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Popularization of Rabi Maize Cultivation in the Villages of West Tripura district

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ABSTRACT

A study was organized by Krishi Vigyan Kendra West Tripura in the five selected villages of West Tripura district during the *Rabi* season of 2019, 2020 and 2021 to popularize the improved & scientific cultivation practices of maize among the farmers. Front Line Demonstration (FLD) was conducted with scientific package of practices of maize production technology. The maize hybrid HQPM-1 was given to the farmers for conducting demonstration. The HQPM-1 was found superior over farmers' practice. The quality protein maize HQPM-1 showed 78.8% increased in yield over the local check. The net return and return per rupee invested were sufficiently high to motivate farmers for adoption of maize hybrid HQPM-1 with improved production technologies during *rabi* season.

1. Introduction

Among cereals, maize ranks next to rice. Maize can be cultivated throughout the year provided there is water (Dhaka *et al* 2010). Maize (*Zea mays* L) is one of the most important cereals having wider adaptability under varied agro climatic conditions. Globally, maize is known as queen of cereals, because it has the highest genetic yield potential among the cereals. In India, maize occupies third position both in area and production after rice and wheat. Maize in India, contributes nearly 9 per cent in the national food basket and more than Rs.100 billion to the agricultural GDP at current prices apart from generating employment to over 100 million man-days at the farm , downstream agricultural and industrial sectors (Meena *et al*.2014). Besides being staple food for some people and quality feed for animals, maize serves as a basic raw material as an ingredient to thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc. In Tripura, maize is cultivated in a very few pockets and mostly confined in the Jhum land. Farmers are less interested to cultivate maize in the district. This may be due to some of the reasons like i) The population are rice eater ii) Seeds of high yielding varieties are not available due to which farmers are getting poor yield of 2.4 MT/ha. iii) Lack of awareness among the farmers regarding the utility of maize. iv) Marketting problem etc. The productivity of maize per unit area could be increased by adopting recommended scientific and sustainable management practices using a suitable hybrid or high yielding cultivar.

The climatic and edaphic factors of the West Tripura are favourable for maize cultivation, hence there is an immense scope of cultivation of this crop in the rice fallow of the district provided irrigation is there. Taking into account the above considerations, Front Line demonstrations (FLD) were carried out in a systematic manner on farmers' field to show the worth of Quality Protein Maize (HQPM-1) and convincing farmers to adopt improved maize production technology for enhancing productivity of maize.

Front Line demonstration (FLD) of maize was carried out in the selected villages for three consecutive *rabi* season of 2019, 2020 and 2021 after discussion with the farmers in the training programme on maize. Based on the trials conducted by ICAR Tripura centre and KVK, quality protein maize HQPM-1 was selected for demonstration in the farmers' field. Altogether, 110 numbers of demonstration covering an area of 44 ha in five selected villages had been taken. Awareness programme on the importance of quality protein maize in human diet was also organized. A group meeting and training programme on the topic like scientific cultivation practices of maize was also conducted. Besides imparting training, printed leaflet on the production technology of maize was also distributed among the farmers.

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Regular visit by the KVK Scientists were ensured and made to guide the farmers. These visits were also utilized to collect feedback for further improvement in research and extension programme. Field day was organized at the demonstration site to provide opportunities for other farmers to witness the benefit of demonstrated technologies. The critical inputs like seed, fertilizer, insecticide/pesticides were supplied to the farmers by KVK, West Tripura.

Regular data on various parameters were collected from the farmers field. The constraints in production were identified through participatory approach, farmers' meeting, training programmes and field diagnostic visits during crop growth period. The yield of demonstration as well as farmers' practice (local check) were recorded and analysed according to different parameters suggested by Yadav *et al* (2004). The details of these parameters are as follows:

1. Extension gap: Demonstration yield –Farmers' practice yield
2. Technology gap: Potential yield-Demonstration yield
3. Technology index: (Potential yield-Demonstration yield)/Potential yield x 100

Economics of the demonstration was also calculated to see the feasibility of the technology.

2. Result and discussion

Front line demonstration technology and farmers' practices

The data in Table 1 showed the comparison between the demonstrated and farmers' practices. In the farmers' practice seed treatment, plant protection measures and integrated crop management practices were not followed which were demonstrated under FLD plot. Likewise, time of sowing was also different and no chemical control of weeds was followed in case of farmers' practice. (Table 1)

Yield attributing characters and yield

The data (Table 2) revealed that, number of cobs under the demonstration were more (2 cobs/plant) compared to farmers' practice (1 cob/plant). Similarly, weight of the cob was also higher under demonstrated plot than the farmers' practice which results in higher maize yield (43.1 qha^{-1}) of demonstrated plot. Similar, enhancement in productivity of different crops through front line demonstration has been documented by Tiwari *et al.* (2003), Sreelakshmi *et al.* (2012), Kumar *et al.* (2014) and Sharma *et al.* (2016) and the FLDs conducted in the present investigation also resulted in enhanced productivity which is in line with the results of these workers.

Table 1. Comparison between demonstrated package and existing farmer's practice of maize

Sl. No.	Intervention	Demonstrated package	Farmers' practice
1.	Farming situation	Rabi	Rabi
2.	Variety/Hybrid	HQPM-1	Local
3.	Seed treatment	Seed treated with thiram 75% WP@3g/kg	Seed treatment is not practiced
4.	Time of sowing	1st fortnight of October	2nd fortnight of November
5.	Method of sowing	Line sowing with proper crop geometry	Hill sowing
6.	Seed rate	18 to 20 kg/ha	20 to 25 kg/ha
7.	Fertiliser dose	120: 60:40 kg NPK/ha	80:40:0 kg NPK/ha
8.	Plant protection	Need based application of carbofuran 3G@10 kg/ha to protect against stemborer	Nil
9.	Weed management	Atrazine @2.5kg/ha as pre-emergence followed by one hand weeding at 30 days after sowing	One hand weeding at 30-35 days after sowing

Table 2. Yield and yield attributing characters of demonstrated variety and local check

Sl. No.	Parameter	Demonstration	Farmers' practice
1.	Number of cobs/plant	2	1
2.	Length of cob(cm)	30.16 cm	18.5 cm
3.	Girth of cob	18.5 cm	12.3 cm
4.	Weight of cob(g)	650 g	250.5 g
5.	Yield	43.1 q	24.1 q

Gap analysis

An extension gap of 18.7 to 19.0 q ha^{-1} in yield was found between demonstrated technology and farmers' practice during the different years (Table 3). Average extension gap was 18.9 qha^{-1}. The extension gap was lowest (18.7 q ha^{-1}) during 2021 while the highest extension gap was (19.2 q ha^{-1}) in the year 2020. Overall such gap might be attributed to improved maize hybrid and adoption of improved technology in the demonstration which resulted in higher yield than the existing farmers' practices. Narrow technology gap were observed during all the years. The mean technology gap of total 110 nos. of demonstrations were found 6.93 q ha^{-1} which was 86.2% of the potential yield. This showed that the farmers could able to adopt the technology in a correct way. Similarly, the technology index for all the demonstrations during different years was in accordance with technology gap (Table-3). The technology index of the present study reflected the adequate proves of technology for transferring to farmers and sufficient extension services for transfer of technology. This was in conformity with the study conducted by Singh *et al.*2001.

Economics

Seed, fertilizers and plant protection chemicals were considered as critical inputs for the demonstrations as well as farmers' practices. An additional investment of Rs. 10,000 ha^{-1} was made under demonstration. Gross return, net return and return per rupee invested was highest under demonstration in comparison to farmers' practice (Table-4).This could be due to maize hybrid HQPM-1 and adoption of scientific production techniques. It can be inferred that conductance of demonstrations on new technologies help the farmers in increasing both the farm yield & income.

3. Conclusion

Front line demonstrations conducted under the close supervision of KVK officials is one of the most important tools of extension to demonstrate improved technologies at farmers' field. FLDs are playing important role in motivating the farmers for adoption of improved agriculture technology resulting in increasing yield and their profits. The production under demonstration created awareness and motivated the other farmers to adopt cultivation of maize during *Rabi* season.

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Table 3. Yield and gap analysis of HQPM-1 under FLD at Farmers' field

Season/Year	Number of demonstrations	Area(ha)	Potential yield (q ha^{-1})	Demonstration yield (q ha^{-1})	Farmers' practice (q ha^{-1})	Increase in yield percentage	Extension gap (q ha^{-1})	Technology gap (q ha^{-1})	Technology index (%)
Rabi 2019	30	12	50	43.0	24.0	79.16	19.0	7.0	14.0
Rabi 2020	40	16	50	42.2	23.0	83.47	19.2	7.8	15.6
Rabi 2021	40	16	50	44.0	25.3	73.91	18.7	6.0	12.0
Mean			50	43.1	24.1	78.8	18.9	6.9	13.6

Table 4. Economics of rabi maize cultivation under FLD and farmers' practice

Sl. No.	Year	Cost of cultivation(Rs/ha)		Gross returns (Rs/ha)		Net returns (Rs/ha)		B:C ratio	
		Demonstration	Farmers' practice	Demonstration	Farmers' practice	Demonstration	Farmers' practice	Demonstration	Farmers' practice
1	2019	40,000	30,000	86,000	48,000	46,000	18,000	2.15	1.36
2	2020	40,000	30,000	84,400	46,000	44,400	16,000	2.11	1.53
3	2021	40,000	30,000	88,000	50,600	48,000	20,600	2.20	1.68