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An assessment of extension, technological gaps and income augmentation through participatory cluster front line demonstrations on Sesame (*Sesamum indicum L.*) in Karuli district of Rajasthan

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Abstract

Indian Council of Agricultural Research (ICAR), New Delhi, initiated national level cluster frontline demonstrations (CFLDs) on oilseeds with the main objective of demonstrating the production potential of improved varieties and technologies in the farmers' fields The cluster frontline demonstrations (CFLDs) on sesame were conducted by Krishi Vigyan Kendra, Karauli during kharif season from 2019 to 2022 under National Food Security Mission (NFSM). All 230 demonstrations on sesame crop were carried out in area of 92 ha by the active participation of farmers with the objective to demonstrate the improved technologies of oilseeds production potential. The improved technologies consisting use of improved variety, seed treatment, mechanized sowing, integrated nutrient & weed management, pest and disease management. The study shows a higher yield of 4.82 q/ha over farmers' practice (3.94 q/ha). The technology gap of 2.18q/ha, extension gap of 0.87q/ha, and technology index of 31.14% were observed. An average, additional yield of 0.87q/ha was observed in CFLDs. Consequently, mean additional income of Rs.4606/ha has been added through Improved practices with B:C ratio of 1.64.

Key words: Cluster front line demonstration, sesame, grain yield, technology gap, extension gap and technology index

Introduction

Sesame (Sesamum indicum L.) is one of the important oilseed crop in Indian agriculture. Sesame seeds are rich source of food, nutrition, edible oil and bio-medicine and due to presence of potent antioxidants, they are called as "the seeds of immortality". Its oil has excellent nutritional, medicinal, cosmetic and cooking qualities for which it is known as the" queen of oils". It is cultivated on a large area in the states of Maharashtra, Uttar Pradesh, Rajasthan, Orissa, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, West Bengal, Gujarat, Karnataka, Kerala, Bihar, Assam. By virtue of its early maturing, sesame fits well into a number of multiple cropping systems either as a catch crop or a sequence crop in Rabi and pre Kharif seasons. India ranks first in area, production and export of sesame in the world. But the productivity of sesame in general is much lower than its potential yield. Lower productivity is due to use of sub-optimal rate of fertilizer, poor management and cultivation of sesame in marginal and sub-marginal lands. This indicates the scope and need to increase the productivity of sesame. Sesame is an important source of high quality oil and protein. The oil has excellent stability due to the presence of natural antioxidants such as sesamolin and sesamin (Bedigian et al., 1985). The Queen of the oilseed crops by virtue of the excellent quality of the oil, flavor, taste and softness. Sesame is usually rich in oil (50%), protein (18-20%), moisture (5%), carbohydrate (16%) and fibre (5%). Accordingly Mahrous et al. (2015) in arid and semi-arid conditions, sesame is one of the most commonly ancient oil crop cultivated for grain, oil and bio-energy production in subtropical and tropical regions.

Materials and Methods

The present study was carried out in the Karauli district of Rajasthan. Cluster frontline demonstrations were conducted during kharif 2019 to 2022 with evaluation the performance of RT-351 variety of sesame in Hindaun, Nadauti and Mandrail block of the district. In this study, 230 farmers were selected from a foresaid blocks during consecutive years under cluster frontline demonstration of sesame. All the technological intervention was taken as per prescribed package and practices for improved variety of sesame crop (Table1). The grain yield, extension gap, technology gap, technology index, cost of cultivation, net return and additional returns parameters were recorded. Assessment of gap in adoption of recommended technology before laying out the cluster frontline demonstrations (CFLD's) through personal discussion with selected farmers. The training was organized for selection of farmer's and skilled development about detailed technological intervention with improved package and practice for successful sesame cultivation. Scientists visited regularly cluster frontline demonstration fields and farmer's fields also. The feedback information from the farmer 's was also recorded for further improvement in research and extension programmes. The extension activities i.e. training, scientist's visits and field days were organized at the cluster frontline demonstrations sites. The basic information were recorded from the farmer's field and analyzed to comparative performance of cluster front line demonstrations and farmer's practice. Different parameters were calculated to find out technology gaps (Yadav et al., 2004).

Extension gap =

Demonstrated yield - farmer's practice yield

Technology gap= Potential yield - Demonstration yield

Additional return=

Demonstration return- farmer's practice return

Technology index =

$$\frac{\text{Potential yield-Demonstration yield}}{\text{Potential yield}} \times 100$$

Results and Discussion

The major differences were observed between Improved practices and farmer's practices are regarding recommended varieties, seed treatment, fertilizer dose, and plant protection measures. The demonstrations were recorded high average yield 4.82 qha^{-1} as compared to average local check yield of 3.94 q ha^{-1} and the percentage increase in the demonstration yield over local check was 22.33 per cent. Similarly, yield enhancement in different crops in front line demonstrations were documented by Deshmukh et al., (2014), Meena et al., (2018) and Sumitra and Gopichand (2020).

Table 1: Detail of package and practices for sesame cultivation

S. No.	Technological intervention	Improved Practices (CFLds)	Farmer's Practices (Existing Practices
1	Variety	RT-351	Local
2	Seed rate	2.5 kg ha^{-1}	3.0-3.5 kg ha^{-1}
3	Seed treatment	Trichoderma viride =8g/kg, Fipronil 5% SC= 5 ml /kg NPK Consortia= 10 ml /kg	Carbendazim 50%WP @2 g kg^{-1}
4	Nutrient management	Balance fertilization:-10-15 kg N, 30-40 kg P2O5 & 40 kg S/ha.	Imbalance use of fertilizers and 30 kg P_2O_5
5	Weed management	Pendamenthalin 30 % EC 1 kg a.i./ha PE	Hand weeding
6	Plant protection	Imidachloprid 17.8 %SL @ 250 ml /ha for phyllody management Propiconazole 25% EC for Alternaria Blight management	Use of monocrotophos 1 litre/ha

Table 2: Yield performance, technology gap, extension gap and technology Index of sesame under Improved practices and Farmers' Practice

Season & year	No. of Demo.	Area (ha)	Variety	Yield (q/ha) IP	FP	% increase in yield over FP	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
Kharif- 2019	75	30	RT-351	4.80	3.95	21.52	0.85	2.20	31.42
Kharif -2020	75	30	RT-351	4.75	3.90	21.79	0.85	2.25	32.14
Kharif -2021	30	12	RT-351	4.85	3.95	22.78	0.90	2.15	30.71
Kharif-2022	50	20	RT-351	4.87	3.98	22.36	0.89	2.13	30.42
Total/mean	230	92		4.82	3.94	22.33	0.87	2.18	31.14

IP: Improved practices (CFLDs); FP: Farmer's practices

Table 3: Economics of sesame under Cluster frontline demonstrations

Season & year	Cost of cultivation (Rs/ha)		Gross Returns (Rs/ha)		Net Returns (Rs/ha)		Additional net income over local Check (Rs/ha)	B:C ratio	
	IP	FP	IP	FP	IP	FP		IP	FP
Kharif -2019	18500	17600	31128	25615	12668	8015	4653	1.68	1.45
Kharif -2020	18900	17800	30789	25291	11889	7491	4398	1.62	1.42
Kharif -2021	19200	18100	31452	25615	12252	7515	4737	1.63	1.41
Kharif -2022	19500	18200	31582	25810	12082	7610	4472	1.62	1.42
Mean	19025	17925	31257	25551	12232	7626	4606	1.64	1.42

Extension gap, Technology gap and technology index

This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to discontinue the old technologies and to adopt new technologies by the farmers. The mean extension gap 0.87 q ha^{-1} was recorded (Table 2). Technology gap may be attributed to dissimilarities in soil fertility, salinity and to erratic rain fall and other vagaries of weather in the demonstration area. Hence, location specific recommendations may become necessary to narrow down the gap. The mean technology gap 2.18 q ha^{-1} was recorded (Table 2). Technology index shows the feasibility of the variety/technology at the farmer's field. The lower the value of technology index (31.14 %) more is the feasibility of the particular technology (Table 2). The results of the present study are in consonance with the finding (Meena et al., (2018) and Sumitra and Gopichand (2020).

Economic analysis

The mean Net returns and B:C ratio of demonstration plot was Rs. 12232 ha^{-1} & 1.64 and for control Rs.7626 ha^{-1} and 1.42 respectively (Table 3). This improvement in yield might be due to the application of seed treatment, use of bio fertilizers, timely sowing, application of recommended dose of fertilizers, proper and timely weed management and integrated pest management practices. The results indicated that the cluster frontline demonstrations gave good impact over the farmers practice. The result confirmed the similar findings of front line demonstrations on oilseed crops by Lathwal (2010) and Singh et al., (2012).

Conclusion

The cluster front line demonstrations on sesame showed a significant and positive result, which provided opportunities to the KVK for demonstrating the latest production technologies. The productivity gained under CFLDs over existing sesame cultivation practices has created greater awareness and motivation amongst other fellow farmers to adopt suitable production technology of sesame. There exists a wide gap in the potential yields, demonstration yields & farmers' plot yields due to improved practices (4.82 q/ha) and extension gaps (0.87/ha). The study emphasizes the dissemination o flocation-specific crop management, improved technologies embedded with high-yielding varieties to minimize these gaps and improve oilseeds productivity& profitability in Karauli district of Rajasthan. Moreover, the state's extension functionaries strictly focus on disseminating the proven oilseed production technologies in sesame production systems.

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