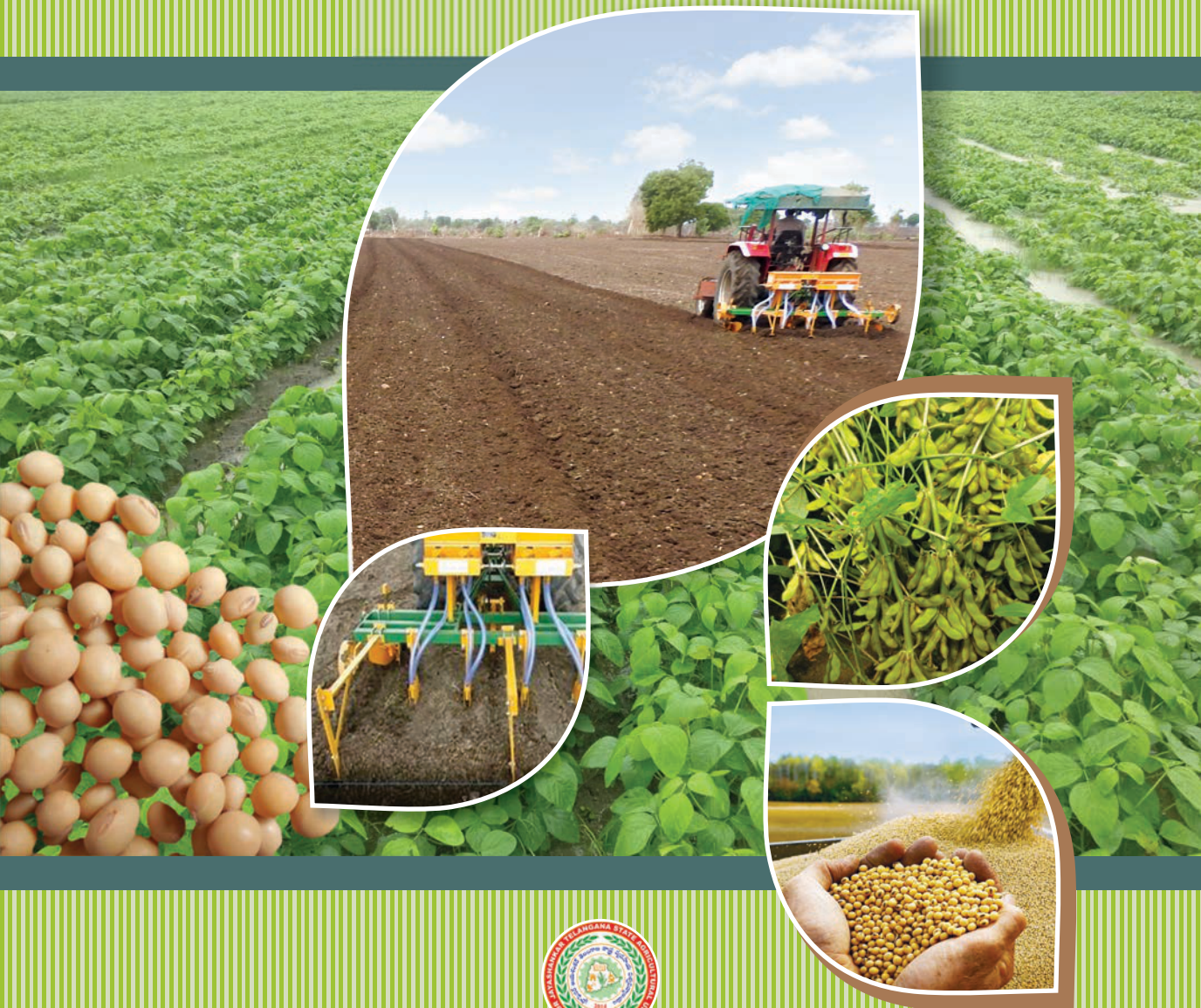


# Enhancing productivity of Soybean through BBF planter in Telangana



**PROF. JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY**

Rajendranagar, Hyderabad, Telangana

# **Enhancing productivity of Soybean through BBF planter in Telangana**



**PROF. JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY**

Rajendranagar, Hyderabad, Telangana

Publication No. :  
Technical bulletin : Enhancing productivity of Soybean through  
BBF planter in Telangana  
Year of publication : 2021  
No. of copies : 500

**Compiled by:**

**Dr. Sreedhar Chauhan**, Sr. Scientist (Agro.),  
AICRP –Soybean, ARS, Adilabad.

**Dr. Y. Praveen Kumar**, Programme Coordinator,  
KVK, Adilabad

**Dr. M. Rajendar Reddy**, Scientist (Pl. Br.),  
AICRP-Soybean, ARS, Adilabad.

**Dr. M. Raghuveer**, SMS (CP),  
KVK, Adilabad.

**Dr. R. Uma Reddy**, Associate Director of Research,  
NTZ, RARS, Jagtial.

**Printed at:**

PJTSAU Press, ARI Campus, Rajendranagar, Hyderabad, Telangana

**Published by:**

Professor Jayashankar Telangana State Agricultural University,  
Rajendranagar, Hyderabad - 30.





# ENHANCING PRODUCTIVITY OF SOYBEAN THROUGH BBF PLANTER IN TELANGANA

## Introduction

Soybean (*Glycine max* (L.) Merrill) is known as the “golden bean” of the 21<sup>st</sup> century and is being grown in 1.5 L ha area, 2.4 L t production with 1600 kg/ha productivity in Telangana state (2018). However, 80% of the crop area is majorly confined to Erstwhile Adilabad and Nizamabad districts only. Though, soybean is a legume crop, yet it is widely used as oilseed. Majority of the area under Soybean (+) Redgram or Soybean–Chickpea based cropping system is in Telangana and is covered under vertisols and associated soils under rainfed during *kharif*.

Soybean cultivated areas normally receives assured seasonal rainfall ranging from 750-800 mm with South-West monsoon. Almost 90% of which is received between June to September months. The climate change during the last decade particularly the rainfall pattern and its distribution has exhibited frequent aberrations with extreme situation of sudden down pour or prolonged dry spell entailing into severe stress in Soybean crop at various crop growth stages more so during pod initiation to seed filling stage. In general, the productivity of rainfed Soybean is relatively low as compared to irrigated crop. So, it is necessary to adopt suitable technology(s) to conserve the rain water (in-situ) to ensure adequate moisture during the various crop growth stages, particularly under rainfed cultivation.







Fig. 1 Overall field view of Soybean with BBF technology

**Table 1: Yearwise Area, production & productivity of Soybean in Telangana**

Year	Area (L.ha.)	Production (L.t)	Productivity (kg/ha)
2008	1.41	1.93	1365
2009	1.56	1.28	824
2010	1.25	2.14	1704
2011	1.28	2.07	1616
2012	1.57	2.86	1818
2013	2.42	3.90	1610
2014	2.42	2.62	1081
2015	2.43	2.52	1036
2016	2.76	3.22	1166
2017	1.50	2.50	1667
2018	1.50	2.40	1600

**Source:**

Directorate of Economic & Statistics, Govt. of AP/Telangana Annual Reports



**Table 2:** District-Wise Area, Production and Productivity of Soybean

S.No.	District (Erst-while)	Area (ha)	Production (Tonnes)	Productivity (Kg/ha)
1.	ADILABAD	96,367	96,367	1000
2.	NIZAMABAD	1,09,589	1,16,931	1067
3.	KARIMNAGAR	9,328	11,921	1278
4.	MEDAK	26,007	24,811	954
5.	RANGAREDDY	1,326	1,375	1037
6.	WARANGAL	185	192	1037
	<b>Total:</b>	<b>2,42,802</b>	<b>2,51,597</b>	<b>1037</b>

**Source:**

Directorate of Economic & Statistics, Govt. of AP/Telangana Annual Reports

Fig. 2 Soybean crop subjected to heavy rains during July & August months



**Table 3:** Seasonal Rainfall (mm) in Telangana during Soybean crop growth period (S-W Monsoon)

Year/ Month	June	July	August	September	October	Total
2008	101.5	159.3	365.6	150.3	24.2	<b>800.9</b>
2009	72.5	94.3	184.6	154.9	83.6	<b>589.9</b>
2010	102.8	334.3	260.8	204.8	93.8	<b>996.5</b>
2011	66.7	252.5	213.3	75.6	23.8	<b>631.9</b>
2012	114	241.6	190.3	167	85.8	<b>798.7</b>
2013	166.1	344.1	179.4	156.2	221.7	<b>1067.5</b>
2014	152	140.8	177.8	118.1	38.3	<b>627.0</b>
2015	213.1	91.1	157.9	156.3	30	<b>648.4</b>
2016	189.1	231.9	127.4	380.1	70.5	<b>999.0</b>
2017	188.1	146.2	193	117.7	126.6	<b>771.6</b>
<b>Average</b>	136.6	203.6	205.0	168.1	79.8	<b>793.1</b>

Source : Agriculture Department, Adilabad

### Major reasons for lower productivity in Soybean

#### 1. Maintenance of optimum plant stand

- Conventional bullock drawn seed drill has the limitation in maintaining proper plant stand.
- Sowing behind the cattle pair with seed hoppers leads to uneven plant to plant distance.
- Use of high seed rate (75 kg/ha)

#### 2. Moisture stress at critical crop growth stages.

Frequent dry spells or prolonged moisture stress due to change in the climate, yields of Soybean in rainfed farming is often reduced due to lack of soil moisture.

#### 3. Stunted growth due to water logging in heavy soils

Due to sudden down pour or continuous rainfall for longer period resulted in poor drainage in heavy soils which effects crop growth.

#### 4. Infestation of pest and diseases.

Difficulty in timely taking up plant protection measures at later crop growth stages because of high dense plant stand.



To overcome the above the production constraints, use of BBF planter is one of the technology to optimum utilization the resources and to realize higher yields in soybean.



Fig. 3 Four tyne BBF machine

Fig. 4 Five tyne BBF machine





Fig. 5 BBF machine – demonstrations in farmers fields (2019)



Fig. 6 Sowing & proper seed covering

### Technical specification of BBF planter

1. Seed cum fertilizer box
2. Seed plate
3. Seed tubes
4. Furrow openers – 2
5. Tynes – 4/5/6
6. Frame
7. Ground wheel
8. Tyne to tyne distance
9. Seed to seed distance
10. Seed capacity – 12 to 20 kgs
11. Fertilizer capacity – 12 to 20 kgs
12. Tractor HP – 35 HP & above



## Mechanism

Ground wheel drives chain drive connected to gear mechanism which rotates seed plate and assures continuous of seed maintaining plant to plant distance dropping through seed tubes & fertilizer through fertilizer mechanism.



Fig. 7 Sowing with BBF machine





**Table 4:** Performance of BBF planter (Vs.) Former's practice, (*Kharif*, 2019)

S. No.	No. of demos	Particulars	Farmer's practice	BBF Technology	Remarks
1	60	Sowing method	Conventional seed drill (Bullock drawn)	BBF planter	
2		Seed rate (kg/ha)	75 kg	60 kg	Saving of seed over farmers practice 25 %
3		Time taken (hr./ha)	4.0 hr.	2.0 hr.	Saving of half of the time over conventional method
4		Spacing adopted	45 cm x line sowing	<b>Dimensions for 4 tyne planter:</b> Bed width: 1.8 m Furrow width: 0.3 m Spacing: 45 x 10 cm  <b>Dimensions for 5 tyne planter:</b> Bed width: 2.1 m Furrow width: 0.3 m Spacing: 40 x 10 cm	
5		Level of pest & disease incidences	High	Low	Ease to spray even during later crop growth stages with the help of furrow made by the BBF Machine
6		Seed yield (kg/ha)	2150	2500	16.3 % higher yield over conventional method
7		Cost of cultivation (₹/ha)	40500	36600	₹ 3500 – 4000 can be saved
8		Gross returns (₹/ha)	79765	92750	
9		Net returns (₹/ha)	39265	56150	Additional returns of ₹ 16500 – 17000
10		B:C ratio	1:1.96	1:2.53	



Fig. 8 Soybean pod bearing with BBF technology

**Table 5:** Exploitable yield and seed saving in Soybean

Crop	Farmer's practice (State area, production, productivity & seed required)			Projected		
	Area (L. ha)	Productivity (kg/ha)	Seed required (L. t)	Area (L. ha)	Productivity (kg/ha)	Seed required (L. t)
Soybean	2.10	1549	1.57	2.10	2500	1.26

#### Advantages of Soybean sowing with BBF planter

1. Under extreme dry spells, increase the period of wetting by conserving the moisture (in-situ) and also to facilitate drain out the excess rain water under down pour through furrows.
2. Reduces the seed rate (20%)
3. Open furrows can be utilized for easy sprayings and installation of sprinklers for supplemental irrigation.
4. Making the bed can improve the root system and crop growth.
5. Reduces the pest and disease incidences due to proper aeration
6. Maintain optimum plant stand thus reduce the cost thinning and gap filling, if any
7. Increases seed yield and net returns.





Fig. 9 Crop performance with BBF machine

Fig. 10 BBF machine facilitates for proper drainage (through furrows)



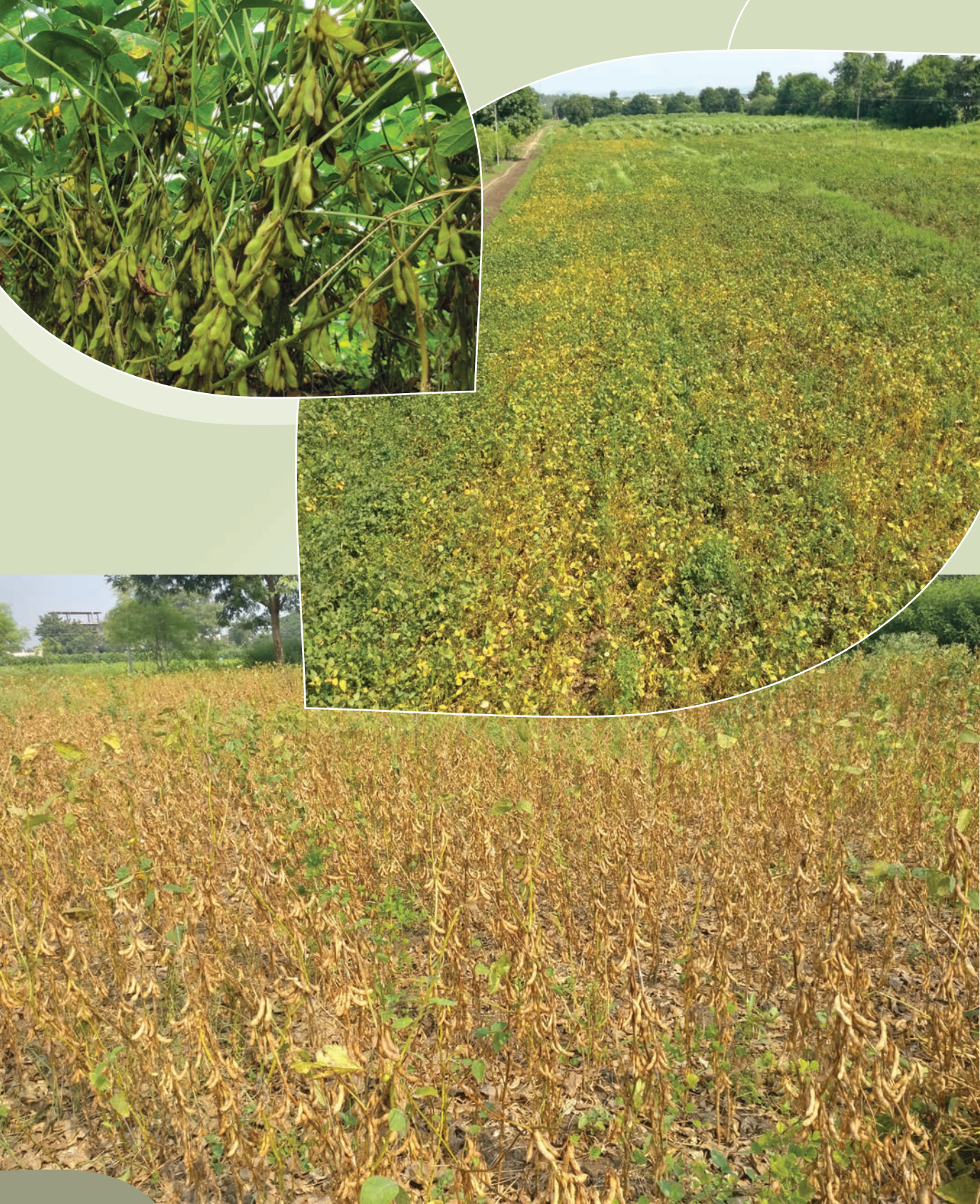


**Table 6:** Comparative performance of Soybean in farmer's fields.

Parameters	Flat bed method of sowing	BBF seed drill
Plant height at maturity (cm)	50-55	55-60
Plant population (No. of plants/ m <sup>2</sup> )	25-35	22.2 (45 x 10 cm – with 4 tyne BBF planter) 25.0 (40 x 10 cm – with 5 tyne BBF planter)
Number of pods / plant	36-45	52-60
Pod length (cm)	4.32	4.68
No. of seeds / pod	2.37	2.61
Single plant yield (g./plant)	10.8-12.1	11.1-13.5
Seed index (g.)	11-13	12-14
Seed yield (kg/ha)	2000-2200	2400-2600
Straw weight (kg/ha)	6000-6300	6800-7000
Harvest index (%)	33.0-34.9	35.0-37.1
Cost of cultivation (₹ /ha)	38000-40000	35000-36000
Gross returns (₹ /ha)	74200-85330	92750-96460
Net income (₹ /ha)	34200-45330	57750-61460
B:C ratio	1.86-2.04	2.65-2.76









### Outcome:

Saving in seed quantity of 0.31 lakh tonnes with a worth of ₹ 113.15 crores (with 40% subsidy on seed cost) and ₹ 165.23 crores (without subsidy) per year in Telangana State can be possible by adopting the BBF technology in Soybean.

### Drawback /Limitations:

1. BBF planter works in dry soils or at optimum soil moisture conditions only.
2. Non availability of BBF planters on subsidy to the farmers for wider usage.
3. Lack of awareness about BBF planter among the farming community.

### Farmer's feedback:





1. By adoption of this technology in Soybean, seed rate can be saved upto 10-25 kg/ha (15-20%), sowing time, labour cost on sowing and facilitates for easy spraying during later crop growth stages.
2. Reduced number of sprays due to lower pest and disease incidences.
3. Vigorous crop growth with more number of pods per plant with quality seed.

Fig. 12 Zonal Scientists & Farmers visit to BBF Demonstration plot





## Farmer's feedback on adoption of BBF technology in Soybean cultivation (*kharif*, 2019)

Name of the Farmer	<b>Daratla Kishtu</b> S/o Gangaram	<b>Gopidi Rameshwar Reddy</b> S/o Linga Reddy	<b>N. Srinivas Reddy</b> S/o Madhav Reddy	<b>C. Surendar Reddy</b> S/o Linga Reddy
Photo				
Ph No.	9848125053	9440312050	9492455333	9000904890
Area of cultivation	18.0 ac	4.0 ac	3.20 ac	2.0 ac
Address	Chanda (T) (Village), Adilabad Rural (Mandal), Adilabad (District)	Kouta (B), Boath (Mandal), Adilabad (District)	Kouta (B), Boath (Mandal), Adilabad (District)	Kouta (B), Boath (Mandal), Adilabad (District)
Yield	9 q/ac	8.50 q/ac	8.00 q/ac	8-10 q/ac
Farmer's opinion	<ul style="list-style-type: none"> <li>Used 24-25 kg/ac seed for sowing and saved 5-6 kg seed per acre against traditional method (30 kg/ac).</li> <li>One acre sowing was completed in a one hour (required 1/3<sup>rd</sup> time of farmer's practice).</li> <li>Required IWM approaches for effective weed control.</li> <li>Relatively less pest &amp; diseases incidences were observed and conveniently taken up plant protection measures.</li> </ul>	<ul style="list-style-type: none"> <li>Sown 22-23 kg/ac seed and saved 7-8 kg seed per acre.</li> <li>Sowing Cost: ₹ 1200-1300/acre.</li> <li>One acre sowing was completed in a one hour.</li> <li>Lower pest &amp; diseases were observed with this machine sowing.</li> <li>Under heavy rainfall situations, plant stand, plant growth &amp; development was not affected significantly.</li> </ul>	<ul style="list-style-type: none"> <li>Sown 22-23 kg/ac seed and saved 6-7 kg seed per acre.</li> <li>Sowing Cost: ₹ 1200-1300/acre against ₹ 2500-3000/ac in traditional method.</li> <li>One acre sowing was completed in a one hour against 2.5 hours in Farmer's practice.</li> <li>Lower pest &amp; diseases incidence was noticed.</li> </ul>	<ul style="list-style-type: none"> <li>Sown 24-25 kg/ac seed and saved 5-6 kg seed per acre.</li> <li>Sowing Cost: ₹ 1200-1300/acre.</li> <li>One acre sowing was completed in a one hour.</li> <li>Furrows facilitated for easy spraying.</li> </ul>
Signature of the farmer	