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The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(10): 921-923

www.thepharmajournal.com
Received: 08-07-2021
Accepted: 17-09-2021

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Impact assessment of cluster front line demonstration on mustard crop in Sultanpur District of U.P.

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Abstract
Krishi Vigyan Kendra, Sultanpur conducted 90 demonstrations on mustard, variety demonstrated under this programme were PM-30 during two consecutive years from 2018-19 to 2019-20. The critical inputs were identified in existing production technology through meetings and discussions with farmers. Delayed sowing, use of higher seed rate resulting into dense plant population, uneven plant population, uncontrolled weeds, ignorance about fertilizers and lack of plant protection measures were the predominant identified causes of low productivity of oilseeds in district Sultanpur. In the same sequence the other parameters like technological impact, economic impact and extension gap were analysed for Impact assessment of front-line demonstration on mustard crop and feasibility of demonstrated technologies at grass root levels. The results of two years study revealed that the yield under demonstration plots was 10.15 q/ha as compared to 7.27 q/ha in traditional farmer practices plots. This additional yield of 2.87 q /ha and the increase in average mustard productivity by 39.53 per cent may contribute to present oilseed requirement on national basis. The results clearly indicate the positive effects of FLDs over the existing practices. Benefit: cost ratio was recorded to be higher under demonstrations against control treatments during the years of experimentation.

Keywords: Assessment, demonstration, mustard and yield enhancement

Introduction
Mustard (*Brassica juncea*) is a one of the important oilseed crops of India. It is the second most important edible oilseed after groundnut and sharing 27.8% in the India's oilseed economy. The share of oilseeds is 14.1% out of the total cropped area in the country. The global area, production, and productivity of rapeseed-mustard are around 33.11 mha, 60.66 mt and 18.32 qha-1, respectively Shekhawat *et al.* 2012. India contributes 28.3% and 19.8% in world areas and production, respectively. The total area in India was 6.30 million hectares along with million tonnes of production. Uttar Pradesh accounts for 14.03% and 13.78% of area and production, respectively in the country with the average yield of 1123 kg/ha which is equivalent to the national average (1143 kg/ha). It is mainly grown in the states of Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and Gujarat. Frontline demonstration (FLD) is one of the most important and powerful tools for transfer of technology Meena, 2018. With the launching of Technology Mission in 1986 to provide policy impetus to oilseeds in India, the productivity of oilseeds jumped from 670 kg per hectare in the eighties to 835 kg per hectare in the nineties. There is a demand-supply gap in the oilseeds in India, particularly in edible oils. Presently, India is world's largest importer of edible oil and 60-65% of their requirement comes from other countries. Oilseeds are important commodity crops for human diet after cereal and sugar crops in the country and these are the source of vegetable oil which provides 2.5 times more energy than protein and carbohydrates.

In India, rapeseed–mustard is grown in diverse agro-climatic conditions ranging from north-eastern/north-western hills to down south under irrigated/rainfed, timely/late sown and mixed cropping. Brassicas grow well under low temperature and average (day and night) temperature of 25 ^{0}C is required at the time of sowing for optimum germination. The crop takes 135-150 days to mature. Some early varieties maturing in 110 days are also available. Mustard can be grown in sandy to heavy clay soils. Oil content in Rapeseed & Mustard seeds varies from 35-46 per cent, Pal, *et al.*, 2017 [2].

Materials and Methods

The present study was carried out by the Krishi Vigyan Kendra, Sultanpur during rabi season of 2018-19 and 2019-20 at the farmers' fields of different villages of Sultanpur district in Eastern Plain Zone of Uttar Pradesh. Totally 90 frontline demonstrations were conducted in 80 ha area. Materials for the demonstrations with respect to FLDs and farmers' practices were given in Table 1. In case of farmers practice plots, existing practices being used by farmers were followed. In general, soils of the area under study were loam in texture and medium to low in fertility status. The FLDs were conducted to study the gaps between the potential yield and demonstration yield, extension gap and technology index. In the present evaluation study, the data on output of mustard cultivation were collected from FLD plots, besides the data on local practices, which is commonly adopted by the farmers of this region, were also collected. In demonstration plots, a few critical inputs in the form of sulphur, borax and agrochemicals etc. were provided and nonmonetary inputs like timely sowing in lines, thinning timing and proper weed management were also performed, whereas, traditional practices were maintained in case of local checks. The demonstration farmers were facilitated by KVK scientists in performing field operations like sowing, spraying, weeding, harvesting etc. during the course of training and visits. The technologies demonstrated are mentioned in Table 1 and compared with local practices. The data collected were tabulated and satisfactory analyzed to interpret the results. The economic-parameters (gross return, net return and B:C ratio) were worked out on the basis of prevailing market prices of inputs and Minimum Support Prices of outputs.

Result and Discussion

The data (Table 2) indicated that the frontline demonstration has given a good impact over farming community of Sultanpur district as they were motivated by the new agricultural technologies applied in the demonstrations. Result of 90 frontline demonstration conducted during 2017-18 and 2018-19 in 80 ha area on farmers' fields indicated that the cultivation practices comprised under FLD *viz*., balanced application of fertilizer (N:P:K@ 120:60:60 kg/ha with 40 kg/ha sulphur) line sowing, timely weed management and timely control of mustard disease and insect *viz.* Alternaria blight, White rust & Aphid through fungicide & insecticide, produce on an average 10.15 kg/ha mustard yield, which was 39.53% higher compared to prevailing farmers practice (7.27 kg/ha). Kumar and Yadav 2007 [5], also reported that recommended dose of phosphorus and sulphur increase the yield and quality of Indian mustard.

Table 1: Details of package of practices followed in the Front-Line Demonstrations of Mustard

S.N.	Inputs	Quantity per hectare	
		Demonstration	Farmer's practice
1.	Mustard variety	PM-30	Varuna
2.	Seed rate	5 kg/ha	6.5 kg/ha
3.	Seed treatment (Metalaxyal)	1.5 g/kg seed	-
4.	Di-ammonium phosphate (DAP)	130 kg/ha	100 kg/ha
5.	Urea	200 kg/ha	200 kg/ha
6.	MOP	100 kg/ha	-
7.	Sulphur	40 kg/ha	25 kg/ha
8.	Borax	1.0 kg/ha	-
9.	Thinning	After 15 -20 days	After 40 - 45 days
10.	Insecticides	Imidacloprid @ 250 ml/ha	Indosulphan @1.0 lit./ha
11.	Fungicides (Mancozeb)	Mancozeb @2.0 kg/ha	Mancozeb @2.0 kg/ha
12.	Weeding	Use of Pendimethalin	Manual weeding

A presented in Front Line demonstration (FLDs) organized on various crops helped to increase their area under recommended variety. Moreover, highest average yield 10.15 recorded through the mustard crop with its yield enhancement value 39.53 at Kamla Nehru Krishi Vigyan Kendra, Sultanpur. It is revealed that result of conformity with the finding of Tiwari and Saxena 2001 [3] and Tiwari *et al.* 2003 [4]. Clearly indicated the positive effect of FLDs occurred over the existing practices toward enhancing the yield of mustard and other selected verities for the research investigation. It was observed that study area due to use of high yielding variety, timely sowing, balance does of fertilizers along with sulphur, proper irrigation, need based plant protection, etc. accepted reason of yield enhancement.

The economics (cost of cultivation, gross & net return) of mustard under front line demonstration were estimated and the result has been presented in Table 3. The front-line demonstration plots recorded higher average gross returns (Rs.69737/ha) and net return (Rs.53737/ha) with higher benefit cost ratio (4.36) compare to farmer's practice. The results suggest that higher profitability and economic viability of mustard demonstration under local agro-ecological situation.

Table 2: Yield performance of mustard under FLDs at farmers' field

No	Crop	Variety	Technology Demonstrated	Area (ha.)	No. of Demonstration	Potential yield (q/ha)	Yield of the crop (q/ha) under Demonstration	Variety and Yield of local Check (q./ha)	Increase in yield (%)
2017-2018									
1	Mustard	PM-30	HYV Seed, Weedicide, Fertilizers & PP	20	15	31.25	9.9	7.2	37.5
2	Mustard	PM-30	HYV Seed, Weedicide, Fertilizers & PP	25	30	31.25	10.5	7.6	38.15
2018-2019									
3	Mustard	PM-30	HYV Seed, Weedicide, Fertilizers & PP	20	25	31.25	9.8	6.9	42
4	Mustard	PM-30	HYV Seed, Weedicide, Fertilizers & PP	15	20	31.25	10.4	7.4	40.5

Table 3: Economic performance of mustard under FLDs at farmers' field

Variety	Cost of Cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B: C Ratio
	Demonstration plot	Local Check plot	Demonstration plot	Local Check plot	Demonstration plot	Local Check plot	
PM-30	15850	14250	67830	49330	51980	35080	4.28
PM-30	15850	14250	71940	52071	56090	37820	4.54
PM-30	16150	14700	67522	47541	51372	32841	4.18
PM-30	16150	14700	71656	50986	55506	36286	4.44

Conclusion

The Front-Line Demonstration (FLD) is an applied approach to accelerate the dissemination of proven technologies at farmers' fields in a participatory mode with an objective to explore the maximum available resources of crop production and also to bridge the productivity gaps by enhancing the production in national basket. From the findings of present study, it can be concluded that use of latest technologies of mustard cultivation can reduce the technology gap to a considerable extent resulting in to increased productivity of mustard profitable and feasible in Eastern Plain Zone of Uttar Pradesh as compared to prevailing farmers practice under real farming situations. It requires collaborative extension efforts to enhance adoption level of location and crop specific technologies among of the farmers for bridging these gaps. Therefore, extension agencies in the district need to provide proper technical support to the farmers through various educational and extension methods for better mustard production in the district.

Acknowledgement

The authors acknowledge the Indian Council for Agriculture Research, New Delhi and Agricultural Technology Application Research Institute (ATARI) –Zone III, Kanpur for supplying funds and facilities for the study.

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