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## Augmenting the productivity of mustard through CFLD's in Sawaimadhapur, Rajasthan

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### Abstract

Mustard is one of the important oilseeds crop and occupies a major position among oilseed in Rajasthan state. Indian government imports large quantity of palm oils to fulfill domestic requirement of oils. In this regard, to sustain this production and consumption system, the Department of Agriculture, Cooperation and Farmers Welfare had sanctioned the project "Cluster Frontline Demonstrations on Rabi Pulses 2015-16, 2016-17 and 2017-18" to ICAR-ATARI, Jodhpur through National Mission on Oilseed and Oil Palm. This project was also implemented by Krishi Vigyan Kendra, Sawai Madhopur with main objective to boost the production and productivity of oilseeds through CFLDs with latest and specific technologies. CFLDs on mustard crop were conducted by KVK, Sawai Madhopur, Rajasthan was purposively assessed. The performance of frontline demonstrations and the change in adoption level was measured in the study. Cluster Frontline demonstrations on mustard were conducted by using variety NRCDR-2 and Giriraj in an area of 100 ha at 225 farmer's field in different clusters of Sawaimadhapur district. The need based critical inputs provided to farmers were improved seed @ 4 kg/ha, soil treatment with quenolphas 1.5% @ 25kg/ha seed treatment with mencozeb @ 2.0 g/ kg seed and imidachloprid 48%FS @ 7ml gm/kg seed, application of sulphur @ 40kg/ha. Recommended doses of fertilizers, plant protection measures and other practices (PoP) were applied by farmers. Results were concluded that average increased in yield of demonstrations plots was 25.11% over control plots. The same trend found in case of average gross and net monetary returns of CFLDs, was Rs. 71519/- and Rs. 52527/- and for control Rs. 56724/- and Rs. 36403/- per hectare, respectively. The average benefit cost ratio was recorded higher in demonstration plots (2.79) as compared to control plots (2.06). This improvement in yield might be due to the use of improved seed, soil treatment, seed treatment, use of fertilizers, timely weed and water management and integrated pest management practices. The findings of the study also revealed that they had increase in adoption level ranging from 13.33 percent of storage and marketing to 40.89 percent of seed treatment after conducting the CFLDs. It can be concluded that the CFLDs is playing one of the important role in motivating the farmers for adoption of production technology resulting in increasing their yield and profit. It can be also concluded that the oilseed production could be enhanced by encouraging the farmers through adoption of recommended technologies which were followed in cluster frontline demonstrations.

**Keywords:** Cluster frontline demonstration, mustard, economic performance, yield performance

### Introduction

Edible oilseeds are playing an important role in daily food basket of human being. The decision regarding the acreage allocation under oilseed crops depends upon the previous season prices, thus prices of oilseed is one of the important and highly influencing factors from farmer's point of view. Mustard (*Brassica juncea*) is one of the first domesticated crops in rabi season. It is widely cultivated in tropical and sub-tropical areas of the world. Globally, it is mainly cultivated in India, Canada, China, Pakistan, Poland, Bangladesh, Sweden and France. About 35% area of the total cultivated area of world is in India with 16% of shares in production. India is the fifth major mustard producing country and fourth major mustard consuming country in the world. The major mustard growing states in India are Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh, Gujarat and West Bengal. The government of India has introduced National Mission on Oilseeds and Oil Palm (NMOOP), with a vision to increase production of vegetable oils sourced from oilseeds. Apart from that, various other initiatives have been taken to increase oilseed production in India, including mustard in order to meet domestic as well as global demand. Rajasthan contributes about 49% to the county's total mustard production, followed by Uttar Pradesh (11%), Haryana (11%), Madhya Pradesh (11%), Gujarat (6%), West Bengal (5%) and other districts (7%) (<http://www.commoditiescontrol.com>). Mustard is grown for its oil rich seeds. Apart from extracting oil, seeds are also used directly in the preparation of almost all Indian curries particularly in a process called "tadka". India occupies the first position both in area and production of mustard. The mustard seed gives edible oil which is used as cooking medium in north India. Oil content

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in mustard varies from 30 to 49%. Mustard Seed is used as a condiment in the preparation of vegetable and curries. Split seed (Mohari dal) and oil is used for pickling. The leaves of the young plants are used as vegetable and Oil cake is fed to cattle. Due to the gap between domestic availability and actual consumption of edible oils, India has to resort to import of edible oils. It is the major source of income, especially to the marginal and small farmers in rain fed areas. Its contribution to livelihood security of the small and marginal farmers is also very important. So, the crop has the importance for farmers as well as for the nation. In Rajasthan, the mustard crop is mostly cultivated in Alwar, Bharatpur, Jaipur, Dholpur, Sawaimadhopur, Sriganganagar, Jhunjhunu & Sikar districts. Bharatpur, eastern district of Rajasthan is the largest mustard growing division covering about 48 per cent of the total production of state. Front line demonstrations (FLDs) are one of the most powerful tools of extension because farmers, in general, are driven by the perception that 'learning by doing' and "Seeing is believing. The main objective of front line demonstrations is to demonstrate newly released crop production and protection technologies and its management practices in the farmer's field under different agro-climatic regions and farming situations. During demonstration in the farmer's field, scientists are required to study the factors contributing higher crop production, field constraints of production and there by generate production data and feedback information. Keeping in mind, the importance of CFLDs on mustard, which were conducted by the KVK, Sawaimadhopur, Rajasthan under NMOOP project entitled "Cluster Frontline Demonstrations on oilseed under NMOOP" during the year 2015-16 to 2017-18 were analysis under this study.

### Materials and Methods

The cluster frontline demonstrations on oilseed were conducted by several institutes or organizations but due to paucity of time and proximity, study was confined to CFLDs conducted by KVK Sawaimadhopur, Rajasthan. For the purpose of investigation, all CFLDs on oilseeds were conducted under NMOOP, during Rabi 2015-16 to 2017-18 were selected. The data on output were collected from CFLDs plots and finally the grain yield, cost of cultivation, net returns with the benefit cost ratio was work out. Soil of the area under research study was sandy loam with low to medium fertility status. The need based critical inputs provided to farmers were improved seed @ 4 kg/ha, soil treatment with quenolphas 1.5% @25kg/ha seed treatment with mencozeb @ 2.0 g/ kg seed and imidachloprid 48%FS @ 7ml gm/kg seed,

application of sulpher@40kg/ha. Recommended doses of fertilizers, plant protection measures and other practices (PoP) were applied by farmers. The sowing of mustard crop seed was done during 15 October to 20 October. The fertilizers were given as per soil test based recommendations as basal dose and one hand weeding was done at 25-30 DAS. The spacing between Row & Plant was kept 30 x 10 cm for mustard under front line demonstration. The crops were harvested at perfect maturity stage by manually. The Adoption level of the farmers about improved production practices of mustard before conducting and after conducting CFLDs was measured.

### Results and Discussion

**Yield performance of Mustard CFLDs:** The data revealed on yield Parameters of mustard are presented in [Table-2] showed that the maximum seed yield of mustard was obtained under demonstrated plots 21.67 qha<sup>-1</sup> during 2016-17 followed by 18.82 qha<sup>-1</sup> (2017-18) and 15.25 qha<sup>-1</sup> (2015-16) respectively with an average of 18.58 qha<sup>-1</sup> as compared to farmer practices 17.10 qha<sup>-1</sup> during 2016-17 followed by 15.63 qha<sup>-1</sup> (2017-18) and 11.90 qha<sup>-1</sup> (2015-16) respectively with an average of 14.88 qha<sup>-1</sup> which was increased with an average value of 25.11 percent for mustard production. Amule Ramesh et., al., study was conducted during *Kharif*, and *Rabi* seasons in adopted NICRA village Koste, Balaghat, Madhya Pradesh, India during 2012-13 to 2015-16 on pigeon pea and chickpea crops in which the improve technology recorded higher yield of 1310kg/ha, and 1370 kg/ha pigeon pea and chickpea, respectively over farmers practice 970 kg/ha pigeon pea and 1110 kg/ha chickpea. K.C. Meena, et., al. (2018) [8] conducted Cluster Frontline demonstrations on chickpea by using variety GNG 1581, GNG 1958 and RSG 44 in an area of 96 ha at 240 farmer's field in Sawai Madhopur district of Rajasthan during Rabi 2015-16 to 2017-18 in which the improved technology recorded that the average highest yield 19.78 q/ha found in demonstration plot and 15.93 q/ha in control plot. It might be due the soil type & its moisture availability, rainfall & weather condition, disease & pest attacks as well as the change in the locations of demonstration plots every year. In general, in all the years grain yield of CFLDs plots was higher as compared to local check which was due to good variety, seed treatment, recommended fertilizer doses, plant protection measures were followed by the demonstrators and scientists in the demonstrations plots. The similar results were also observed by Singh (2013) [11], Dayanand et al. (2014) [3] and G. Lal et al. (2015) [5].

**Table 1:** Grain yield performance of Cluster frontline demonstrations on mustard (n=225)

Season and Year	Variety	No. of CFLDs	Area (ha)	Average Yield (Kg/ha)		Increase in seed yield (%) over local Check
				CFLDs	Local Check	
Rabi 2015-16	NRCDR-2	60	30	15.25	11.90	28.15
Rabi 2016-17	NRCDR-2	40	20	21.67	17.10	26.72
Rabi 2017-18	Giriraj	125	50	18.82	15.63	20.47
Total		225	100	18.58	14.88	25.11

**Table 2:** Economic performance of Cluster frontline demonstrations on mustard (n=225)

Season and Year	Variety	Cost of cultivation (Rs/ha)		Gross Return (Rs/ha)		Net return (Rs/ha)		Benefit Cost Ratio	
		Demo	Local Check	Demo.	Local Check	Demo.	Local Check	Demo	Local Check
Rabi 2015-16	NRCDR-2	17717	16684	59425	47030	41708	22346	2.35	1.82
Rabi 2016-17	NRCDR-2	18644	17617	75845	59850	54701	40233	2.93	2.28
Rabi 2017-18	Giriraj	20114	18662	79286	63292	61173	46630	3.04	2.49
Average		18825	17654	71519	56724	52527	36403	2.79	2.06

**Economic performance of Mustard CFLDs:** The data revealed on economic performance of mustard are presented in [Table-3] showed that the maximum net return of CFLD's mustard was obtained Rs 61173q/ha during 2017-18 followed by Rs 54701q/ha (2016-17) and Rs 41708 q/ha (2015-16) respectively with an average of Rs 52527 q/ha as compared to Local check Rs 46630 q/ha during 2017-18 followed by Rs 40233 q/ha (2016-17) and Rs 22346q/ha (2015-16) respectively with an average of Rs 36403 q/ha. The data represented on the cost of cultivation was more under demonstration practice with an average of Rs 18825/ha as compared to farmer practices Rs 17654/ha. Use of costly seeds for seed sowing, seed treatment, use of chemical fertilizers, integrated pest management, integrated nutrient management etc. are the main factors for increased in cost of cultivation under demonstration practices as compared to farmer practices. The data depicted on higher average gross returns (Rs 71519/ha) were obtained under demonstration plots as compared to farmer practices (Rs 56724/ha). The average benefit cost ratio was recorded higher under front line demonstrations 2.79 as compared to farmer practices 2.06 during the period of research study. The higher net returns and B: C ratio in mustard demonstration might be due to the higher grain yield and better pricing of the produce in the market. Bhargav *et al.* were conducted front line demonstrations on chick pea in Pankhedi and Bhadoni villages of Shajapur district during Rabi seasons of 2011 and 2012. The result revealed that the benefit cost ratio of chick pea cultivation under improved practices were 2.31 and 2.26 as compared to 2.02 and 1.94 under farmer practices for the two consecutive years. K.C. Meena, *et al.* (2018)<sup>[8]</sup> found the same trends, in case of chickpea CFLDs gross and net monetary returns, was Rs. 95547/- and Rs. 70602/- ha and for control Rs. 76493/- and Rs. 52288/-ha, respectively. Benefit cost ratio for demonstration and control was 3.82, and 3.20, respectively. Dayanand *et al.* (2014)<sup>[3]</sup> G. Lal *et al.* (2015)<sup>[5]</sup> and also show the same findings. The result clearly showed that the front line demonstration was given a good impact

over the farming community as they were inspired by the new agricultural technology used in the demonstrated plots. The high yielding variety under demonstrated plot was performed very well as compared to local check.

**Change in Adoption level of farmers:** The data regarding adoption of the improved mustard production technologies were also recorded under two heads like; adoption before conducting and after conducting frontline demonstration. The data in table 3 revealed that improved practices of mustard production like; improved & quality seed (71.56 percent), weeding (70.22 percent), sowing time & method (55.56 percent), harvesting (47.56 percent), irrigation scheduling (44.44 percent), fertilizer application (43.56 percent), plant protection measures (39.56 percent), seed treatment (21.78 percent), storage & marketing (18.22 percent), soil treatment (13.78 percent) and soil testing (10.22 percent) before conducting CFLDs while other farmers were started adopting the improved practices like; seed treatment (40.89 percent), soil testing (33.78 percent), fertilizer application (30.67 percent), plant protection measures, (28.44 percent), soil treatment (25.33 percent), harvesting (19.11 percent), improved & quality seed (18.67 percent), seed rate & spacing (18.22 percent), sowing time & method (17.33 percent), irrigation scheduling (16.44 percent), weeding (19.56 percent) and storage & marketing (13.33 percent). The findings of the study also revealed that they had increase in adoption ranging from 13.33 percent of storage & marketing to 40.89 percent of seed treatment after conducting the training and FLD programmes. The similar results were also reported by Meena *et al.* (2013)<sup>[7]</sup> and Meena and Gupta (2013)<sup>[6]</sup>. This might be due the fact that increasing in knowledge, skills and confidence level of farmers through FLD and training programmes on different production technologies of gram crop like; high yielding variety, seed rate & spacing, seed treatment, soil treatment, weeding, plant protection measures, irrigation scheduling, fertilizer application and harvesting has helped farmers to improve the yield of mustard crop.

**Table 3:** Change in adoption level of the respondents regarding mustard production technologies (n=225).

Mustard Production Technologies	Before CFLDs		After CFLDs		Increase in adoption level	
	No.	Percent	No.	Percent	No.	Percent
Soil testing	23	10.22	99	44.00	76	33.78
Soil treatment	31	13.78	88	39.11	57	25.33
Seed treatment	49	21.78	141	62.67	92	40.89
Improved & quality seed	161	71.56	203	90.22	42	18.67
Seed Rate & Spacing	37	16.44	78	34.67	41	18.22
Sowing time & method	125	55.56	164	72.89	39	17.33
Irrigation scheduling	100	44.44	137	60.89	37	16.44
Weeding	158	70.22	202	89.78	44	19.56
Fertilizer application	98	43.56	167	74.22	69	30.67
Plant protection Measures	89	39.56	153	68.00	64	28.44
Harvesting	105	46.67	148	65.78	43	19.11
Storage & marketing	41	18.22	71	31.56	30	13.33

## Conclusion

It can be concluded that the FLD is playing one of the important role in motivating the farmers for adoption of production technology resulting in increasing their yield and profit. They had increase in adoption level after conducting the CFLDs. It can be concluded that frontline demonstration conducted under the close supervision of scientists is one of the important tool for extension to demonstrate newly released crop production and protection technologies and its

management practices in the farmer's field under different agro-climatic regions and farming situations.

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