POPULARIZATION OF IMPROVED CULTIVARS OF MAIZE THROUGH FRONTLINE DEMONSTRATIONS IN CENTRAL GUJARAT

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ABSTRACT

Maize is as one of the most important cereal crops of the Panchmahals district of Gujarat. However, its productivity of maize in the district is very low. Attempts are made to improve productivity and to increase area under maize by adopting HYVs (high yielding variety) and SCH(single cross hybrid). In order to compare conventional maize with HYVs and SCH varieties, 75 front line demonstrations were carried out in systematic manner on farmers' field to show the worth of a new variety in comparison to local check and thereby convincing farmers about potentialities of improved production management practices of maize for further adoption, involving feasible and effective scientific package of practices.The demonstrations clearly showed enhancement of productivity per cent, at the same time area under maize cultivation was enhanced. The yield was found to be increase from 3300kg/ha in local check to 4108kg/ha in demonstrations. Similarly, the cost benefit ratio for SCH varieties was found to increase to 1.99 as compared to local check (1.65). The economic and cost benefit ratio can be further improved to 2.48 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: *maize, production technology, frontline demonstration*

INTRODUCTION

Maize is the third most important cereal crop, of the country after paddy and wheat, as per the data of the maize cultivation in country for the year 2009-2010. India ranks third in productivity (2024 kg/ha) of maize, fourth in total production (16.72 m. ton) and fifth in total area (8.26 m. ha) (Anonymous 2010-11). In India, 35% of the total produce is directly consumed as human food while rest is used in industry and as poultry feed. It has over 3000 kinds of uses like human food, cattle and poultry feed and in industries. Most of the human feed is derived from grain *i.e.* raw (as green cobs) or mature grain (as corn-meal). In Gujarat, it is grown on 0.497m ha area with production 0.80 m ton and productivity of 1356 kg/ha. During recent years, Panchmahals district of central Gujarat has emerged as the leading district in maize production in the state. Farmers of area are preferring maize over all other crops owing to its adoptability with better productivity. However, the productivity of maize in the district is very low as compared to average national productivity. Lack of suitable high yielding varieties, especially the SCHs, as well as poor knowledge about production practices are ascribed as main reasons for low productivity of maize. The productivity of maize per unit area could be increased by adopting recommended scientific and sustainable management practices using a suitable high yielding variety. Taking into account the above considerations, frontline demonstrations were undertaken in a systematic manner on farmers' field to show the worth of a new variety and convince the farmers to adopt improved production management practices of maize for enhancing productivity. The study was aimed to find out yield, economics and factors (constraints) affecting the adoption of HYV, SCH and technology of maize production.

METHODOLOGY

The study was conducted in Kalol, Godhra and Ghoghmba talukas of Panchmahals district of Gujarat. To popularize the improved maize production practices, constrains in maize production were identified though participatory approach. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in maize production. Farmers were also asked to rank the constraints perceived as limiting maize 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 Sabarathanam (1988), which is as follows:

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 Integrated Scheme of Oilseeds, Pulses, Oil Palms and Maize (ISOPOM). In all, 150 frontline demonstrations were conducted to convince farmers about potentialities of improved variety of maize 'HQPM-1', during 2009, 2010 and 2011. All the participating farmers were trained on various aspects of maize production technologies. 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 150 participating farmers, a total of 75 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 formula given by Samui *et al.* (2000):

Knowledge level of the farmers about improved production practices of maize 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.

RESULTS AND DISCUSSION

Constraints in Maize Production

Production problems of maize faced by the farmers were documented in present study. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in maize production. The ranking given by the different farmers are given in table 1. A perusal of data indicates that lack of suitable HYVs and SCH was given the top most rank by 29 respondent farmers. The FLD participants were provided SCH 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=75

Sr. No.	Production Constraints	Ranks								
		I	II	III	IV	V	VI	VII	VIII	IX
1	Lack of suitable HYVs and SCH	29	16	12	08	05	05	00	00	00
2	Grass hopper infestation	02	04	05	10	08	17	15	06	08
3	Wild animals	13	12	16	17	05	06	03	03	00
4	Stem borer infestation	11	11	12	06	07	05	08	10	05
5	Low soil fertility	03	00	05	08	17	09	11	12	10
6	Low technical knowledge	08	15	18	16	13	00	05	00	00
7	Low or erratic rainfall	00	06	07	03	11	07	08	18	15
8	Weed infestation	04	06	00	00	00	15	11	13	26
9	Wilt	05	05	00	07	07	11	14	13	13

The analysis of data presented in the Table 2 revealed that lack of suitable HYVs and SCH, wild animals, low technical knowledge and followed by stem borer were the major constraints of maize production. Other constraints such low soil fertility, grass hopper infestation, wilt infestation and erratic rainfall were also found as came so of low productivity for maize production. Among all the constraints, weed infestation got the least concerns. These finding are in the agreement of the results as reported by earlier workers (Ouma *et al*. 2002; Joshi *et al*. 2005).

Table 2: Frequency distribution of RBQ values given by farmers n=75

Sr. No.	Problems	R.B.Q	Overall rank
1	Lack of suitable HYV	84.00	I
2	Grass hopper infestation	47.11	VI
3	Wild animals	72.74	II
4	Stem borer infestation	42.51	IV
5	Low soil fertility	59.60	V
6	Low technical knowledge	69.62	III
7	Low or erratic rainfall	40.44	VIII
8	Weed infestation	33.92	IX
9	Wilt	60.59	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 maize variety HQPM-1 recorded the higher grain yield (4108 kg ha^{-1}) when compared to local check (3300 kg ha^{-1}). The percentage increase in the yield over local check was 26.6. Similar yield enhancement in different crops in front line demonstration has amply been documented by Hiremath *et al*. (2007), Mishra *et al*. (2009), Kumar *et al*. (2010) and Dhaka (2010). 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. The technology gap shows the gap in the demonstration yield over potential yield and it was 892 kg ha^{-1}. 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. Result of study depiction in Table 3 revealed that the technology index values were 17.84%. The results of the present study are in consonance with the findings of Sawardekar *et al*. (2003), and Hiremath and Nagaraju (2009).

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

Variables	Yield (kg ha^{-1})	Increase(%) over Local check	Technology Gap- (kg ha^{-1})	Technology Index (%)
Local check	3300	-	-	-
Demonstration (HQPM-1)	4108	26.6	892	17.84

The economics of maize 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 (Rs. 45980 ha^{-1}) and net return (Rs. 17880 ha^{-1}) with higher benefit ratio (1.99) as compared to local checks. These results are in accordance with the findings of Hiremath *et al*. (2007) and Hiremath and Nagaraju (2009). Further, additional cost of Rs.1200 per hectare in demonstration has increased additional net returns Rs. 8180 per hectare with incremental benefit cost ratio 7.81 suggesting its higher profitability and economic viability of the demonstration. Similar results were also reported by Hiremath and Nagaraju (2009) and Dhaka et *al* (2010).

Table 4: Economics of frontline demonstrations

Variables	Cost of Cultivation (₹ha^{-1})	Gross Return (₹ ha^{-1})	Net Return (₹ ha^{-1})	Benefit Cost Ratio
Local check	21900	36300	14400	1.65
Demonstration	23100	45980	22880	1.99
Additional in demonstration	1200	9380	8180	7.81*

***** Incremental benefit: cost ratio

CONCLUSION

The study revealed that the productivity, production and area under maize cultivation can be improved by adopting SCH and HYVs of maize which can be popularized through laying of maize in the District. The results revealed that lack of knowledge of suitable SCH, damage to crop by wild animals and low technological knowledge were the three most important factors which inhibited the adoption of SCH of maize in Panchmahals. The yield of maize in demonstration was 4108 kg/ha as compared local check (3300 kg/ha). The benefit/cost ratio for SCH was 1.99 as compared to 1.65 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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