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IMPACT ASSESSMENT OF FRONT LINE DEMONSTRATIONS ON SESAME (*SESAMUM INDICUM* L.) IN SIDHI DISTRICT OF MADHYA PRADESH

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Abstract: Farm Science Centre known as Krishi Vigyan Kendra laid down Front Line Demonstrations under AICRP Sesame & Niger programme in the year 2019-20 introducing new & high yielding variety "TKG 306" and applying scientific practices in their cultivation. The productivity and economic returns of sesame in improved technologies were calculated and compared with the corresponding farmer's practices (local check). Improved practices recorded sesame ICM gave the highest yield of 632 kg/ha followed by 573 kg/ha (Plant Protection), 480 kg/ha (Sowing method) and 470 kg/ha (Improved variety TKG 306). as compare to farmers practice. The highest yield in the FLDs plot was 6.32 q/ha and in farmers practice 3.10 q/ha. In spite of increase in yield of sesame, technology gap, extension gap and technology index existed. The highest net return from recommended practice were observed of Rs 29497/- in ICM comparison to other demonstration plot i.e. Rs 11117/, followed by plant protection, sowing method and improved variety (TKG 306). The variation in per cent increase in the yield was found due to the lack of knowledge, and poor socio economic condition. Under sustainable agricultural practices, with this study it is concluded that the FLDs programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of sesame adoption.

Keywords: *Frontline Demonstration, Technology gap, Extension gap, Sesame*

INTRODUCTION

Sesame is an ancient oilseed crop of India, seeds of which are very high quality, health food and known as the "seeds of immortality" as well as it is also called as "the queen of oilseed crops" in view of very high nutrition, medicinal and cosmetic property of its seed and oils. It is having the highest oil content (46-64%) and dietary energy (6355 k cal/kg). The Technology Mission on Oilseeds was launched during 1986 with the objective to create/manage conditions that would harness the best of production, processing and storage technologies to attain self-reliance in edible oils. Within a decade the Mission was able to achieve substantial progress and this transformation was termed as the "Yellow Revolution". The oilseed production in India is now estimated to be 25.5 million tones. India is among the top five countries of the world in oilseed production. Nine edible oilseeds are cultivated in India and sesame ranks fifth in production (about 0.8 million tones) following groundnut, rape seed, soybean and sunflower. The growing domestic demand for edible oil, coupled with the emergence of sesame as a potential export crop, provides good opportunity for farmers to take up the cultivation of this crop and be assured of good market value. However, the gap between the potential achievable yield and the average yield of sesame is wide.

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Oilseed cultivation is undertaken across the country in about 26 million ha on marginal lands, dependent on monsoon rains, nearly 72% of area under oilseeds is rainfed and with low levels of input usage. Location specific and need based agriculture extension services is a vital component for the small and marginal farmers, especially with the shifting from a production based to a market demand based system. The improved technology packages were also found to be financially attractive. Yet, adoption levels for several components of the improved technology were low, emphasizing the need for better dissemination (Kiresur *et al.*, 2001). Several biotic, abiotic and socioeconomic constraints inhibit exploitation of the yield potential and these needs to be addressed.

METHODOLOGY

The present investigation was carried out during the kharif season in the adopted farmers' field on different modules during 2019-20 by Krishi Vigyan Kendra of Sidhi. In total 20 FLDs were conducted. Varieties for the present study comprised four high yielding varieties of sesame viz. TKG-306. Locally cultivated varieties were used as local check. The FLD was conducted to study the gap between the potential yield and demonstration yield, extension gap and the technology index. In the present evaluation study the data on output of sesame cultivation were collected from FLD plots, besides the data on local practices commonly adopted by the farmers of this region were also collected.

To estimate the technology gap, extension gap and the technology index the following formulae have been used (Sagar *et. al.* 2004 & Singh 2007).

Technology gap = Potential yield – Demonstration yield

Extension gap = Demonstration yield – Farmers yield

Technology index = [(Potential yield - Demonstration yield)/ Potential yield] x 100

The techniques which were part of the package of practices were emphasized. However, it was left to the farmers to adopt and practice them depending on the individual farmer's resource availability and preference as to inputs (fertilizers and pesticides). Table 1 gives a comparison between the existing practice and those that were recommended.

Table 1: Comparison between existing and recommended practices under FLD

S. No.	*Recommendation*	*Existing*
1	Importance of preparing the land to get fine tilth. It needs 2 to 3 ploughing	Ploughing is restricted to one or two, which does not break the soil into fine particles
2	Soil testing and application of basal fertilizers, farm yard manure (FYM), Azospirillum, Phosphobacteria and application of micronutrients such as Zinc sulphate and Manganese sulphate based on the deficiencies observed	Soil testing is not done. Normally farmers do not apply fertilizer as it is raised as a residual crop. If fertilizer is applied than it is usually DAP at one bag per acre
3	Treating the seeds with Trichoderma and Azospirillum	Seeds as such procured are used for sowing, mostly the seeds are not treated. However, seeds procured from Agriculture Department are pre-treated with Carbendazin/Thiram
4	Mixing 2 kg of seeds with 4 kg of fine sand for seed roadcasting or line sowing method with the help of a seed drill	Farmers use higher quantity of seeds; sometimes they use double the recommended quantity as they are not sure about the germination percentage
5	Importance of providing irrigation at the right stages of the plant growth such as during the early stage of vegetative growth, flowering and pod-setting stage. Irrigation at 25, 35, 55 and 60 days after sowing (DAS)	Farmers provide irrigation 3 times – after sowing, 15 DAS and 40 DAS
6	Carrying out weeding and thinning operations to maintain the desired population. Weeding should be carried out twice during 15 DAS and 30 DAS	Farmers carry out weeding operation only once at 20 days after sowing (DAS). Thinning is normally not practiced
7	Application of fertilizers as top dressing and growth regulators. Urea is recommended for application as top dressing during 35 DAS as this provides sufficient nitrogen which helps in the vegetative growth of the plant	This is not practiced by farmers

S. No.	*Recommendation*	*Existing*
8	Proper identification of pests and diseases and taking the correct control measure and removing diseased and affected plants and identifying the correct stage for harvest of crops and post-harvest protection from pests	No preventive measure is followed
9	Harvesting at the proper time and post-harvest practices adopted.	The correct stage of harvesting The crop is normally guessed by the farmer and recommended post-harvest operations are not practiced.

RESULTS AND DISCUSSION

Yield

Frontline demonstration was conducted on 20 acre of land with 20 demonstration plots. On sesame ICM gave the highest yield of 632 kg/ha followed by 573 kg/ha (Plant Protection), 480 kg/ha (Sowing method) and 470 kg/ha (Improved variety TKG 306). The result indicate that the Frontline demonstration had good impact over the farming community of Sidhi district as they were motivated by the new agro technologies applied in the FLD plots. Yield of sesame was varied with different scientific technologies, which might have been due to improved variety, change in sowing method, proper insect and pest management. The highest yield observed in ICM this may be due to adoption of proper and complete agronomic management practices. (Singh *et al.* 2016 & Singh *et al.* 2018)

Table 2: Performance of the different scientific crop production technologies under FLD

Technology	*Location (Village/Block)*	*No. of Demo.*	*Area (ha)*	*Yield (q/ha)*		*% Increase Over check*
				Demo	*Check*	
ICM	Panwar Sengran/ Sidhi	05	2.0	6.32	3.10	50.95
Improved Variety (TKG 306)	Teduha/Sihawal	05	2.0	4.70	2.98	36.59
Plant Protection	Panwar / Sidhi	05	2.0	5.73	2.98	47.99
Sowing Method	Banjari / Sidhi	05	2.0	4.80	3.00	37.50
Average				5.39	3.02	43.26

Data in table 2 presents the performance improved Sesame varieties TKG 306 under FLDs. Yield increase was observed in 36.59 per cent of the trials. The average increase observed was 43.26 per cent. The highest recorded yield in ICM was 6.32 q/ha. Farmers, who followed improved practices, were able to get better yields compared to their earlier practices.

Economic Parameters

Data in table 3 presents economic indicators i.e. gross expenditure, gross returns, net returns and BC ratio of front line demonstrations. The data clearly revealed that, the net returns from the recommended practice were substantially higher than check plot, i.e. farmers practice during all the demonstration. The highest net return from recommended practice were observed of Rs 29497/- in ICM comparison to other demonstration plot i.e. Rs 11117/, followed by plant protection, sowing method and improved variety (TKG 306). On an additional income in ICM over all the recommended practices and control check is attributed to the technological interventions provided in demonstrations plots, i.e. balanced nutrition, sowing method, improved variety and timely management of insect and diseases. Economic analysis of the yield performance revealed that cost benefit ratio of demonstration plots were observed significantly higher than control plots. The cost benefit ratio of demonstrated and control plots were 3.57, 2.96, 3.32 & 3.03 and 2.19, 2.10, 2.10 & 2.12 respectively. Hence, favourable cost benefit ratios proved the economic viability of the intervention made under demonstration and convinced the farmers on the utility of intervention. The data clearly revealed that the maximum increase in yield and

Table 3: Economic Indicators of the different scientific crop production technologies under FLD

Variety	**Economics of demonstration Rs./unit)*				**Economics of check (Rs./unit)*			
	Gross cost	*Gross Return*	*Net Return*	*BCR*	*Gross cost*	*Gross Return*	*Net Return*	*BCR*
ICM	11475	40972	29497	3.57	9200	20117	11117	2.19
Improved Variety (TKG 306)	10277	30492	20215	2.96	9200	19338	10138	2.10
Plant Protection	11185	37159	25974	3.32	9200	19338	10138	2.10
Sowing Method	10277	31128	20851	3.03	9200	19468	10268	2.12

maximum cost benefit ratio of 3.57 was observed in ICM. The variation in cost benefit ratio during different scientific crop production technology may mainly be on account of yield performance and input output cost. (Singh *et al.* 2016 & Singh *et al.* 2018)

Technology gap, Extension gap and Technology Index

Table 4: Technology and Extension gap of the different scientific crop production technologies under FLD

Variety	*Potential Yield (q/ha)*	*Technology gap (q/ha)*	*Extension gap (q/ha)*	*Technology Index*
ICM	7	0.68	3.22	9.71
Improved Variety (TKG 306)	7	2.30	1.72	32.85
Plant Protection	7	1.27	2.75	18.14
Sowing Method	7	2.20	1.80	31.43

The technology gap which corroborates to the gap in the demonstration yield over potential yield were 68 kg/ha for ICM, 230 kg/ha for improved variety (TKG 306), 127 kg/ha for plant protection and 220 kg/ha for sowing method. The technology gap observed in different scientific crop production technologies may be attributed to dissimilarity in the soil fertility status of soil and weather conditions. Hence location specific recommendation appears to be necessary to bridge gap (Singh *et al.* 2016 & Singh *et al.* 2018)

The highest extension gap of 322 kg/ha was recorded in variety ICM followed by plant protection (275 kg/ha), sowing method (180 kg/ha) and improved variety TKG 306 (172 kg/ha) which emphasized the need to educate the farmers through various means for the adoption of improved high yielding varieties and improved agro technologies to reverse this trend of wide extension gap (Singh *et al.* 2016 & Singh *et al.* 2018)

The technology index shows the feasibility of the evolved technology at the farmer's field. The lower the value of technology index more is the feasibility of the technology. The technology index is lowest for the ICM followed by plant protection, sowing method and highest for improved variety TKG 306. The technology indexes of ICM, plant protection, sowing method and improved variety TKG 306 were 9.71, 18.14, 31.43 and 32.85 percent respectively. The highest technology index of ICM indicates that if we adopt all the scientific technology for crop production we can increase the productivity of sesame in this area (Singh *et al.* 2016 & Singh *et al.* 2018)

CONSTRAINTS

The farmers indicated that both inadequate knowledge in the application and practice of recommended agronomic practices and access to credit were the constraints found by them. Specific constraints identified were

- Availability of quality seed materials for sowing
- Low yield
- Pest and diseases
- Labour availability
- Lack of awareness of suitable management practices to ensure good yield

- High yield variation within the field
- Vagaries of nature
- Lack of good returns from sale

The knowledge gaps indicated were in the areas of seed treatment, use of seed drill, thinning, pest control measures, organic farming practices and application of micronutrients. Technical support and constant interaction with the farmers help in building their confidence and clarifying their doubts. However, other external factors, such as vagaries of nature and availability of labourers, credit, inputs locally and market fluctuations are the major constraints faced by the farmers. Farm mechanization would reduce the burden; however, mobilizing the capital investment for the same would be difficult for the farmers.

CONCLUSION

The productivity gain under FLD over existing practices of sesame cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of sesame in the district. The constraints faced by the farmers were different for different technologies. Efforts should, therefore, be made by the extension agencies in their transfer of technology programmes to consider the constraints as perceived by the farmers in this investigations as well as personal. Therefore, for enhancing the production & productivity of sesame crop, strategy should be made for getting the more and more recommended technologies adopted by the farmers.

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