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Research Article

IMPACT OF CLUSTER FRONT LINE DEMONSTRATION OVER TRADITIONAL FARMERS PRACTICE ON MUSTARD (*Brassica juncea* L.) CROP GROWN UNDER IRRIGATED CONDITION OF KURUKSHETRA DISTRICT

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Abstract: Cluster Front line demonstrations (CFLD) were conducted during 2017-18 and 2018-19 by Krishi Vigyan Kendra, Kurukshetra to compare the yield gap and net return between demonstrated farmers field and traditional farmers practice under irrigated condition. Yield of mustard was found higher in demonstrated farmers field over traditional farmer practices. The average yield of mustard var. RH-0749 was recorded 17.80 and 18.80 q/ha during both the year under studied respectively. Technology gap 10.95 and 9.95, extension gap 02.20 and 03.60 and technology index percent 38.09 and 34.61 was recorded during 2017-18 and 2018-19 respectively. The cost benefit ratio was found better in demonstrated field over farmer practices during both the years under studied. The yield and net return gap between demonstrated field and farmer practices was due to the farmer had not applied the scientific technology as mentioned in package of practices published by CCSHAU, Hisar from seed treatment to final maturity period of crop.

Keywords: *Mustard, Cluster Front Line Demonstration, Farmer Practices, Economic and Yield*

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Introduction

India is one of the largest mustard rapeseed growing countries of the world and occupying the first position in terms of area and second position after China in Production [1]. Bezbaruah and Deka (2020) [2] reported that various oilseeds crop grown in India, mustard is considered the third most important crop after soybean and groundnut. Kurukshetra district covers 3.46 percent area of Haryana state. The annual rainfall of the district is 582 mm which is unevenly distributed over the area. The southwest monsoon contributes about 81 percent of annual rainfall and 19 percent rainfall received due to western disturbances and thunder storms. The Kurukshetra district is covered by tropical arid brown soils which are deep and imperfectly drained with moderate to strongly alkaline in reaction. The ground water level in different blocks of district Kurukshetra is depleting at a rate of 0.5 to 2.0 meter per year out of 433 villages of Kurukshetra, 422 villages are categorized as severely groundwater stressed. In this situation, crop diversification is only method to overcome such situation and grow those crops which required less water as compared to paddy and wheat crops. The dependence upon rice-wheat system is showing adverse effects on soil health and ground water resources. Presently, 70-80 percent of farmers had land below 2 hectares these farmers must be diversified with high remunerative crops such as mustard. The government of Haryana has also promoted the crop diversification by giving incentive for switching to and alternate crop under the scheme "mera pani meri virasat." Statistic of the state agriculture department reported that the cultivation area under mustard has increased to the last three years. It has increased to around 7.8, 6.1 and 5.62 lakh hectares during 2021-22, 2020-21 and 2019-20 respectively.

Keeping in view of the above-mentioned problem Mustard variety RH-749 had grown for demonstration purpose at farmer field. It was developed during 2013 for Punjab, Haryana, Delhi and some part of Rajasthan regions. This is a timely sown variety grown in irrigated condition and produce seed yield 10.0 to 11.5 q/ha, its maturity period is 145-148 days. The siliquae of this variety is long and bold with its seeds containing 39.0-40.0 percent edible oil.

Materials and Methods

150 cluster front line demonstrations (CFLD) which cover an area 60 ha during 2017-18 to 2018-19 was conducted by Krishi Vigyan Kendra Kurukshetra CCSHAU in irrigated condition in different villages of Kurukshetra. Improved variety of Mustard var. RH-749 was sown as per guidelines mentioned in package of practices published by CCS Haryana Agricultural University, Hisar during 2021. Soil of all the villages under demonstration were clay loam to loam in texture with low to medium in organic carbon and other essential plant nutrients like Nitrogen, Phosphorous and Potassium which is essential for growth and development of crop. In demonstrated plots the mustard seeds were sown at 30 cm row-row and 10-15 cm plant-plant distance in the fields after seed treatment with Rhizobium culture and all the cultural and management practices like maintain plant-plant and row-row distance, timely thinning operation, irrigation at critical stages, timely weed management, use proper doses of fertilizers and timely application pesticides with proper doses to control insect-pest and diseases. The gap between both the practices i.e., demonstrated field and farmers practices are given in Table 1. The output data were collected from both the farmers' field for analysis i.e., demonstrated field and farmer practices (FP) field to find out the yield gap of Mustard. Finally, the technology gap, extension gap, technology index and cost benefit ratio (B:C) were analyzed as given by Katare, *et al.,* (2011) [3] and Samui, *et al.,* (2000) [10].

Technology Gap = Potential Yield (q/ha) - Demonstration Yield (q/ha)
Extension Gap = Demonstration Yield (q/ha) - Farmers Practices Yield (q/ha)
TechnologyIndex=(Potential Yield (q/ha)- Demonstration Yield(q/ha)) / (Potential Yield (q/ha)) X 100
B:C=(Gross Return (₹/ha))/(Cost of Cultivation (₹/ha))

Results and Discussion

One hundred and twenty cluster front line demonstration of Mustard var. RH-749 were conducted by Krishi Vigyan Kendra Kurukshetra, CCSHAU Hisar

Table-1 Comparison of recommended practices and farmers practices

Components	Recommended practices used in CFLD	Traditional Farmers practices
Variety	RH-749	Local variety/Private company variety
Seed rate	1.25 kg/acres	15-20 percent higher
Time of sowing	25 September to 10 October	Delay in sowing
Seed treatment	Seed treatment with Azotabacter culture	No seed treatment
Row to row spacing	Row- Row: 30cm and Plant-Plant: 10-15cm	Broadcasting of seeds
Fertilizer doses	Urea:35kg, SSP: 50 kg, Zinc sulphate: 10kg/acre	Apply imbalance doses of fertilizers
Water management	At the time of flowering and siliquae formation	Water stress during critical period
Plant protection	Insects control:- 1.Hairy caterpillar: Quinalphos 25 EC @ 500ml in 250 liters of water. 2.Painted bug: Malathion 50EC @ 200 ml in 200 liters of water. 3.Mustard aphid and leaf minor: Methyldemeton 25EC @ 250ml in 250 liters of water. Disease control:- 1.Alternaria blight and white rust: Mancozeb @ 600ml in 250-300 liters of water, repeat 3-4 times after 15 days interval. 2.Stem rot: Seed treatment with 2g Carbendazim/kg of seeds and spray with 0.1% carbendazim after 45-50 and 65-70 days interval.	Use of more pesticides without proper doses

Table-2 Comparison of yield (q/ha), Technology Gap, Extension Gap and Technology Index of Mustard (RH-749) between Cluster Front Line Demonstration practices and Farmers practices

Year	No. of Farmers	Area (ha)	Yield (q/ha)			% increase Over farmers practices	Technology Gap	Extension Gap	Technology Index
			PY	DY	FP				(%)
2017-18	100	40	28.75	17.8	15.6	14.1	10.95	2.2	38.09
2018-19	50	20	28.75	18.8	15.2	23.6	9.95	3.6	34.61

Table-3 Comparison of Economic between Cluster Front Line Demonstration practices and Farmers practices var. RH-749

Year	Economic of demonstration (Rs/ha)				Economic of farmer practices (Rs/ha)			
	Gross cost	Gross return	Net return	BCR	Gross Cost	Gross return	Net return	B:C
2017-18	24500	70530	46030	2.88	25700	58000	32300	2.28
2018-19	26400	69192	42792	2.62	27800	56544	28744	2.03

which cover an area 40 and 20 ha during 2017-18 and 2018-19 respectively as shown in [Table-2]. The mustard variety RH-749 were grown in demonstrated field by applying all the practices as mentioned in package of practices develop by CCSHAU, Hisar like use of improved variety, seed treatment with rhizobium culture, proper weed management and application of recommended doses of fertilizers, weedicides and pesticides and found that mustard yield was higher under demonstrated field and the average yield was recorded 17.8 and 18.8 q/ha during 2017-18 and 2018-19 respectively. However, in traditional farming system the yield of mustard was recorded 14.1 and 23.6 percent lower than demonstrated farmers field during both the year of studied. Chaudhary, *et al.,* (2018) [5] reported that after two years study the mustard crop yield under demonstrated plots was 21.50 q/ha as compared to 16.65q/ha in traditional farmer practices fields. Sharma, *et al.,* (2020) [6] revealed that the yield of mustard was recorded higher in demonstrated field than farmer practices field by the application of improved technology of growing mustard. Meena, *et al.,* (2018) [7] also reported that the use of improved variety of mustard under demonstrated field with the application of full package of practices of growing mustard had significant impact on seed yield as compared to local varieties grown by the farmers under traditional farming system. Use of improved variety, line sowing, recommended doses of fertilizers, timely weed management and control of insect-pest showed that the yield of mustard increased from 44.31 to 50.08 percent under demonstrated field over farmer practices during demonstration period reported by Rachhoya, *et al.,* (2018) [8].

The technology gap was calculated 10.95 and 09.95, extension gap 02.20 and 03.60, technology index 38.09 and 34.61 percent during 2017-18 and 2018-19 respectively in mustard crop. Verma (2013) [9] reported that the extension gap indicating the need to aware the farmer community through organize various extension approaches for adopting of latest improved technology and also informed that if lower the technology index indicated the feasibility of the demonstrated crop technology. It was notice that there is lot of possibility to apply improved technologies which are mentioned in Package of Practices at farmer fields. If the technology index was found lower, the technology feasibility will be increased. The average technology and extension gap suggested that the further improvement in the extension activities to overcome the gap for better adoption of improved technology by the farmers reported by Prasad, *et al.,* (2022) [10]. Singh, *et al.,* (2023) [11] also reported that the technology gap, extension gap and technology index gap between demonstrated field over farmers practice may be due to the farmers were not followed the latest technology in chickpea as mentioned in package of practices from seed treatment to final maturity of crop. Similar observation was also recorded by Singh, *et al.,* (2021) [12] in case of Basmati Rice and Singh, *et al.,* (2021) [13] in case of Moong.

The economics of demonstration and farmer practices i.e., gross cost, gross return and net return was recorded higher in demonstrated field as compared with traditional farmer practices during both the years under studied. Singh, *et al.,* (2023) reported that gross cost, gross return and net return was calculated higher in demonstrated field than traditional farmers' practices in case of chickpea. The higher net return in demonstration field may be due to the adopting of latest technology and proper management practices of growing mustard crop as mentioned in package of practices. Net return in demonstrated field was higher over traditional farmers' practices in short duration paddy crop reported by Singh, *et al.,* (2021) [14]. Lower yield and higher expenditure in traditional farming practice may be due to the farmers used local variety, applied over doses of fertilizers, expend more in controlling of insect and pest etc in short duration paddy crop reported by Singh, *et al.,* (2021) [14]. Rajpoot (2020) [15] reported that the net return may be higher due to higher yields obtained in demonstrated field and less cost of cultivation by adopting latest technology than farmer practices. Similar observation also reported by Mishra, *et al.,* (2018) [16] in Greengram crop. The higher returns obtained under demonstrated field could be due to applied latest technology in Greengram production reported by Bezbaruah and Deka (2020). The B:C ratio in demonstrated field and farmers practice field conducted at different villages of Kurukshetra was recorded 2.88 and 2.28 during 2017-18 and 2.62 and 2.03 was recorded during 2018-19. Similar observation was also reported by Singh, *et al.,* (2021) [17] in wheat crop. Better B:C ratio under demonstrated field proved that the farmers using the scientific technology for cultivation of Greengram as mentioned in package of practices gave better net return than farmer practices [18]. Similarly, the cost benefit ratio (B:C) was obtained better in demonstrated field than farmers practice. Similar observation was also reported by Singh, *et al.,* (2023) in case of Chickpea. Similar observation was also recorded by Singh, *et al.,* (2021) in case of Basmati Rice and Singh, *et al.,* (2021) in case of Moong. Chaudhary, *et al.,* (2018) also reported that the benefit cost ratio of mustard crop was recorded higher in demonstration fields than control field during the year of experimentation.

Conclusion

It may be concluded that the farmers followed the latest technology of growing mustard crop in their field as mentioned in package of practices i.e., seed treatment, timely sowing and line sowing, maintain proper plant population in the field, use of improved variety, timely weed control, application of proper doses of fertilizers, timely application of pesticides for control of insect-pest and diseases etc obtained higher yield and net return than traditional farmers practices. The gap between demonstrated field and farmers practices of growing crop can be

overcome by organizing various programmes like awareness programme, field visit, kisan mela etc for aware the farmers to adopting the latest technology and management practices from seed treatment to final maturity period of crop for getting higher yield and net return.

Application of research: Study of the gap between demonstrated field and farmers practices of growing crop can be overcome by organizing various programmes like awareness programme, field visit, kisan mela etc for aware the farmers to adopting the latest technology and management practices from seed treatment to final maturity period of crop for getting higher yield and net return.

Research Category: Extension Education

Abbreviations: CFLD-cluster front line demonstration, FP-Farmers Practice, PY-Potential Yield, DY- Demonstrated Yield

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Study area / Sample Collection: Farmer field at Kurukshetra

Cultivar / Variety / Breed name: Mustard (*Brassica juncea* L.) - RH-0749

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