, porous media supplied the accurate balance of air and water for the development of the soybean crop. Due to the BBF, additional yield contributing characters such as no. of pods $plant^{-1}$, weight of grain $plant^{-1}$, 100 seed weight have all increased significantly, resulting in increased seed yield and straw yield. These findings are compatible with Dikey *et al.*, (2013) [17], Begum *et al.*, (2015) [3], Asewar *et al.*, (2017) [1], Bhadre *et al.*, (2018) [4] and Kadam *et al.*, (2020) [10].

Effect of nutrient management on yield and yield contributing characters

The important yield contributing characters *viz.* no. of pods $plant^{-1}$, weight of grain $plant^{-1}$, 100 seed weight, seedyield (kg ha^{-1}) and straw yield (kg ha^{-1}) were significantly more in 100 per cent RDF (50:75:45 $N:P_2O_5:K_2O$ $kgha^{-1}$) as compared to other nutrient management level and lowest under the 100 per cent N from organic manure(50 per cent N from FYM + 25 per cent N from vermicompost + 25 per cent N from Neem cake + Phosphorous *Solubilizing* Bacteria + Rhizobium). These, result are similar with Bodkhe and Ismail (2014) [5], Begum *et al*., (2015) [3] and Jamliya and Vyas (2017) [9].

Table 1: No. of pods plant-1, Weight of grain plant-1 (g) and 100 seed wt. (g) as influenced by different treatment

	Treatments	No. of pods $plant^{-1}$	Weight of grain $plant^{-1}$ (g)	100 seed wt. (g)
A. Planting Methods (M)				
M_1	Broad bed furrow	40.38	18.19	14.89
M_2	Ridges andfurrows	39.50	16.69	14.50
M_3	Flat bed furrow	38.62	15.95	14.11
	S.Em. ±	0.11	0.40	0.09
	CD at 5%	0.36	1.29	0.30
B. Nutrient management (N)				
N_1	100 per cent RDF (50:75:45 $N:P_2O_5:K_2O$ kg ha^{-1})	43.47	19.74	15.11
N_2	75 per cent RDF+ 25 per cent N from FYM+PSB + *Rhizobium*	41.49	18.65	14.76
N_3	50 per cent RDF+50 per cent N from FYM + PSB +*Rhizobium*	39.52	17.61	14.56
N_4	25 per cent RDF + 75 per cent Nfrom FYM + PSB +*Rhizobium*	37.56	16.21	14.36
N_5	100 per cent N from organic manure	35.47	14.07	13.88
	S.Em. ±	0.12	0.27	0.11
	CD at 5%	0.33	0.78	0.32
C. Interaction (M×N)				
	S.Em. ±	0.26	0.89	0.19
	CD at 5%	NS	NS	NS
	General Mean	39.50	17.14	14.52

N_5:100 per cent N from organic manure (50 per cent N from Farm Yard Manure + 25 per cent N from vermicompost + 25 per cent N from Neem cake + Phosphorous Solublizing Bacteria + *Rhizobium*)

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The application of 100 percent RDF (50:75:45 $N:P_2O_5:K_2O$ kg ha^{-1}) resulted maximum gross monetary returns (₹109701 ha^{-1}) and net monetary returns (₹71463) compared to other treatments. In the 100 percent N through organic manure treatment, minimum gross monetary return (₹81171 ha^{-1}) and net monetary return (₹33427 ha^{-1}) was recorded. The use of 100per cent RDF (50:75:45 $N:P_2O_5:K_2O$ kg ha^{-1}) resulted in B:C ratio of 2.86, which was significantly higher than other treatments. In 100 per cent N through organic manure, lowest B: C ratio (1.70) was found. These results confirm with findings of Ramesh *et al.*, (2010) [12], Verma *et al.*, (2017) [15] and Dhale *et al.*, (2021) [6].

Table 2: Seed yield (kg ha^{-1}), straw yield (kg ha^{-1}), gross monetary returns and net monetary returns and B:C ratio in sweet corn as influenced by different treatments

	Treatments	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Gross monetary return (₹ ha^{-1})	Cost of Cultiv-ation (₹ ha^{-1})	Net monetary return (₹ ha^{-1})	B:C ratio
A. Planting Methods (M)							
M_1	Broad bed furrow	2804	3644	107171	43520	63651	2.46
M_2	Ridges andfurrows	2555	3356	97661	43520	54141	2.24
M_3	Flat bed furrow	2383	3185	91095	42520	48575	2.14
B. Nutrient management (N)							
N_1	100 per cent RDF (50:75:45N:P_2O_5:K_2O kg ha^{-1})	2870	3772	109701	38238	71463	2.86
N_2	75 per cent RDF+ 25 per cent N from FYM+PSB + *Rhizobium*	2755	3655	105311	41035	64276	2.56
N_3	50 per cent RDF+50 per cent N from FYM + PSB +*Rhizobium*	2531	3430	96761	43251	53510	2.23
N_4	25 per cent RDF + 75 per cent Nfrom FYM + PSB +*Rhizobium*	2393	3196	91477	45667	45810	2.00
N_5	100 per cent N from organic manure	2123	2922	81171	47744	33427	1.70
	S.Em. ±	19.26	19.18	677.16	-	1073.05	0.02
	CD at 5%	55.45	55.24	1950.12	-	3152.26	0.07
C.	**Interaction (M X N)**						
	S.Em. ±	32.11	32.91	1127.40	-	1127.40	0.02
	CD at 5%	NS	NS	NS	-	NS	NS
	General Mean	2552	3395	97544	43187	54357	2.27

N_5:100 per cent N from organic manure (50 per cent N from Farm Yard Manure + 25 per cent N from vermicompost + 25 per cent N from Neem cake + Phosphorous Solublizing Bacteria + *Rhizobium*)

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Gross monetary returns of broad bed furrow were (₹107171 ha^{-1}) maximum. The flat bed planting method had the lowest gross monetary returns (₹91095 ha^{-1}). Maximum net monetary returns (₹63651ha^{-1}) from broad bed furrow than the other planting methods. The flat bed planting method recorded the minimum net monetary return (₹71463 ha^{-1}). highest B: C ratio (2.46), followed by R&F (2.24), and FB (2.14).The BBF created a porous soil mass that was moist enough. These circumstances favoured easy nutrient uptake and prevented water logging. Similar result was reported by Dikey *et al.*, (2013) [17], Verma *et al.*, (2017) [15] and Dhale *et al.*, (2021) [6].

Conclusion

Among the various treatment of planting methods and nutrient management, broad bed furrow (BBF) planting method and 100 per cent RDF (50:75:45 N:P_2O_5:K_2O kg ha^{-1}) should adopted for maximize the crop production. From the economic point of view broad bed furrow (BBF) planting method and application 100 per cent RDF (50:75:45 N:P_2O_5:K_2O kg ha^{-1}) could be economical viable treatments based on B:C ratio.

References

1. Asewar BV, Gore AK, Pendke MS, Waskar DP, Gaikwad GK, Ravindra Chary G, *et al*. Broad Bed and Furrow Technique- A Climate Smart Technology for Rainfed Soybean of Marathwada Region J Agric. Res. Technol. 2017;42(3):005-009.
2. Astatke A, Jabbar M, Mohamed MA, Erkossa T. Technical and economic performance of animal drawn implements for minimum tillage-experience on vertisols in ethopia. Expl Agric. 2002;38(2):185-196.
3. Begum MA, Islam MA, Ahmed QM, Islam MA, Rahman MM. Effect of nitrogen and phosphorus on the growth and yield performance of soybean. Res. Agric., Livest. Fish. 2015;2(1):35-42.
4. Bhadre CK, Narkhede WN, Gokhale DN. Growth, yield and economics of soybean-safflower cropping sequence as influenced by different land configuration and nutrient management. J Pharmac. And Phytochem. 2018;8(1):169-173.
5. Bodkhe AA, Ismail S. Effect of bio-inoculants and fertilizer levels on growth, yield attributes and yield of soybean (*Glycine max* L.) grown on Vertisol. Asian J Soil Sci. 2014;9(1):63-66.
6. Dhale SY, Gore AK, Asewar BV,Javle SA. Effect of tillage and land configuration practices on growth and yield of rainfed soybean (*Glycine max* (L.) Merrill). J Pharmac. Phytochem. 2021;10(1):1245-1248.
7. Dikey HH, Wankhade RS, Patil SP, Patil CU. Management of water stress through furrow opening technique in soybean for yield enhancement. J Food Legumes. 2013;26(1 & 2):106-108.
8. Hildebrand DF, Phillips GC, Collins GB. Soybean [*Glycine max* (L.) Merrill] Biotechnol. Agric. For., Crops I (ed. by Y.P.S. Bajaj) Springer-Verlag Berlin Heidelberg 1986, 1.
9. Jamliya GS, Vyas MD. Effect of fertilizers with and without FYM on growth, yield attributes and yield of soybean varieties in medium black (Vertisol) of vindhyan plateau of Madhya Pradesh, India. Plant Archives. 2017;17(2):1421-1424.
10. Kadam AK, Keteku AK, Dana S, Blege PK. Influence of land configuration and fertilization techniques on soybean (*Glycine max* (L.) Merrill.) productivity, soil moisture and fertility. Actaagriculturae Slovenica. 2020;115(1):79–88.
11. Nagavallemma KP, Wani SP, Reddy MS, Pathak P. Effect of landform and soil depth on productivity of soybean based cropping systems and erosion losses in VerticInceptisols. Indian J Soil Cons. 2005;33:132-136.
12. Ramesh P, Panwar NR, Singh AB. Crop productivity, soil fertility and economics of soybean (*Glycine max*), chickpea (*Cicer arietinum*) and blond psyllium (*Plantagoovata*) under organic nutrient management practices. Indian J Agric. Sci. 2010;80(11):965-969.
13. Singh P, Alagarswamy G, Pathak P, Wani SP, Hoogenboom G, Virmani SM. Soybean-chickpea rotation on Vertic Inceptisol: I. Effect of soil depth and landform on light interception, water balance and crop yields. Field Crops Res 63:211-224. II. Long-term simulation of water

balance and crop yields. Field Crops Res. 1999;63:225-236.
14. Srinivas I. Mechanization options for alternate land use and resource conservation. Central Research Institute for Dryland Agriculture, 2005, 233-338.
15. Verma R, Nagwanshi A, Dwivedi AK. Long-term application of fertilizers and manure on productivity and quality determinants of soybean grown on black soil. Int. J Chem. Stud. 2017;5(6):1935-1938.