

## **Impact of new production technologies on productivity and sustainability of soybean grown in the Nimar region of Madhya Pradesh**

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### **Abstract**

*Front line demonstration is an appropriate tool to demonstrate recommended technologies among the farmers. Krishi Vigyan Kendra, Burhanpur conducted 60 front line demonstrations (FLDs) on soybean during 2010 to 2014 in five adopted villages. The critical inputs were identified in existing production technology through farmers meeting and group discussions with the farmers. Average yield data of conducted FLDs revealed that, higher yield (2009.6 kg ha<sup>-1</sup>) was obtained in FLDs over local check (1698.6 kg ha<sup>-1</sup>) consequently 310.8 kg additional yield was obtained in demo and yield increases 18.30% over local check. Average technology gap, extension gap and technology index were found 290 kg.ha<sup>-1</sup>, 310 kg.ha<sup>-1</sup> and 12.62% respectively. Most important factor which is indicating either Front line demonstration technology is profitable or nor is B: C ratio which was found higher through out the study and average was (3.43) in demonstration over local check (2.83).*

Key words: Krishi Vigyan Kendra, demonstrations, FLDs, B: C ratio

### **Introduction**

Among the oilseed crops, Soybean has a great importance because it is highly proteinous crop in spite of oil content. On account of high protein (around 40 %) and quality oil (20 %) contents, it serves as ideal crop to provide these two vital constituent to human body. Good quality of protein provided by soybean is capable of alleviating the wide-spread protein malnutrition in the country. The soybean oil is highly digestible and devoid of cholesterol. In addition soya-processed foods contain phytoharmones with health benefits.

India is one of the most important oilseeds producing country in the world. India accounts for 12-15% of world's oil seed area, 7-8% of world's oil seed output, 6-7% of world's vegetable oil production and 9-10% of world's oil consumption.

Soybean is a legume that grows in tropical, sub-tropical and temperate climates. India ranks fifth in production after United States, Brazil, Argentina, and China. In India, Madhya Pradesh, also known as 'Soya State', is the leading state in soybean cultivation with 57.30 lakh ha area under the crop (SOPA, 2011).

Area in the upcoming Nimar region of the MP is increasing under soybean cultivation day by day. It is

gaining momentum among the farmers of this region as it is a cash crop and fits well in traditional cropping systems.

The technology mission on oilseed (TMO) was started in 1986 for attaining self reliance in oilseeds. The achievements occurred during TMO were further disseminated through the ad-hoc project on frontline demonstrations in oilseed crops started from Kharif 1990-91 supported by department of agriculture & cooperation, Government of India. Vast yield gaps still persist between farmers' field and potential yield recorded at research station and FLD plots. Through much progress has been made in the field of agriculture research and education, but benefits of these developments could not be realized by the farming community because of low adoption of technologies at the farmers' level. Keeping in view the importance of front line demonstrations present study has been undertaken.

### **Materials and Methods**

Study was carried out in Burhanpur (MP) during kharif season 2010 to 2014 (five consecutive years) in the farmers' field of Dhoolkot, Harda, Hanumatkheda, Umarda and Bhagwaniya villages of Burhanpur district.

Table 1: Comparison between technological intervention and local check under FLDs on soybean.

S. No	Particulars	Technological Intervention (Demonstration).	Local check (Farmers' practice)	Technological Gap
1.	Variety	JS-9305	JS-335 (Old)	Full gap
2.	Land preparation	SDP followed by rotavator	SDP followed by rotavator	No gap
3.	Time of sowing	With the first shower of rains or when 6' soil became moist	With the first shower of rains or when 6' soil became moist	No gap
4.	Seed treatment	Mixture of carboxin a.i.37.5% + Thiram a.i.37.5% @ 2 gram/ kg seed	No seed treatment	Full gap
5.	Seed rate	75 kg ha <sup>-1</sup>	85-95 kg ha <sup>-1</sup>	Higher seed rate
6.	Method of sowing	Line sowing	Line sowing	No gap
7.	Fertilizers dose	20:60:20:20 kg NPKS ha <sup>-1</sup>	18: 46:0:0 kg NPKS ha <sup>-1</sup>	Imbalance use of fertilizers
8.	Weed management	Chemical followed by hoeing	Only manual weeding	Partial gap
9.	Plant protection measures	For the control of green semilooper and other apply Trizophos 40 EC and Prophenophos 50 EC @ 2.5 MI/liter water	Indiscriminate use of pesticides	Full gap

During five years of study an area of 5 ha in each year was covered with plot size 0.4 ha under intervention with active participation of 60 farmers. Before conducting FLDs a list of farmers were prepared through group meeting and specific POP of crop oriented training imparted to the selected farmers (Venkatta kumar *et.al.* 2010). The differences in demonstrated technology and existing farmers' practices (local check) are mentioned in Table 1.

In general the soil in which FLDs were conducted having P<sup>H</sup> range of 7.4-8.2, EC < 1.0, available nitrogen, phosphorus and potassium were ranges 224-367, 10-19 and >280 kg ha<sup>-1</sup> respectively. Soils of the region come under Vertisols soil order and defined as medium deep black soils.

In demo plots used quality seeds of improved varieties; line sowing, timely weed management and need based application of pesticides as well as balanced fertilization were emphasized. Selection of site and farmers, layout of demo plots and others were followed as suggested by Choudhary (1999). Traditional operations were maintained in local checks as done by farmers. Data were collected from both FLDs as well as farmers' practice plots and analyzed for the extension gap, technology gap, technology index (Samui *et. al.* 2003) by using following formula (Eq. 1 to 4).

$$\text{Percent increase in yield} = \frac{\text{Demonstration yield} - \text{local check yield}}{\text{Local check yield}} \times 100 \quad (\text{Eq.01})$$

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstration yield} \quad (\text{Eq.02})$$

$$\text{Extension gap} = \text{Demonstration yield} - \text{local check yield} \quad (\text{Eq.03})$$

$$\text{Technology Index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100 \quad (\text{Eq.04})$$

## Results and Discussion

Data presented in Table 2 revealed that, the maximum yield was recorded 2158 kg ha<sup>-1</sup> during 2012-13 and minimum (1896 kg ha<sup>-1</sup>) was recorded during 2010-11 in demo plots. The average yield of five year FLD programme was 2009.6 kg ha<sup>-1</sup> while average yield of farmers' practice (local check) was 1698.8 kg ha<sup>-1</sup>. Percent increase in demo yield over farmers' practice was calculated and it was ranges between 16.90-20.33%, highest percent increase was found during 2014-15. Higher yield under demo plots

Table 2: Performance of front line demonstration (FLDs).

Year	Seed yield (kg ha <sup>-1</sup> )			% increase over control	Technology gap (kg ha <sup>-1</sup> )	Extension gap (kg ha <sup>-1</sup> )	Technology index (%)	B: C ratio	
	Potential	Demo (FLDs)	Local check (FP)					Demo (FLDs)	Local check (FP)
2010-11	2300	1896	1618	17.18	404	278	17.56	3.40	2.80
2011-12	2300	2058	1743	18.07	242	315	10.52	3.27	2.74
2012-13	2300	2158	1846	16.90	142	312	6.17	3.44	2.88
2013-14	2300	1923	1598	20.33	377	325	16.39	3.56	2.97
2014-15	2300	2013	1689	19.18	287	324	12.47	3.50	2.79
Average	-	2009.6	1698.8	18.30	290	310	12.62	3.43	2.83

was obtained due to adoption of improved package of practices (table-1) for the cultivation of soybean. Similar results have also been reported by Tomar *et al.* (2003) and Tiwari *et al.* (2003).

The results clearly indicated positive impact of FLDs over existing farmers' practice towards enhancing yield of soybean in Burhanpur district. Demonstrated technology is adoptable, it is clearer from B: C ratio, because B: C ratio was always found higher in FLDs than local check. These results are in agreement with those of Deshmukh *et al.* (2005).

The technology gap (404 -142 kg ha<sup>-1</sup>) reflected the farmers' cooperation in carrying out front line demonstration with encouraging results in subsequent years. Fluctuation in technology gap was observed may be due to several biotic and abiotic factors. These results are in close conformity with the findings of Mitra and Samajdar (2010).

The extension gap showed an increasing trend. It ranges 278 - 325 kg ha<sup>-1</sup> during the period of FLDs emphasizes the need to educate the farmers through the various means for adoption of improved production technologies to fill the extension gap.

Technology index showed the feasibility of the evolved technology at the farmers' fields. Lower value of technology index means more feasibility of disseminated technology. Variations in technology index were found 6.17-17.56 during the FLDs however; its average of five year was 12.62%. Variations in technology index may be due to variations in soil fertility, environmental hazards and infestation of pests.

## Conclusion

from the study it may be concluded that use of scientific methods of soybean cultivation can reduce technology gap up to a certain extent consequently to increase the productivity of soybean. However, extension agencies need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap in soybean production.

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