Impact of Front Line Demonstrations in Transfer of Sesamum Production Technology

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ABSTRACT

Sesamum (Sesamum indicum L.) is as one of the most important oil crops of the Panchmahal district of Gujarat. However, its productivity of sesamum in the district is very low. Attempts are made to improve productivity and to increase area under sesamum by adopting HYVs (high yielding variety). In order to compare conventional sesamum with HYVs varieties, 50 front line demonstrations were carried out in systematic manner on farmers' field to show the worth of a new varietiesin comparison to local check and thereby convincing farmers about potentialities of improved production management practices of sesamum for further adoption, involving feasible and effective scientific package of practices. The demonstrations clearly showed enhancement of productivity, at the same time area under sesamum cultivation was also noticed to be enhanced. The yield was found to be increase from 369kg/ha in local check to 470kg/ha in demonstrations. Similarly, the benefit cost ratio for HYVs varieties was found to increase to 1.65 as compared to local check (1.29). The economic and benefit cost ratio can be further improved to 1.68 by giving slightly higher inputs for cultivation and marketing. The impact of FLDs was analysed which showed improvement of knowledge and satisfaction of farmers as the main reason for mass scale adoption.

Keywords: *Sesamum, Production technology, Frontline demonstration*

INTRODUCTION

Sesame (*Sesamum indicum L.*) is one of the important oilseed crops in Indian agriculture. Sesame seeds are rich source of food, nutrition, edible oil and bio-medicine. Sesame oil has excellent nutritional, medicinal, cosmetic and cooking qualities for which it is known as 'the queen of oils'. Due to the presence of potent antioxidants, sesame seeds are called as 'the seeds of immortality'. Sesame cake or meal obtained as a by-product of the oilmilling industry is rich in protein, vitamin (Niacine) and minerals (Ca and P). India ranks first in area (29%), production (26%) and export (40%) of sesame in the world. In India, sesame is grown on an area of 13.85 lakh hectares with an annual production of 4.34 lakh tonnes. The average yield of sesame in India is very low that is 311 kg per ha (Anon., 2004). It is cultivated on a large area in the states of Maharashtra, Uttar Pradesh, Rajasthan, Orissa, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, West Bengal, Gujarath and Karnataka. In Gujarat, it is grown on an area of 0.36 lakh hectares with an annual production of 0.14lakh tonnes with a productivity of 397 kg per ha (Anon., 2004).

The production of oil seed crops in our country including sesame is not enough to meet the domestic demand of the large population. Low productivity of sesame is attributed to the fact that the crop is usually grown under rainfed condition on marginal and low fertility of soils. Further, lack of proper nutrient management is one of the major causes for low yields. Sesame responds well to integrated nutrient management. Integrated use of organic manures and mineral fertilizers help in maintaining stability in production, besides improving soil physical properties (Muthuswamy et al., 1990; Subbarao, 1994).

METHODOLOGY

An extensive survey was conducted to collect information pertaining to various usage of sesamum in the Panchmahals District. Fifty farm families each from seven villages of (who grew sesamum) were selected from three Talukas viz. Goghamba, Kalol, and Godhra for gathering the information. A questionnaire containing (7) questions were put to the respondents and data were analyzed. To popularize the improved sesamum production practices, were identified through participatory approach. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in sesamum production. Farmers were

also asked to rank the constraints they perceive as limiting sesamum protection in order of preference. The quantification of data was done by first ranking the constraints and then calculating the Rank Based Quotient (RBQ) as given by Sabarathnam (1988), which is as follows:

$$R.B.Q = \frac{\sum fi\ (n + 1 - ith)}{N \times n} \times 100$$

Wherein,

fi = Number of farmers reporting a particular problem under i^{th} rank

N = number of farmers

n = number of problems identified

Based on top rank farmers problems identified, front line demonstrations were planned and conducted at the farmers' field under technology demonstration. In all, 50 full package frontline demonstrations were conducted to convince them about potentialities of improved variety of sesamum 'GT-2' during 2009, 2010 and 2011. All the participating farmers were trained on all aspects of sesamum production management. Recommended agronomic practices and genuine seeds were used for FLDs in 0.5 ha area. A one fifth area was also devoted to grow local standard check. To study the impact of front line demonstrations, out of 50 participating farmers, a total of 50 farmers were selected as respondent through proportionate sampling. Production and economic data for FLDs and local practices were collected and analyzed. The technology gap and technology index were calculated using the following formulas as given by Samui et al. (2000):

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstration yield}$$

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

Knowledge level of the farmers about improved production practices of sesamum before frontline demonstration implementation and after implementation was measured and compared by applying dependent't' test. Further, the satisfaction level of respondent farmers about extension services provided was also measured based on various dimensions like training of participating farmers, timeliness of services, supply of inputs, solving field problems and advisory services, fairness of scientists, performance of variety demonstrated and overall impact of FLDs.

The selected respondents were interviewed personally with the help of a pre-tested and well structured interview schedule. Client Satisfaction Index was calculated as developed by Kumaran and Vijayaragavan (2005). The harvest index was worked out by using following formula given by Donald (1962). The data thus collected were tabulated and statistically analyzed to interpret the results.

RESULTS AND DISCUSSION

Constraints in Sesamum Production

Farmers' sesamum production problems were documented in this study. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in sesamum production. The ranking given by the different farmers are given in Table 1. A perusal of table indicates that lack of suitable HYVs was given the top most rank by 18 respondent farmers. The FLD participants were provided HYVs seeds as critical inputs. Based on the ranks given by the respondent farmers for the different constraints listed out in table 1, the rank based quotients were calculated and presented in Table 2.

Table 1: Ranks given by farmers for different constraints n=50

Sr. No.	Constraints	Ranks						
		I	II	III	IV	V	VI	VII
1	Lack of suitable HYVs	18	10	07	06	05	04	00
2	Low technical knowledge	13	09	08	08	06	06	00
3	Low soil fertility	08	09	12	14	04	03	01
4	Wild animals	12	11	08	07	04	04	04
5	Weed infestation	08	10	10	11	07	02	02
6	Phylody Disease infestation	11	08	07	10	05	07	02
7	Insect infestation	09	07	04	09	11	06	04

The analysis of data presented in the Table 2 revealed that lack of suitable HYVs, low soil fertility, Low technical knowledge and followed by Wild animals were the major constraints to sesamum production. Other constraints such weed infestation, phylody disease infestation, insect infestation and erratic rainfall were also found to reduce sesamum production.

Table 2: Frequency distribution of RBQ values given by farmers n=50

Sr. No.	Problems	R.B.Q	Overall rank
1	Lack of suitable HYVs	76.57	I
2	Low technical knowledge	70.57	III
3	Low soil fertility	72.22	II
4	Wild animals	69.14	IV
5	Weed infestation	67.71	V
6	Phylody Disease infestation	66.00	VI
7	Insect infestation	62.28	VII

Performance of FLD

A comparison of productivity levels between demonstrated variety and local checks is shown in Table 3. During the period under study it was observed that in front line demonstrations, the improved sesamum variety GT-2 recorded the higher grain yield (4.70 q ha^{-1}) compared to local check (3.29 q ha^{-1}). The percentage increase in the yield over local check was 33.55.

From these results it is evident that the performance of improved variety was found better than the local check under local conditions. Farmers were motivated by results of agro technologies applied in the FLDs trials and it is expected that they would adopt these technologies in the coming years. Yield of the front demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology index and harvesting index. The technology gap shows the gap in the demonstration yield over potential yield and it was 0.5q ha^{-1}. The best potential yield comes from the scientists fill where all inputs are given at optimum level. The observed technology gap may be attributed to dissimilarities in soil fertility, salinity and erratic rainfall and other vagaries of weather conditions in the area. Hence, to narrow down the gap between the yields of different varieties, location specific recommendation appears to be necessary. Technology index shows the feasibility of the variety at the farmer's field. The lower the value of technology index more is the feasibility. Table 3 revealed that the technology index values were 9.62%.

Table 3: Yield, technology gap and technology index of demonstration

Variables	Yield (q ha^{-1})	Increase (%) over Local check	Technology gap(qha^{-1})	Techno-logy index (%)
Local check	3.69	-	-	-
Demonstration (GT-2)	4.70	30.55	0.5	9.62

Table 4: Harvesting index of demonstration

Variables	Seed Yield (q ha^{-1})	Stalk Yield (q ha^{-1})	Harvesting index
Local check	3.69	17.85	0.171
Demonstration (vaishali)	4.70	20.70	0.185

The economics of semamum production under front line demonstrations were estimated and the results have been presented in Table 4. Economic analysis of the yield performance revealed that front line demonstrations recorded higher gross returns (₹ 27225 ha^{-1}) and net return (₹ 10725 ha^{-1}) with higher benefit ratio (1.65) compared to local checks (Table 5). Further, additional cost of ₹ 2000 per hectare in demonstration has yielded additional net returns ₹ 2000 per hectare with incremental benefit cost ratio 1.68 suggesting its higher profitability and economic viability of the demonstration.

Table 5: Economics of frontline demonstrations

Variables	Cost of cultivation (₹ ha^{-1})	Gross return (₹ ha^{-1})	Net return (₹ ha^{-1})	Benefit cost ratio
Local check	16150	20898	4748	1.29
Demonstration	16500	27225	10725	1.65
Additional in demonstration	2000	4000	2000	1.68*

* Incremental benefit cost ratio

Increase in Knowledge

Knowledge level of respondent farmers on various aspects of improved sesamum production technologies before conducting the frontline demonstration and after implementation was measured and compared by applying dependent't' test. It could be seen from the Table 6 that farmers mean knowledge score had increased by 38.70 after

implementation of frontline demonstrations. The increase in mean knowledge score of farmers was observed significantly higher. As the computed value of 't' (6.74) was statistically significant at 5 % probability level.

Table 6: Comparison between knowledge levels of the respondent farmers about Improved Farming Practices of maize n=50

Mean score			Calculated 't' value
Before FLD implem-ntation	After FLD implemen-tation	Mean difference	6.74*
29.98	68.77	38.70	

* Significant at 5% probability level.

It means there was significant increase in knowledge level of the farmers due to frontline demonstration. This shows positive impact of frontline demonstration on knowledge of the farmers that have resulted in higher adoption of improved farm practices. The results so arrived might be due to the concentrated educational efforts made by the scientists.

Farmers' Satisfaction

The extent of satisfaction level of respondent farmers over extension services and performance of demonstrated variety was measured by Client Satisfaction Index (CSI) and results presented in table 7.

Table 7: Extent of farmers satisfaction of extension services rendered n=50

Sr. No.	Satisfaction	No.	Per cent
1	Low	09	12.00
2	Medium	30	40.00
3	High	34	45.33

It is observed from Table 7 that majority of the respondent farmers expressed high (45.33 %) to the medium (40%) level of satisfaction for extension services and performance of technology under demonstrations. Whereas, very few (12%) per cent of respondents expressed lower level of satisfaction.

The medium to higher level of satisfaction with respect to services rendered, linkage with farmers, and technologies demonstrated etc. indicate stronger conviction, physical and mental involvement in the frontline demonstration which in turn would lead to higher adoption. This shows the relevance of frontline demonstration.

CONCLUSION

The study undertaken with the help of 50 FLD participants at KVK Panchmahal to know the economics of sesamum production using HYVs and adoption level and constraint influencing the adoption of HYVs. The results revealed that lack of knowledge of suitable HYV, soil fertility and low technological knowledge were the three most important factors which inhibited the adoption of HYV of sesamum in Panchmahal. The yield of sesamum in demonstration was 4.70 q/ha as compared local check (3.67q/ha). The benefit/cast ration for HYV was 1.65 as compared to 1.29 in case of local check. The impact of FLD was also analyzed which showed that there was significant improvement in knowledge level and satisfaction on the part of farmers.

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