SHORT COMMUNICATION

IMPACT ANALYSIS OF CLUSTER FRONTLINE DEMONSTRATION IN SOYBEAN CULTIVATION

R.K. Dwivedi[1], B.K. Tiwari[2]* and K.S. Baghel[2]

[1]*JNKVV Krishi Vigyan Kendra, Damoh (M.P)*
[2]*JNKVV Krishi Vigyan Kendra, Rewa (M.P.)*

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Abstract: The domestic requirement of oilseed had been manifold of a modern living standard which has been fulfilled through the imports that leads to imbalance the Indian economy. To fulfill the domestic demand and to boost the production and productivity, cluster frontline demonstrations (CFLDs) on Soybean were conducted at farmer's field through Krishi Vigyan Kendra Damoh (M.P.). These demonstrations were conducted in two villages namely Jortala and Bamori during kharif seasons of 2015-16 and 2016-17. The results of CFLDs show a greater impact on farming community due to significant increase in crop yield greater than farmer practice. The economics and benefit cost ratio of both farmers practice (FP) and recommended practice (RP) were workout. An average of Rs. 30990/ha was recorded net profit under RP while it was Rs. 18792/ha under FP. Benefit cost ratio was 2.10 under RP, while it was 1.87 under FP. By introducing the proven technology i.e improved variety (JS 95-60), seed treatment, sowing in broad bed furrow method, integrated weed management, recommended dose of fertilizers on soil test base and integrated pest management by encouraging the farming community of the district through recommended technologies were followed in the CFLDs.

Keywords: Soybean, CFLDs, Farming community, Net profit, B:C ratio

INTRODUCTION

Soybean (*Glycine max* (L) marril) belongs to family leguminaceae. It is mainly grown in *Kharif* Season and occupies second place followed by ground nut. Production of soybean in India is dominated by Maharastra and Madhya Pradesh which contribute 89% of the total production. Madhya Pradesh and Maharastra have 45% and 40% share in production respectively; Anonymous (2017).

Among the Kharif oilseeds, soybean is an important crop in India and is mostly grown under rainfed condition. The average productivity of soybean is 950 kg/ha in Madhya Pradesh (2016-17), which is very low as compared to national productivity (1450 kg/ha). The reasons for low productivity were traditional method of cultivation. With the development of high yielding varieties and use of improved management practices, there is a much scope for further increase in yield. So the Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW) had sanctioned the project "Cluster Frontline Demonstration on oilseed to ICAR-ATARI Jabalpur. This project was implemented in Krishi vigyan kendras of Zone IX with main objective to boost the production and productivity of soybean through frontline demonstration (FLDs) with latest and specific technologies.

MATERIAL AND METHOD

Field demonstrations were conducted under close supervision of krishi vigyan Kendra, Damoh. Total 100 cluster front line demonstrations under real farming situations were conducted during *kharif* season of 2015-16 and 2016-17 at two different villages namely; Jortala and Bamori, respectively under krishi vigyan kendra operational area. The area under each demonstration was 0.4 ha. The soil was sandy clay-loam in texture with moderate water holding capacity, low in organic carbon (0.2-0.42%), low in available nitrogen (96.5-146.9 kg/ha), low to medium in available phosphorus (8.0 -12.6 kg/ha), low in available potassium (170.2-225.2 kg/ha) and soil pH was slightly acidic to neutral in reaction (6.4-7.0). The treatment comprised of recommended practice (Improved variety JS-95-60, integrated nutrient management-@ 20:60:40:20 kg NPKS/ha + *Rhizobium* + PSB @ 5 g/kg seed, integrated pest management- deep ploughing + seed treatment with *Trichoderma viridae* @ 5 g/kg seed + indoxacarb @ 500 ml/ha etc. *vs.* farmers practice. Deep ploughing was done during the April month. Crop was sown between 25 June to 10 July with a spacing of 45 cm and seed rate was 75 kg/ha. An entire dose of N and P through diammonium phosphate, K through muriate of potash and sulphur through $ZnSO_4$ was applied as basal before sowing. The seeds were treated with *Trichoderma viridae* @5 g/kg seeds then inoculated by *Rhizobium* and phospho-solubilizing bacteria biofertilizers each 5g/kg of seeds. Application of Imazethapyr @100 g a.i./ha at 25-30 DAS followed by slight hand weeding at 45 DAS for effective weed management was done; used flat fan nozzle. One spray of Indoxacarb @500 ml/ha with 500 liters of water was given at the time of incidence of stem fly. The crop was harvested between25th October to 10th November during both years of demonstrations. Farmer's practice constituted there were no deep ploughing was done during summer, old seed of variety JS-335 was used, crop was sown on the same time of demonstration, broadcasting method of sowing, higher seed rate (100 kg/ha) sown, imbalance dose of fertilizers applied (15:40:0 kg NPK/ha), no

*Corresponding Author

seed treatment, no biofertilizers, no plant protection measures and one hand weeding at 30-35 DAS were adopted. Crop was harvested on the same time of harvesting of demonstration plots. Harvesting and threshing operations done manually; 5m x 3m plot harvested in 3 locations in each demonstration and average grain weight taken at 14% moisture. Similar procedure adopted on FP plots under each demonstration then grain weight converted into quintal per hectare (q/ha). Before conduct the demonstration training to farmers of respective villages was imparted with respect to envisaged technological interventions. All other steps like site selection, farmers selection, layout of demonstration, farmers participation etc. were followed as suggested by Choudhary (1999).Visits of farmers and extension functionaries were organized at demonstration plots to disseminate the technology at large scale. The grass returns, cost of cultivation, net returns and benefit cost ratio (B:C ratio) were calculated by using prevailing prices of inputs and outputs and finally the extension gap, technology gap and technology index were worked out. To estimate the technology gap, extension gap and technology index, following formulae given by Kadian *et al* (1997) have been used.

$$\text{Technology Index} = \frac{(Pi-Di)}{Pi} \times 100$$

Where,

Pi- Potential yield of i^{th} crop

Di- Demonstration yield of i^{th} crop

RESULT AND DISCUSSION

Yield attributing parameters:

The yields attributing parameters like number of pods/plant and branches/plant of soybean obtained over the years under recommended practice as well as farmers practice are presented in Table1. The Number of pods/plant of soybean with mean of 65 under recommended practice on farmer's field as against 43 recorded under farmers practice. Similarly higher number of branches/plant was recorded under recommended practice 7 as compared to farmers practice mean of 4.The higher values of number of pods/plant and number of branches/plant following recommended practice as well as farmers practice was due to the use of latest high yielding variety, integrated nutrient management and integrated pest management on soybean during both the years of demonstration. Similar results have been reported earlier by Prasad (2005).

Seed yield:

The yields of soybean obtained over the years under recommended practice as well as farmers practice are presented in Table1. The productivity of soybean average of 19 q/ha under recommended practice on farmers field as against a mean yield of 12.8 q/ha recorded under farmers practice. The higher productivity following recommended practice as well as farmers practice was during both the years which might be due to congenial climate for better growth of crop. The higher yield of soybean under recommended practices was due to the use of latest high yielding variety, integrated weed management, integrated nutrient management and integrated pest management. Similar results have been reported earlier by Jain and Dubey (1998).

Economics:

The inputs and outputs prices of commodities prevailed during both the year of demonstrations were taken for calculating cost of cultivation, net returns and benefit cost ratio (Table 3). The investment on production by adopting recommended practices ranged from Rs.27416 to 28718/ha with a mean value of Rs.28067/ha against farmers practice where the variation in cost of production was Rs. 22175-Rs. 20720/ha, mean of Rs. 21447/ha. Cultivation of soybean under recommended practices gave higher net return of Rs.32784 and Rs.29197/ha compared to Rs.19341 and Rs.18252/ha under farmers practice during 2015-16 and 2016-17, respectively. The average benefit cost ratio of recommended practices was 2.10, varying from 2.01 to 2.19 and that of farmers practice was 1.87. This may be due to higher yields obtained under recommended practices compared to farmers practice. Similar results have been reported earlier on chickpea by Tomar *et al* (1999) and Tomar (2010).

Extension and technology gap

The extension gap ranging between 6.2 q/ha during the period of study emphasized the need to educate the farmers through various means for the adoption of improved agricultural production to reverse the trend of wide extension gap (Table-2). The trend of technology gap ranging between 5.6 – 6.3 q/ha reflected the farmer's cooperation in carrying out such demonstration with encouraging results in both the years. The technology gap observed may be attributed to the dissimilarity in weather conditions. The technology index showed the feasibility of the evolved technology at the farmer's field. The lower the value of technology index, the more is the feasibility of the technology. As such, the reduction in technology index from 22.4% during 2015-16 to 25.2% during 2016-17 exhibited the feasibility of the demonstrated technology in this region.

HRD Components

To increase the understanding and skill of the district and village about improved cultivation technology of soybean, various training programme, ratio talk, field day. Kisan sangosthi, CD shows, folders and kisan mela were organized both at district level and village level (Table-4). These human resource development (HRD) components not only helped in proper understanding of technology required to adopt farmers themselves compared in actual RP with FP (Table4).

Contraints observed during CFLDs

The farmer's yields were affected by various environmental and socio-economic factors like non availability of quality seed, unawareness in seed treatment, use of recommended dosage of fertilizer etc. high losses in yield observed due to heavy infestation of girdle beetle, stem fly, white fly and pod borer due to improper method and time of application of pesticide.

Table 1. Performance of CFLDs on soybean as affected by recommended practices as well as farmers practices (Mean of two years 2015-16, 2016-17).

S.No	Parameters	Treatment	
		Recommended Practice (RP)	Farmers Practice (FP)
1.	No of Branches/Plant	7.0	4.0
2.	No of Pods/Plant	65	43
3.	Seeds/Pod	3.5	2.0
4.	Grain yield q/ha	19.0	12.8

Table 2. Productivity, Technology gap, Extension gap and technology index of soybean as affected by recommended practice as well as farmers Practices.

Year	Area (ha)	No. of Demo.	Grain yield q/ha			% increase over FP	Technology Gap (q/ha)	Extension gap q/ha	Technology Index (%)
			Potential	RP	FP				
2015-16	20	50	25	19.4	13.2	46.9	5.6	6.2	22.4
2016-17	20	50	25	18.7	12.5	49.6	6.3	6.2	25.2
Total/ Mean	**40**	**100**	**25**	**19.0**	**12.8**	**48.2**	**5.9**	**6.2**	**23.8**

Table 3. Economics of front line demonstration of Soybean as affected by recommended Practice as well as farmer's Practices.

Year	Yield (q/ha)		% increase over FP	Gross Expenditure (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B:C Ratio	
	RP	FP		RP	FP	RP	FP	RP	FP	RP	FP
2015-16	19.4	13.2	46.9	27416	22175	60200	41516	32784	19341	2.19	1.87
2016-17	18.7	12.5	49.6	28718	20720	57915	38972	29197	18252	2.01	1.88
Mean	**19.0**	**12.8**	**48.2**	**28067**	**21447**	**59057**	**40244**	**30990**	**18792**	**2.10**	**1.87**

Table 4. HRD Component : Cumulative data of 2015-16 and 2016-17.

S.No	HRD Component	Frequency	Beneficiaries
1.	Training	10	565
2.	Radio Talk	1	Mass
3.	CD Shows	4	252
4.	Kisan Mela	2	3217
5.	Kisan Sangosthi	4	105
6.	News Paper Coverage	11	Mass
7.	Folder	1	Mass
8.	Kisan Mobil Sandesh	6	14672

CONCLUSION

Cluster frontline demonstration of oilseed (soybean) conducted in two village in Damoh district and result concluded the average yield 19.0q/ha in RP as compared to 12.8q/ha in FP. It was observed that potential yield can be achieved by imparting scientific knowledge to the farmers, providing the quality need based inputs and proper application of inputs. Horizontal spread of improved technology may be achieved by the successful implementation of frontline demonstration and various extension activities in farmer's field. For wide dissemination of technologies recommended by SAUs and other research institute, more number of FLDs should be conducted.

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