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Evaluation of Sowing Methods of Soybean in Bhatapara District of Chhattisgarh

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ABSTRACT

The study was conducted for evaluation of different sowing methods of soybean in Bhatapara and Simga blocks of district Balodabazar-Bhataparaat farmers' field. The experiment was conducted by involving three treatments namely (i) flat-bed method by broadcasting (ii) Broad bed furrow (BBF) seed drill and (iii) Inclined plate planter. Soybean was more water stress crop and at the time of germination sudden rainfall affects the crop. The results indicated per cent change in yield of flat-bed method by broadcasting versus BBF seed drill and inclined plate planter was 43.07 and 34.31, respectively. The average yield of 13.70, 19.60 and 18.40 q/ha, benefit cost ratio of 1.79, 3.13 and 2.99. Due to drainage of excessive rain water from the fields and stronger plant anchorage on the beds broad bed furrow method gave best result. Similarly, 40 to 50 per cent saving in irrigation water was recorded with bed furrow method of soybean in comparison with flood irrigation in controlled plots. Plant height, number of pods per plant, seed yield weight per plant, seed index, seed yield, straw yield and harvest index (%) found higher in bed furrow method as compared to flat bed and inclined planter methods.

Key Words: Broad Bed Furrow, Flat bed soybean broadcasting, Inclined plate planter, soybean planter

INTRODUCTION

Soybean (*Glycine max* L.) is an important oil seed crop. The total area under soybean cultivation in India was 10.69 mha and total production was 12.67 Mt with productivity of 1185 kg/ha (SOPA, 2014). Furrow irrigation raised bed (FIRB) farming system for wheat was originally developed in Maxico's Yaqui Valley, single row was planted on top of the each bed for crops like maize, soybean, cotton, sorghum, sunflower and dry bean; 1–2 rows per bed were planted for crop like chick pea and canola; but 2–4 rows were planted for wheat. Upland crops grown on soils in high rainfall areas (>1000 mm), mainly soybean and maize (*Zea mays*), were prone to temporary water-logging and anaerobic conditions (Rajput *et al,* 2009). Land treatments (raised sunken bed system, ridges and furrows, broad bed and furrows) increased in situ soil moisture conservation, minimized runoff, and soil erosion (Singh *et al,* 1999).

The broad bed furrow (BBF) farming has many advantages with regard to water saving, mechanical weeding, fertilizer placement, available moisture conservation, less lodging and better crop stand (Astatke *et al,* 2002). In-situ water conservation makes the moisture available for the sown crop. Jat and Singh (2003) reported higher biological yield and highest net and gross return from land configuration treatment as compared to conventional system has been reported. Singh *et al* (1999) and Nagavallemma (2005) reported that land treatments (raised sunken bed system, ridges and furrows, broad bed and furrows) increased in situ soil moisture conservation, minimized runoff, and soil erosion and increased the yield of principal crops grown in the region. Therefore, the study was conducted for evaluation of different sowing methods of soybean in Bhatapara and Simga blocks of district Balodabazar-Bhataparaat farmers' field

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MATERIALS AND METHODS

The average annual rainfall of Balodabazar-Batapara district was 1100 mm annually. Mostly the farmer of the district used flat-bed sowing method for soybean cultivation. Study was carried out during *Kharif* 2015-2017 on thirty eight farmer's field of Bhatapara and Sigma block of district Balodabazar-Bhatapara of Chhattisgarh to determine the impact of sowing techniques on yield of soybean under farmers' conditions. Broad bed furrow machine (BBF seed drill) was developed basically to cope up with the problem of moisture stress in the soybean fields. For this purpose, broad bed furrow technology was introduced in the study area to compare it with the conventional sowing of soybean by broad casting and seed planter methods. Treatments includes: T1: Flat-bed sowing by broadcasting, T2: Broad bed furrow seed drill and T3: Flat-bed sowing with inclined plate planter.

The technical details of broad bed furrow machine inclined plate planter have been given in table 1. These furrows were useful to drain out excessive rainwater during heavy storms and for storing rainwater in furrows for enriching soil moisture through percolation in case of deficit rainfall. The soil moisture thus stored sustains the crop during dry spells. The plant growth character and yield contributing data such as plant height, number of branches/plant, root length, number of root nodules/ plant, number of pods per plant, pod length, number of seeds per pod, seed index (weight of 100 seeds), seed yield/plant, stover yield, harvest index (%), seed yield, net monetary returns, benefit: cost ratio (B: C ratio) were recorded for soybean crop.

Figure 1: Operational view of broad bed furrow machine

Figure 2: Sowing of Soybean through Inclined Plate metering Mechanism

Table 1. Specification of Broad Bed Furrow Machine and Inclined Plate Planter.

Sr. No.	Particular	Broad Bed Furrow Machine	Inclined Plate Planter
1.	No. of ridgers	2	2
2.	Width of bed	2.35 meter	2.70 meter
3.	No. of plant rows in bed	6	5
4.	Row to row spacing	14 inch (35 cm)	45 cm
5.	Seed and fertilizer metering mechanism	Fluted roller type	Inclined Plate type
6.	Type of furrow openers	Shoe type	Inverted T type

RESULTS AND DISCUSSION

The plant population and plant height were found better in broad bed furrow system as compared to normal flat-bed sowing and planter (Table 2). The increase in plant growth was mainly due to proper drainage of excess rainfall through furrows. The plant population ranged 9-10 per cent higher on planting soybean using broad bed furrow seed cum fertilizer drill machine as compared to sowing by normal seed drill but BBF compare to inclined planter. Post Harvest observation on number of pods per plant, pod length and seed index were 47.21, 4.68 and 5.79, respectively in the broad bed furrow system, which were higher than normal flat-bed sowing and inclined plate planter.

The yield in above three practices was respectively 13.70, 19.60 and 18.40 q/ha. The percentage increase in yield as compared to flat bed sowing was found to be 43.07 per cent with BBF and 34.31 per cent with inclined planter (Table 2) and the Benefit to cost (B: C) ratio as observed more in BBF field (3.13), T1 and T3 respectively found to be 1.79 and 2.99, respectively.

Table 2. Comparative performance of three different methods of soybean cultivation at farmers' field.

Parameter	Flat bed sowing	BBF seed drill	Inclined plate planter
Plant height at maturity (cm)	55.40	58.70	56.40
Plant population No. of plants/ m2	41.20	45.60	43.25
Number of pods / plant	36.54	47.21	44.89
Pod length (cm)	4.32	4.68	4.52
No. of Seeds / pod	2.37	2.61	2.46
Seed yield wt. / plant (g)	10.78	11.14	10.98
Seed Index (g)	4.37	5.79	5.34
Seed yield (kg/ha)	13700	19600	18400
Straw yield (kg/ha)	17560	25120	23580
Harvest index (%)	43.48	45.32	44.15
Cost of cultivation (Rs/ha)	26447	21610	21200
Gross Cost (Rs/ha)	47265	67620	63480
Net Income (Rs/ha)	20818	46010	42280
B:C ratio	1.79	3.13	2.99

CONCLUSION

Plant population ranged 9 -10 per cent higher on planting soybean using broad bed furrow seed cum fertilizer drill machine as compared to sowing by normal seed drill. The number of pods per plant, pod length and seed index were observed 47.21, 4.68 and 5.79, respectively in broad bed furrow system. B: C ratio was 3.13 for BBF, 1.79 for flat bed sowing and 2.99 for inclined plate planting. The uniform sowing and plant geometry gave good results in inclined plate metering mechanism because it maintained seed to seed placement precisely as compare to drilling mechanism because it maintain seed to seed placement precisely as compared to drilling mechanism.

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