



# Yield Performance of Soybean (*Glycine max.* L) under BBF sowing with improved variety MACS-1188 under Western Maharashtra Condition

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## ABSTRACT

The field experiment was conducted at farmer's field for evaluation of different sowing methods with improved variety MACS-1188 of soybean in Junnar block of Pune district during the year 2016 to 2019. The experiment was conducted by involving two treatments namely Flat-bed method of sowing and Broad bed furrow (BBF) method of sowing. Generally Soybean crop is affected due to excessive rainfall or less rainfall during the germination and at important growth stages of crop. The results indicated that per cent change in yield of flat-bed method by seed drill over BBF seed drill was 18.95 per cent. The average yield of soybean was recorded 24.50 q/ha under BBF sowing. Due to drainage of excessive rain water from the fields, the broad bed furrow method gave best result. Similarly, 30 to 40 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 broad bed furrow method as compared to flat bed methods. The net return of Rs. 51424/- with B:C ratio of 2.90 was achieved under broad bed furrow method of sowing as compared to flat bed method of sowing.

**Key Words-** Soybean, Broad bed furrow, Yield, Net return.

## INTRODUCTION

Soybean (*Glycine max* (L) Merrill) is known as *chinese pea* and *manchurian bean* which belongs to family *Fabaceae*, sub family *Faboideae* and has Eastern Asian origin. Soybean is considered as a wonder crop due to its dual qualities *viz.*, high protein (40-43 %) and oil content (20 %). The soybean oil is highly digestible and devoid of cholesterol. Soybean is a legume that grows in tropical, sub-tropical and temperate climates. In spite of its high yield potential (4.5 t/ha), soybean productivity was much less in India (1.07t/ha) than the world average of 2.43t/ha (FAOSTAT, 2011). Soybean being the third in area and production of overall commercial oil seed crops next to contributes 33 per cent of our commercial oil seeds and 21 per cent of total pulse production (Narayana *et al.*, 2009).

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, raised bed 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. In India, Soybean is usually sown on flat bed by seed drill. Several research workers have indicated that manipulation of sowing method provides better environment for germination, growth, flowering and pod development which eventually increase the yield.

The broad bed furrow (BBF) farming has many advantages with regard to water saving,

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**Table1. Comparison between technological intervention and local check under FLDs.**

| Sr. No. | Particular                | Technological Intervention (Demonstration)  | local check (Farmers' practice)                             | Technological Gap              |
|---------|---------------------------|---|---|--------------------------------|
| 1.      | Farming situation         | Rainfed   | Rainfed   | No gap                         |
| 2.      | Variety                   | MACS-1188 (new)   | JS-335 (old)  | Full gap (100%)                |
| 4.      | Time of sowing            | last week of June to first week of July   | last week of June to first week of July                     | No gap                         |
| 5.      | Seed treatment            | Seeds are treated with 5 gm <i>trichoderma</i> /kg of seed, <i>Rhizobium</i> + PSB Culture @ 250 gm/10 kg seeds   | Seeds are treated with 5 gm <i>trichoderma</i> /kg of seed. | 50 % Full gap                  |
| 6.      | Seed rate                 | 62 kg/ha  | 80 kg/ha  | 25% more than recommendation   |
| 7.      | Method of sowing          | Line sowing with broad bed  | Line sowing   | Water stagnation/ water stress |
| 8.      | Nutrients application     | 25:50:50 NPK Kg/ha  | 18: 46:15:0 kg NPKS/ha                                      | Not as per recommendation      |
| 10.     | Plant protection measures | Incidence of Leaf eating catter piller<br>suggested measures-<br>SLNPV @1ml/lit of water<br>Stem Fly- Spraying of<br>Indoxycarb @6ml/10 lit of water.<br>Installation of <i>Pheromen</i> traps. | Use of Indiscriminate and non recommended pesticides        | Full gap (100%)                |

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. Nagavallema (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 Junnar block of Pune District.

### MATERIALS AND METHODS

Study was conducted under rainfed condition and 160 demonstrations were conducted in adopted villages *viz.*, Navlewadi, Khamundi, Pargaon and Netwad of Pune district of Maharashtra during

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**Table 2. Specification of conventional seed drill broad bed furrow machine.**

| Sr. No. | Particular                                | Flat bed sowing by seed drill | Broad Bed Furrow planter Machine |
|---------|---|-------------------------------|----------------------------------|
| 1.      | No. of ridges                             | 0                             | 2                                |
| 2.      | Width of bed                              | 2                             | 1.2 meter                        |
| 3.      | No. of plant rows in bed                  | 9                             | 4                                |
| 4.      | Row to row spacing                        | 30 cm                         | 30 cm (adjustable)               |
| 5.      | Seed and fertilizer application mechanism | Manually                      | Through planter                  |
| 6.      | Type of furrow openers                    | -                             | Shoe type                        |

**Table 3. Performance of technological intervention on yield and yield attributes.**

| Year    | No. of pods per plant |     | Seed yield (kg/ha) |      | Seed index (g/100 seed) |      | Percent increase over control (FP) |
|---------|-----------------------|-----|--------------------|------|-------------------------|------|------------------------------------|
|         | RP                    | FP  | RP                 | FP   | RP                      | FP   |                                    |
| 2016-17 | 120                   | 98  | 2450               | 1800 | 12.2                    | 10.5 | 16.25                              |
| 2017-18 | 124                   | 103 | 2470               | 1730 | 12.4                    | 10.5 | 18.5                               |
| 2018-19 | 130                   | 110 | 2240               | 1578 | 12.6                    | 10.5 | 16.55                              |
| 2019-20 | 117                   | 105 | 2640               | 1660 | 11.8                    | 10.5 | 24.5                               |
| Average | 122.75                | 104 | 2450               | 1692 | 12.25                   | 10.5 | 18.95                              |

*kharif* season of 2016 to 2019. Before conducting the FLDs, a list of sample farmers was prepared. The specific package of practices oriented training to be imparted to the selected farmers. The differences in between demonstrated technology and existing farmers' practices (local check) are given in Table 1.

The average annual rainfall of Junnar Tahsil was 750 mm annually. Most of the farmers of the district used flat-bed sowing method for soybean cultivation. 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 flat bed sowing with seed drill methods. The technical details of broad bed furrow machine have been given in Table 2. These furrows were useful to drain out excessive

rainwater during heavy rainfall and for storing rainwater in furrows for enriching soil moisture through percolation in case of deficit rainfall. The plant growth character and yield contributing data such as plant height, number of branches/plant, number of pods per plant, seed index (weight of 100 seeds), seed yield, net monetary returns, benefit: cost ratio (B: C ratio) were recorded.

### RESULTS AND DISCUSSION

The number of pods ( 122.75) were observed highest in broad bed furrow system as compared to soybean sown by normal seed drill under flat bed system. It was recorded 104 pods per plant. There was increase in 18.95 per cent in broad bed furrow method over the flat bed by seed drill sowing. (Table 3). The Sowing with broad bed furrow method with improved variety MACS-1188 remarkably increased in yield (16.55-24.5 %) over

**Table 4. Economical comparison between recommended practice and farmers' practice.**

| Year    | Gross cost<br>(Rs./ha) |       | Gross return<br>(Rs./ha) |       | Net return<br>(Rs./ha) |       | B: C Ratio |      |
|---------|------------------------|-------|--------------------------|-------|------------------------|-------|------------|------|
|         | RP                     | FP    | RP                       | FP    | RP                     | FP    | RP         | FP   |
| 2016-17 | 27250                  | 27950 | 78400                    | 57600 | 51150                  | 29650 | 2.87       | 2.06 |
| 2017-18 | 28400                  | 26300 | 79040                    | 55360 | 50640                  | 29060 | 2.78       | 2.10 |
| 2018-19 | 25475                  | 23558 | 71680                    | 50496 | 46205                  | 26938 | 2.81       | 2.14 |
| 2019-20 | 26780                  | 26450 | 84480                    | 53120 | 57700                  | 26670 | 3.15       | 2.00 |
| Average | 26976                  | 26064 | 78400                    | 54144 | 51424                  | 28079 | 2.90       | 2.07 |

farmers practice (Table 3). The average yield of demonstration with BBF sowing was 24.50 q/ha (18.95 % higher) over the farmer's practice. These results are closely conformity to the findings of Singh *et al* (2007). The highest net return of Rs. 51425 with B:C ratio of 2.90 was obtained under the treatment of broad bed furrow method of sowing as compared to flat bed sowing with seed drill, under this method net return of Rs. 28079/- with B:C ratio of 2.07. Similar work related to the present investigation was carried out by Lomte *et al* (2006). The uniform sowing and plant geometry gave good results in broad bed furrow method of sowing because it maintained proper spacing. Due to broad bed, it helps for moisture conservation practice as compared to flat bed method of sowing through seed drill.

### CONCLUSION

It may be concluded that adoption of improved technology with BBF sowing significantly increased yield as well as yield attributing traits of the crop and also net returns of the farmers. Hence, there is a need to disseminate the improved technology among the farmers for getting the higher yield and net return.

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