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Impact of Front line Demonstrations on Sesamum Production in Panchmahal District of Gujarat

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ABSTRACT

Sesamum (*Sesamum indicum L.*) is one of the most important oilseed crops of the Panchmahal district of Gujarat. However, its productivity in the district is very low. Attempts are being made to improve productivity and to increase area under sesamum by adoption of HYVs (high yielding variety). In order to compare conventional sesamum with HYVs varieties, 50 front line demonstrations (FLDs) were carried out in systematic manner on farmers' fields to show the worth of new varieties in 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 increased from 369 kg/ha in local check to 470 kg/ha in FLDs. Similarly, the cost : benefit ratio for HYVs varieties was found to be 1.65 as compared to 1.29 in local check. The economic and cost : benefit 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.

Key words: Sesamum, production technology, front-line demonstration, adoption, benefit cost ratio.

INTRODUCTION

Sesamum (*Sesamum indicum L.*) is one of the important oilseed crops in India. Sesamum seeds are rich source of food, nutrition, edible oil and bio-medicine. Sesamum 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, Sesamum seeds are called as 'the seeds of immortality'. Sesamum cake or meal obtained as a by-product of the oil milling 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, i.e. 311 kg per ha Anonymous (2010-11). In Gujarat, it is grown on an area of 0.36 lakh hectares with an annual production of 0.14 lakh tonnes with a productivity of 397 kg per ha Anonymous (2010-11).

The production of oilseed 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 conditions on marginal and low fertile soils. Further, lack of proper nutrient management is one of the major causes for low yields. Sesame responds well to integrated nutrient management.

METHODOLOGY

An extensive survey was conducted to collect information pertaining to various usage of sesamum in the Panchmahal District. Fifty farm families from seven villages (who grew sesamum) were selected from three Talukas viz. Goghamba, Kalol, and Godra for collection of data. An interview schedule was prepared and administered to the respondents and data were analyzed. Preferential ranking technique (participation method) was utilized to identify the constraints faced by the respondent farmers in sesamum production. Farmers were also asked to rank the constraints they perceived as limiting sesamum production 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), as mentioned below.

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

Wherein,

fi = Number of farmers reporting a particular problem under i^{th} rank
N = number of farmers
n = number of problems identified

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Based on top ranks farmers' problems were identified, the front line demonstrations (FLDs) were planned and conducted at the farmers' field under technology demonstration. In all, 50 full package front-line demonstrations were conducted to convince farmers 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, a total of 50 farmers were selected as respondents 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):

Technology gap = Potential yield - Demonstration yield

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

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 by using formula as developed by Kumaran and Vijayaragavan (2005).

$$\text{Client satisfaction index} = \frac{\text{Individual obtained score}}{\text{Maximum score possible}}$$

The harvest index was worked out by using following formula given by Donald (1962).

$$\text{Harvest index} = \frac{\text{Seed yield (kg ha}^{-1}\text{)}}{\text{Seed yield (kg ha}^{-1}\text{) + Stalk yield (kg ha}^{-1}\text{)}}$$

The data thus collected were tabulated and statistically analyzed to interpret the results.

RESULTS AND DISCUSSION

Performance of FLD

A comparison of productivity levels between demonstrated variety and local checks is shown in Table 1. 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 qha $^{-1}$) compared to local check (3.69 qha^{-1}). The percentage increase in the yield over local check was 30.55. From these results it was 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 demonstrations and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology index and harvest 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 is obtained when 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 1 revealed that the technology index values were 9.62.

Table 1: Yield, technology gap and technology index of demonstration

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

Table 2: 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 sesamum production under front line demonstrations were estimated and the results have been presented in Table 3. Economic analysis of the yield performance revealed that front line demonstrations recorded higher gross returns (₹ 27225 ha^{-1}) and net return (₹ 1077200 ha^{-1}) with higher benefit : cost ratio 1.65

compared to 1.29 of local check (Table 3). Further, additional cost of ₹ 2000 per hectare in FLDs has yielded additional net returns ₹ 2000 per hectare with incremental benefit : cost ratio of 1.68 suggesting higher profitability and economic viability of the demonstration. Similar results were also reported by Hiremath and Nagaraju (2009).

Table 3: Economics of front line demonstrations

Variables	Cost of cultivation (₹ ha^{-1})	Gross return (₹ ha^{-1})	Net return (₹ ha^{-1})	Benefit cast 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 front line demonstration and after implementation was measured and compared by applying dependent't' test. It could be seen from the Table 4 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 per cent probability level. It means there was significant increase in knowledge level of the farmers due to front line demonstration. This shows positive impact of front line 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.

Table 4: Comparison between knowledge levels of the respondent farmers about improved farming practices of maize

n=50

Mean score			Calculated 't' value
Before FLD implementation	After FLD implementation	Mean difference	
29.98	68.77	38.70	6.74

* Significant at 5% probability level.

Constraints in Sesamum Production

Farmers' sesamum production problems were documented in this study. Preferential ranking technique (a participatory method) was utilized to identify the constraints faced by the farmers in sesamum production. The ranking given by the different farmers are given in Table 5. 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 farmers for the different constraints listed out in Table 5, the rank based quotients were calculated and are presented in Table 6.

Table 5: Ranks given by farmers for different constraints

n=50

Constraints	Ranks						
	I	II	III	IV	V	VI	VII
Lack of suitable HYVs	18	10	7	6	5	4	00
Low technical knowledge	13	9	8	8	6	6	00
Low soil fertility	8	9	12	14	4	3	1
Wild animals	12	11	8	7	4	4	4
Weed infestation	8	10	10	11	7	2	2
Phylody Disease infestation	11	8	7	10	5	7	2
Insect infestation	9	7	4	9	11	6	4

The analysis of data presented in the Table 6 revealed that lack of suitable HYVs, low soil fertility, low technical knowledge followed by wild animals were the major constraints to sesamum production. Other constraints such weed infestation, phylody disease infestation, insect infestation were also found to reduce sesamum production. Other authors (Hassan et al. 1998; Ouma et al. 2002; Joshi et al. 2005) have also reported similar problems in maize production.

Table 6: Frequency distribution of RBQ values given by farmers

n=50

Problems	R.B.Q	Overall rank
Lack of suitable HYVs	76.57	I
Low technical knowledge	70.57	III
Low soil fertility	72.22	II
Wild animals	69.14	IV
Weed infestation	67.71	V
Phylody Disease infestation	66.00	VI
Insect infestation	62.28	VII

Farmers' Satisfaction:

The extent of satisfaction level of farmers about extension services and performance of demonstrated varieties 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

Satisfaction	level Number	Per cent
Low	09	12.00
Medium	30	40.00
High	34	45.33

It is observed from Table 7 that majority of the 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%) 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 front line demonstration which in turn would lead to higher adoption. This shows the relevance of front line demonstration.

CONCLUSION

The study was undertaken with the help of 50 FLD participants at KVK Panchmahal to ascertain the economics of sesamum production technology using HYVs and find out adoption level and constraints influencing the adoption of HYVs of sesamum. 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. The yield of sesamum in FLDs was 4.70 q/ha as compared local check (3.69q/ha). The benefit : cost ratio 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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