E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(5): 01-03
Received: 01-02-2024
Accepted: 06-03-2024

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Economic impact of front line demonstrations on maize crop

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DOI: https://doi.org/10.33545/2618060X.2024.v7.i5Sa.651

Abstract
The study was carried out during *Kharif* season of 2019 and 2020 in 6 villages across 2 blocks (Bhalla and Bhaderwah) of Doda district. In all 100 frontline demonstrations on maize crop were carried out in an area of 20.0 ha with the active participations of farmers with the objective to demonstrate the latest technology of maize production potential, technological gap, extension gap and other related parameters of improved technologies. Frontline demonstration is one of the important tools for transfer of technology and this programme is being implemented through Krishi Vigyan Kendra's of country. CFLD's are organized on improved production technology at farmers field. This process not only helps in demonstrating the ways and means of increasing productivity but helps in obtaining feedback for further refinement of the production technology. The results revealed that CFLD recorded higher yield as compared to farmer's practices over the two years of study. The experimented technology recorded 61.2 percent higher yield with an average of 31.1 q/ha than that of obtained from farmer's practices (19.3 q/ha). Other than increase in yield of maize, technological gap was recorded as 13.9 q/ha, extension gap as 11.8 q/ha and technology index was recorded as 30.8 percent.

Keywords: Frontline demonstration, KVK, extension gap, technology gap, technology index

1. Introduction

Maize (*Zea mays* L), being a C_4 plant, has yield potential far higher than any other cereals and that's why sometime referred to as the 'miracle crop' or 'queen of cereals' and that's why sometimes referred to as the miracle crop or queen of cereal's Maize is one of the major cereals crops with wide adaptability under diverse agro climatic conditions around the world. It is the third most important crop of India after rice and wheat that occupied 9.60 mha area with an average productivity of 31.0 q/ha compared to world average of 58.0 q/ha. With a production of 18.5 q/ha, which is far below the average national productivity of 31.0 q/ha, maize crop is still considered as major cereal crop in district Doda and covers an area of 28000 ha during *Kharif* season. Yield of maize crop can be enhanced atleast 26.70% with adoption of improved technologies such as improved cultivar, recommended dose of fertilizer and control of pests, fertilizer and plant protection are most critical inputs for increasing yield (Dhaka *et al.*, 2010) [4]. Realizing the situation front line demonstrations on maize production technology were planned and conducted to show the production potential, economic benefit of improved technologies under real farmer's conditions.

2. Materials and Methods

In the present study performance of improved technologies of maize against local check was evaluated through front-line demonstrations conducted at farmer's field during *Kharif* season of 2019 and 2020. An area of 20 ha were covered under 100 demonstrations across 6 villages of two blocks (Bhalla and Bhaderwah) of Doda district. The soils of the study area are mostly sandy loam to clay loam in texture with low nitrogen, medium phosphorus and high in available potassium.

For the present observation, we provided improved maize varieties *viz.*, Bioseed-9621 and DMH-7314 along with technological backstopping like recommended dose of fertilizer and plant protection chemicals to the farmers. Crop was sown after receiving sufficient rainfall, between second week of May to last week of May will crop geometry of 60 x 20 cm and seed rate of 20 kg /ha. The total amount of phosphorus and potassium was applied as basal dose along with half dose of nitrogen and remaining dose of nitrogen was top dressed in two equal splits at 25-30 and 55- 60 days after sowing. Hand weeding was done once at 20 - 30 days after sowing. The total number of hundred beneficiary farmers were associated under this programme with an area of 0.2 ha for each farmer. In the experimental plots, critical inputs such as seed, fertilizers and pesticides were supplied to the farmers free of cost, while farmers practice was followed in control plot. Regular visit of KVK scientists to the demonstration plot ensured adoption of improved technology by the farmers and proper guidance. Field days and group meetings were organized at the site of demonstration to provide the opportunities for other farmers to see the benefit of demonstrated technologies. The feedback from the farmers were utilized for further improvement in research and extension programme (Dalei *et al.*, 2016) [3]. The crop was harvested between first and second week of October. Data were collected from the CFLD's farmers and analyzed with statistical tools to compare the performance of farmer's field and CFLD's field. Further study on technology gap, extension gap and technology index were calculated by the formula as suggested by Samui *et al.*, (2000) [10].

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmers yield

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential Yield}} \times 100$$

Tabular analyzing involving simple tools line mean was done by standard formula to analyze the date and draw conclusions and implications.

3. Results and Discussion

Perusal of data indicated that the adoption of improved technology in demonstrations increased the yield over the farmer's practice in both the years. An analysis of Table 1 shows that during the year 2019 the average yield of 50 demonstrations was 30.2 q/ha against farmer's practice (local check) 19.6 q/ha registering the increase of 54.0 percent. In the year 2020, the average yield of 50 demonstrations was 32.0 q/ha which as 68.4 percent higher in comparison to 19.0 q/ha of local check.

The higher yield of maize under improved technologies was due to the latest high yielding varieties (hybrid varieties), balanced use of fertilizers and plant protection chemicals. The present results are in conformity of the observations as reported by Charak *et al.*, (2020) [2] and Balai *et al.*, (2013) [1].

The technology gap which is the difference between potential and demonstration field was maximum in the year 2019 (14.8 q/ha) and lowest in the year 2020 (13.0 q/ha). However, overall average technological gap in the study was 13.90 q/ha. The technology gap observed may be attributed to the dissimilarity in soil fertility status and weather conditions (Mandavkar *et al.*, 2012) [6].

Mukharjee (2003) [8] has also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. The extension gap varied between 10.6 to 13.0 q/ha and averaged 11.8 q/ha during the period of study, emphasized the need to educate the farmers through various means for adoption of improved technologies to reverse the trend of wide extension gap. Similar results were reported by Sharma *et al.*, (2011) [11].

Technology index shows the feasibility of evolved technology at the farmer's field and lower the value of technology index more is the feasibility of the technology (Jeengar *et al.*, 2006) [5] and Raj *et al.*, (2014). Technology index in the present case varied between 32.8 percent to 28.8% and averaged 30.8 percent during the period of study.

Table-2 shows cost of cultivation, gross return, net return and benefit cost ratio, which are calculated from the inputs and output prices of commodities prevailed during each year of demonstrations. The cost of cultivation for the experimental plots varied from Rs. 26400 to Rs. 26500/ha with a mean value of Rs. 26450/ha, while it was constant (Rs. 22500/ha) for both the years for the local check plot. A higher net return of Rs.25880 and Rs.31500/ha were recorded while used improved technologies for maize cultivation, against Rs.14940 and Rs.16000 under local check, in the corresponding years. The average benefit cost ratio of improved technology was 2.08, varying from 1.98 to 2.18 and that of local check as 1.68, varying from 1.66 to 1.71. This may be due to higher yield obtained under improved technologies compared to local check (farmers practices). This findings is in corroboration with the finding of Mokidue *et al.*, (2011) [7], Tomar (2010) [12] and Balai *et al.*, (2013) [1].

3.1 Reasons of low yield of maize at farmer's field

Optimum sowing time is not followed due to delay in mansoon. Sometimes non availability of quality seed of suitable variety and farmers go for the local seed in hand. High seed rate and low spacing, which are followed by the maximum number of farmers in the district, results dense population of the plants at farmers field, further results low yield. The use of inadequate and imbalance dose of fertilizer and no plant protection chemicals against cutworm and stemborer causes substantial yield loss in maize crop.

3.2 Constraints with marginal and small farmer's

Small holding: Small and marginal farmers are resource poor having loss risk bearing ability and do not dare to invest in the costly input which is a obstacle in adoption of proven technology.

3.3 Farm implements and tools

Traditional implements and tools of poor working efficiency are still in practice due to small holding. The lack of modern implements and tools for small holding also a hindrance to the adoption of improved technology.

Table 1: Performance and gap analysis of frontline demonstration on Maize

Year	Area	No. of Farmers	Yield (q/ha)			% increase in field over local check	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
			Potential	Improved	Local Check				
2019 (DMH-7314)	10	50	45.0	30.2	19.6	54%	14.8	10.6	32.8
2020 (Bio Seed-9621)	10	50	45.0	32.0	19.0	68.4%	13.0	13.0	28.8
Mean	10	50	45.0	31.1	19.3	61.2	13.9	11.8	30.8

Table 2: Cost of cultivation, Gross return, Net return and B:C ratio as affected by improved and local practices

Year	Cost of cultivation (Rs/ha)		Gross return (Rs. /ha)		Net return (Rs. /ha)		B:C ratio	
	Improved Technologies	Local check	Improved Technologies	Local Check	Improved Technologies	Local Check	Improved Technologies	Local Check
2019	26400	22500	52280	37440	25880	14940	1.98	1.66
2020	26500	22500	58000	38500	31500	16000	2.18	1.71
Mean	26450	22500	55140	37970	28690	15470	2.08	1.68

4. Conclusion

Thus the cultivation of maize with improved technology has been found more productive and grain yield might be increased up to 68.4 percent. Technology and extension gap which was extended during this experiment can be a bridge for popularizing package of practices with emphasis on improved high yielding hybrid varieties, use of proper seed rate, balanced nutrient application and proper use of plant protection measures. Replacement of existing local variety with newly released hybrid variety will increase the production and net income. Hybrid maize variety was found to be suitable since it fit well to the existing farming situation and also it had been appreciated by the farmers.

5. Acknowledgements

The authors are thankful to the ICAR and ATARI Zone - 1, Ludhiana (Punjab) for providing financial assistance towards organizing frontline demonstrations.

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