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Increasing the Mustard Productivity through Cluster Frontline Demonstrations in Jaipur District of Rajasthan

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ABSTRACT: The study was conducted by Krishi Vigyan Kendra, Chomu (Tankarda) District- Jaipur (Rajasthan) during *rabi* 2018-19 and 2019-20, to find out the yield gaps between scientific package and practices under cluster front line demonstration and farmer's practice of mustard crop. The total 125 demonstrations with an area of 57.5 ha with active participation of farmers in seven different villages of Jaipur district. The improved technology consists of improved variety, seed treatment, weed management, nutrient management and plant protection measures. The results of study clearly indicated that the highest average yield was recorded 21.38q/ha in demonstration plot and lowest yield was recorded 15.97 q/ha in farmers practices. The highest average net return (Rs. 67274/ha) was obtained in the demonstration plot compared to farmers' practice (Rs. 46328/ha). The average B:C ratio was 3.70 in demonstrated plot and 3.06 in farmer practices. The average yield increase percent was 33.90 % in demonstration plot as compared to farmer practices. The average extension gap 5.41 q/ha, technology gap 2.62q/ha and technology index 10.92 percent were recorded.

Keywords: CFLDs, Mustard, Variety, Yield and Benefit cost ratio.

INTRODUCTION

Mustard is the second most important and most prominent *rabi* season oilseed crop of India. Indian mustard (*Brassica juncea* L.) is one of the most important *winter* oilseed crop and India is the third largest rapeseed-mustard producer in the world after China and Canada with 11.12% of world's total production (DRMR, 2012-13). The major rapeseed mustard growing states in India are Rajasthan, Madhya Pradesh, Utter Pradesh, Haryana, Punjab, West Bengal, Gujarat, Assam and Bihar. In India, rapeseed and mustard comes under major edible oilseeds which is consumed as culinary purpose, young leaves are used for vegetable and the meal cake left after the extraction of oil forms important cattle feed. It can also be used as manure for various agricultural crops. Productivity of the crop is lower in farmer's field due to several constraints. One of the major constraints for such low yield is the non-availability of high yielding varieties. Besides that, faulty sowing practices, improper crop geometry, indiscriminate use of fertilizers and other intercultural operations (Tiwari *et al.,* 2017). The main object of Krishi Vigyan Kendra is to minimize the time lag between generations of technology at the research and its transfer to the farmers for increasing productivity and income from agriculture and allied sectors. The aim of the frontline demonstration is to convey the technical message to farmers that, if they use recommended package and practices then the yield of this crop can be easily doubled than their present level. The improved technology packages were also found to be financially attractive. Yet, adoption levels for several components of the improved technology were low, emphasizing the need for better dissemination (Kiresur *et al.,* 2001).

Front line demonstrations (FLDs) are one of the most successful extension strategies because farmers are generally driven by the ideas that "learning by doing" and "Seeing is believing. "Frontline demonstration may play a very important role in proper transfer of technologies and changing scientific temperament of the farmers. Frontline demonstration is the new concept of field demonstration evolved by the ICAR with the inception of the technology mission on oilseed crops during mid-eighties. The main objective of frontline demonstrations is to demonstrate newly crop production and protection technologies and its management practices in the farmers filed under different agro-climatic regions and farming situations. Keeping the above point in view, the KVK Chomu (Jaipur-1) has been conducted the CFLDs on mustard crop using integrated crop management technology was started with the objectives of showing the productive potentials of the new production technologies under real farm situation over the locally cultivated mustard crop in the operational area of the KVK.

MATERIALS AND METHODS

The CFLD study was conducted in operational area of Krishi Vigyan Kendra, Chomu (Jaipur-1) during *rabi* 2018-19 and 2019-20at farmers' fields in seven villages *viz.*, Nangal Kalan, Nangal Koju, Adagela, Baikabas, Dhoblai, Dehar Tankarda and Mohan ka bas in Jaipur district of Rajasthan. To enhance the mustard productivity under cluster front line demonstrations at the farmers' field in Jaipur district of Rajasthan during *rabi* 2018-19 and 2019-20. The 75 demonstrations with an area of 37.5 ha. and each demonstration size is 0.5 ha. was conducted during *rabi* 2018-19. The 50 demonstrations with an area of 20 ha was conducted during *rabi* 2019-20 and each demonstration size is 0.4 ha. The total 125 demonstrations with an area of 57.5 ha with active participation of farmers in different villages were conducted. For conducting FLDs, farmers were identified or selected following the survey suggested by Choudhary (1999). Present study with respect to CFLDs and farmers' practices (FP) are given in Table 1. The soils in selected villages were loamy sand in texture. Farmers were trained to follow the package of practices for mustard cultivation as recommended by III A Zone of Rajasthan and need based critical inputs provided to the farmers for increasing productivity of mustard crop (Table 1).

Table 1: Technological gap analysis for mustard.

Sr. No.	Technology	Existing Farmers' Practices	Recommended Practices
1.	Variety	Bio-902 / local available seed	Giriraj, RH-749 and RH-725
2.	Seed rate	5-6 kg/ha	4.0 kg/ha
3.	Seed treatment	No seed treatment	Metalaxyl 35% SD @ 6 gm per kg seed
4.	Bio - fertilizers	No use of PSB culture	PSB culture @ 5 ml/kg seed
5.	Nutrient management	NPS - 40:20:00 kg/ha	NPS - 60:40:40 kg/ha
6.	Weed management	One Hand Weeding	Weed Management : Pendamethaline @ 750 gm a.i./ha as a pr-emergence One hand weeding 30-35 DAS
7.	Plant protection	Methyl Parathion Dust @15kg/ha for Aphid	Spray of Imidacloprid 17.8 SL @ 0.4 ml per liter of water for aphid management

The Assessment of gap in adoption of recommended technology before conducting cluster frontline demonstrations by group meeting and discussion with farmers in villages. The training programmes were organized for farmer's selection and development of skill about technological intervention for successful mustard cultivation. Farmer's fields sowing to harvesting of crop were visited regularly under cluster frontline demonstrations by subject matter specialists of KVK. The feedback collected from the farmers for further improvement in research. The extension activities like that Scientist visits time to time at CFLDs fields and field days were organized at the good stage of crops.

The data were collected from both FLD plots as well as control plots (farmers' practices) and finally the extension gap, Technology gap and technology index were worked out (Samui *et al.,* 2000) as given below:

Extension gap = Demonstration yield - Farmers' practice yield

Technology gap = Potential yield – Demonstration yield

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

Seed Yield: The results of the cluster frontline demonstrations (Table 2) conducted at farmers' field clearly found that the yield of mustard was recorded higher under demonstration plots in comparison to the farmer's practice during *rabi*2018-19 to 2019-20. The yield of mustard during two years ranged from 21.35 to 21.41q/ha under cluster frontline demonstrations as against 15.75 to 16.19 q/ha under farmers practices. The demonstrated technologies obtained mean yield of 21.38 q/ha over farmers practice (15.97 q/ha) and 33.90 percent yield increased over farmers' practice.

The higher yield in cluster frontline demonstration field might be due to farmers were trained to follow the package of practices for mustard cultivation as recommended by III A Zone of Rajasthan like high yielding variety, seed treatment, recommended doses of fertilizers, plant protection measures. Bench mark surveys before conducting CFLDs, trainings, regular field visit and field days organized at good stage of crop. The findings were similar with results of Chaoudhary *et al.* (2018); Meena *et al.* (2019); Sharma *et al.* (2020).

Extension gap: Extension gap is gap between yield of demonstrated plot and farmers practice. The extension gap (Table 2) ranged from 5.60 q/ha to 5.22 q/ha was found during *rabi* 2018-19 and 2019-20. The average extension gap of 5.41 q/ha in the two years of demonstrations. This gap might be due to adoption of improved mustard production technologies that is use of latest production technologies along with more emphasis in the use of high yielding new variety will ultimately narrow this alarming trend of wider extension gap and using extension activities like training, field days, Kisan goshthis, Kisan melas, awareness programmes, result demonstration initiatives, etc., can reduce the galloping trend of the extension gap in mustard production. The similar results were also reported by Sharma *et al.* (2022).

Technology gap: The data of (Table 2) showed the technology gap in the demonstration yield against potential yield during the study year and reflects the farmer's cooperation in carrying out such demonstrations with encouraging results. The technology gap was ranged from2.65 and 2.59q/ha during *rabi* 2018-19 and 2019-20 respectively, and average technology gap of two years was found

2.62q/ha. This gap indicates that there is still a technological demonstration gap, as a consequence of which the crop's potential yield could not be obtained by farmers. The technology gap observed may be attributing to the dissimilarity in soil fertility status, timely sowing and weather conditions. Similar finding was recorded by Mitra and Samajdar (2010); Chaudhary *et al.* (2018); Singh and Tetarwal (2022).

Technology Index: The data on presented in Table 2. The technology index showed the feasibility of the demonstrated technology at the farmer's field. The technology index was ranged from 11.04 to 10.79 percent during *rabi* 2018-19 and 2019-20, respectively. The average technology index was recorded 10.92 percent during study years. The technology index indicated the suitability of the demonstrated technology at the farmer's fields and the lower the value of technology index more is the feasibility of the technology. The similar findings were also reported by Singh and Tetarwal (2022).

Economics: The data obtained in respect to economic analysis for the demonstrated technology was presented in Table 3. The results of economics indicated that the cluster front line demonstrations recorded higher gross returns (Rs. 89670/ha and Rs. 94739/ha), net return (Rs. 64829/ha and Rs. 69719/ha) and with higher cost: benefit ratio (3.61 and 3.79) respectively, during *rabi* 2018-19 and 2019-20 and the minimum gross returns (Rs. 66150/ha and Rs. 71641/ha), net return (Rs. 43314/ha and Rs. 49341/ha) and cost: benefit ratio (2.90 and 3.21) recorded under farmer's practice. The highest mean value of two years of gross returns of Rs. 92205/ha, net return Rs. 67274/ha and B:C ratio 3.70 were recorded under cluster front line demonstrations against farmer practice (gross returns of Rs. 68896/ha, net return Rs.46328/ha and B:C ratio 3.06). The results of the economic study clearly indicated that the demonstrated technology is more profitable and economically viable. The greater additional returns and effective gain obtained under cluster front line demonstrations could only be due to the use of effective proven technologies, non-monetary factors, timely operations of crop cultivation and scientific monitoring being conducted time to time at farmer's field. The results confirm the findings by Singh and Tetarwal (2022).

Table 2: Seed yield of Mustard crop under cluster frontline demonstrations (CFLD) and farmer practice (FP).

Year	Area (ha.)	No. of Demo.	Variety	Yield (q/ha)			Percent increase over farmers practices	Extension gap (q/ ha)	Technology gap (q/ ha)	Technology index (%)
				Potential	Demo.	Farmer Practices				
2018-19	37.5	75	RH-749	24.00	21.35	15.75	35.56	5.60	2.65	11.04
2019-20	20	50	RH-749	24.00	21.41	16.19	32.24	5.22	2.59	10.79
Total	57.5	125	-	-	-	-	-	-	-	-
Average	-	-	-	24.00	21.38	15.97	33.90	5.41	2.62	10.92

Demo. – Demonstration, CFLD – Cluster Frontline Demonstration, FP- Farmer Practice

Table 3: Economics of mustard crop under CFLD and farmer practice (FP).

Year	Cost of Cultivation (Rs/ha)		Gross return (Rs./ha)		Net return (Rs./ha)		B:C ratio	
	Demo.	Farmer Practices	Demo.	Farmer Practices	Demo.	Farmer Practices	Demo.	Farmer Practices
2018-19	24841	22836	89670	66150	64829	43314	3.61	2.90
2019-20	25020	22300	94739	71641	69719	49341	3.79	3.21
Average	24931	22568	92205	68896	67274	46328	3.70	3.06

CONCLUSIONS

It is concluded that based on the two years results of cluster front line demonstration with integrated crop management technology on mustard crop was found more productive, profitable and feasible in Jaipur district of Rajasthan. Demonstrated technologies were found effective for enhanced the yield and cluster front line demonstration were the most successful tools for transfer of technology for enhancing the productivity of mustard. So that, it is need to disseminate the improved variety with recommended technologies in the farmers field with extension methods such as training, field visits and field day.

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