Indian Journal of Extension Education
Vol. 57, No. 2 (April-June), 2021, (6-10)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Evaluation of Front Line Demonstration on Mustard Crop in Rohtak District of Haryana

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ABSTRACT

Cluster frontline demonstrations on mustard crop covering 114.4 ha area under mustard using variety RH-0749 were carried out by Krishi Vigyan Kendra at 261 farmers' fields in Rohtak district of Haryana state during three consecutive kharif seasons 2017-18 to 2019-20. The critical inputs were identified in existing crop production technology through farmers meetings and group discussions. The findings showed significant increase in the average yield of demonstrated plot (12.4%) over the control plot of mustard crop. Considerably lower yield was observed under farmer's practices because of considerable gap/variation in the extent of adoption of recommended technology. Average extension gap, technology gap and technology index of mustard crop was found 229 kg/ha, 1423 kg/ha and 40.63 per cent, respectively. Three years average yield, net returns and benefit: cost ratio (BCR) in demonstrated plots came out to be 2076 kg/ha, Rs. 51549 Rs/ha and 2.9, respectively which was significantly higher than local check with average yield 1846 kg/ha, net returns 43366 Rs/ha and BCR 2.74. The higher yield and returns in demonstrations indicated that productivity of mustard at farmers' fields could be increased by adopting improved technologies. Hence, FLDs showed positive effects of production and protection technologies in mustard crop.

Keywords: Adoption, Cluster frontline demonstration, Impact, Mustard, Net returns, Technological gap

INTRODUCTION

Oil seed crops are the second largest agricultural commodity in India. After cereals sharing around 13 per cent of gross cropped area and accounting for 11 per cent of value of all agricultural products. Rapeseed and mustard are the major rabi oil seed crops of the India. Due to continuous increase in import of oilseeds crops, mustard occupies a prominent position in Indian oilseeds scenario. It is the major source of income especially to small and marginal farmers in rainfed areas of country. India produced 8.43 million metric tons of rapeseed and mustard in financial year 2018-19. The area under rapeseed and mustard in India is 6.63 million hectares, with a productivity of 1270 kg/ha during 2018-19 (FAOSTAT). Rajasthan ranked first in rapeseed and mustard production (41 lakh MT) followed by Haryana (10.1 lakh MT). In Haryana, Bhiwani district takes lead in growing mustard followed by Mahendergarh, Rewari, Hisar, Sirsa, Jhajjar, Mewat and other. Area, production and productivity of rapeseed-mustard in state have been fluctuating due to various biotic, abiotic factors and poor marketing support system. Kumar *et al.* (2018)

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observed that proper weed control and knowledge about different production recommendations also affects production and productivity of mustard crop. Although the crop has potential but gap in adoption of improved technological interventions is the major reason for low production of mustard. Thus, with the help of adoption of improved technologies, it is possible to bridge the yield gap and increase the existing production and productivity of mustard crop. Productivity of crops per unit area could be increased by adopting improved practices in a systematic manner along with high yielding varieties (Ranawat *et al.*, 2011 and Rai *et al.*, 2016)

Front line demonstration (FLD) is the long-term educational activity conducted by agricultural scientists in a systematic manner on farmers' field to show the value/output of newly released crop production and protection technologies and its management practices in the farmer's field under the micro-farming situation. Therefore, FLD in oilseeds is an effective extension intervention to demonstrate the production potential of improved technologies on farmers' field for harnessing the productivity potential of oilseed crops in the country. Keeping this in view, present FLD were organized in participatory mode with the objective to enhance production potential of mustard crop in the region of State.

METHODOLOGY

Krishi Vigyan Kendra, Rohtak conducted cluster frontline demonstrations on mustard crop during *rabi* season of 2017, 2018 and 2019 under centrally sponsored scheme on kharif oilseeds production and protection technology namely National Food Security Mission (NFSM). The study was conducted at farmers' fields in all five blocks *viz*. Rohtak, Meham, Lakhan Majra, Sampla and Kalanaur of Rohtak district in Haryana state. Baseline information regarding crop production practices adopted by farmers from selected villages was collected before organization of CFLDs. High level of gap was identified for use of high yielding varieties, seed treatment and weed management methods, while fertilizer management, irrigation management and plant protection measure showed partial adoption gap which ultimately reduced production potential of crop. Thus, CFLDs were organized on farmers' field according to a package of practices recommended by CCSHAU, Hisar (Haryana). Under this, 261 beneficiary farmers were selected purposively as the samples for present investigation. Kisan gosthis, group meeting, skill trainings were conducted for the selected farmers regarding different aspects of production and protection technologies of mustard crop. Critical inputs such as seed, fertilizers, biofertilizers and IPM were provided to the farmers for demonstration plots (DP). The farmers' practice (FP) was considered as control plot/local check in demonstration cluster. These control plots were maintained by the farmers according to their own cultivation practices. Insect-pest, disease and weeds data were observed visually at the scale of 0-100. The yield data of demonstrated plots as well as control plots were recorded immediately after harvesting to assess the impact of FLDs intervention on the yield of mustard crop. Data were analysed for different parameters using following formula as given below:

$$\text{Per cent increase in yield} = \frac{\text{Yield gain in DP plot (q/ha)} - \text{Yield gain in FP plot (q/ha)}}{\text{Yield gain in FP (q/ha)}} \times 100$$

Where, DP = Technology demonstrated plot
FP = Farmers' practice

The following formula was used for the calculation of benefit : cost ratio:

$$\text{B:C ratio} = \frac{\text{Gross return}}{\text{Cost of cultivation}} \times 100$$

The extension gap, technology gap and technology index were calculated as suggested by Dayanand *et al.* (2012).

Extension gap (EG) = Demonstrated yield (Dy) – Farmers' practice yield (Fpy)

Technology gap (TG)= Potential Yield (Py) - Demonstrated Yield (Dy)

Technology index (Ti in %) = Py – Dy/ Py x100

RESULTS AND DISCUSSION

Farmers were not much aware of the recommended package practices of mustard. Farmers,

in general, used local varieties or hybrids instead of the recommended high yielding resistant varieties. They were not using biofertilizer for seed treatment due to lack of awareness and unavailability. Weed management methods were not used by farmers due to lack of information. Balanced dose of fertilizers and soil test based fertilizers were not used due to lack of knowledge and unavailability of fertilizers on scheduled time. Unavailability of irrigation water, poor quality water and lack of awareness regarding time of application were reported the main reasons for imbalanced management of irrigation water. No seed treatment and control measures were adopted for pest and disease management of mustard cultivation. Variations in the technology gap were observed due to variation in agro-climatic parameters, soil fertility, biotic stresses, and socio-economic status and management practices. Katare *et al*. (2011) also observed that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. These variations can be narrowed down by encouraging the farmers to adopt sustainable technological practices for enhancing the production and productivity of oilseed crops.

Technology gap referred to difference between the potential yield of the variety and yield of demonstration. The technology gap of 1400, 1396, and 1475 kg/ha during 2017-18, 2018-19 and 2019-20, respectively (Table 2). The average technology gap was observed as 1423 kg/ha. This gap shows that still there is gap in technology demonstration as a result of which the potential yield of the crop could not be harvested by the farmers. This might be due to the variable fertility status of soil, microclimatic conditions and faulty agriculture practices. The findings of the present study are in line with the findings of Chaudhary *et al.* (2018).

Extensions gap referred to the difference between demonstrated yield and yield under existing farmer's practice. Extension gap of 270, 204 and 215 kg/ha was observed during 2017-18, 2018-19 and 2019-20, respectively (Table 2). The average extension gap was recorded as 229 kg/ha in the demonstration and it need to be reduced with the help of different extension activities like training programmes on latest/improved production and protection technologies with high yielding varieties, awareness programmes, kisan gosthis on integrated pest and nutrient management etc. These programmes have the potential to help the farmers to adopt new and improved practices for crop production which lead to reduction in extension gap.

Technology index referred to the ratio between technology gap and potential yield expressed in percentage. The technology index shows the feasibility and performance of the demonstrated technology at the farmers' field. The lower value of technology index shows the efficacy of good performance of technological interventions. In present demonstration, the technology index varied from 39.8 to 42.1 per cent (Table 2). Mitra and Samajdar (2010) and Dhaka *et al.* (2010) reported similar findings. The average technology index was recorded as 40.95 per cent in mustard crop during the three consecutive years of CFLD programmes. Technology index can be reduced with proper adoption of demonstrated technical interventions to increase the yield performance of mustard crop.

Major weed flora reported in mustard in Rohtak district were *Orobanche* sp., *Chenopodium album, Chenopodium murale, Rumex* spp. *Fumeria parviflora, Coronopus didymus* and *Anagalis arvensis*. Pre emergence application of pendimethalin @ 3.13 L/ha (Punjab Agriculture University, Ludhiana recommen-dations) provided effective (80-85% visual

Table 1: Pest analysis of cluster front line demonstration on Mustard at farmers' field

Treatment	Visual weed control efficiency (%)	Stem Rot control (%)	Mustard aphid population (no./branch)
*CFLD	80-85	80-85	2-5
*Farmers' practice	30-40	20-25	15-20

* Average data of 2017-18 to 2019-20

weed control) control on grassy and broad leaf weed flora in mustard during initial period (Table 1). In sandy soils *Orobanche* was major weed which is parasitic weed. Although, it was very difficult to manage, but application of Glyphosate @ 125 ml/ha at 50 days after sowing (DAS) was very effective (70% visual weed control) against this parasitic weed in mustard. Aphid, sclerotinia stem rot and white rust were recorded as common insect pest and diseases in mustard field during the study period. In CFLD mustard, seed treatment with Bavistin and foliar spray provided effective control of sclerotinia stem rot i.e. 80-85 per cent control as compared to farmers' practices during the study. White rust was controlled with the application of Mancozeb @ 1.5 kg/ha. Mustard aphid caused considerable loss in mustard field which was controlled with application of Dimethoate @ 625 ml/ha and the status of mustard aphid (*Lipaphis erysimi*) in demonstrated field was 2-5 aphid/branch (top 10 cm) as compared to farmers' field where 15-20 aphid/branch were recorded (Table 2).

Grain yield of mustard crop under cluster frontline demonstration were calculated and results are presented in Table 2. Significantly higher grain yield was observed under demonstrated plots over farmers' practice which might be due to use of improved technologies i.e. quality seed, seed treatment, nutrient and pest management etc. The average grain yield was 2076 kg/ha reported in mustard demonstrated plots while 1846 kg/ha were reported in control plot. This showed that 12.4 per cent increase in the average grain yield of mustard in demonstrated plots over the farmers' practice. This increase in yield proves the positive impact of frontline demonstration over existing farmers' practice at all locations. The similar trends of yield enhancement in front line demonstration of oilseeds was reported by Singh *et al.* (2007); Kalita *et al.* (2019) and Meena *et al.* (2020).

The data pertaining to the cost of cultivation, gross return, net return and BC ratio of mustard crop in demonstrated plot under front line demonstration and farmers' practice is presented in Tables 3. Average cost of cultivation was Rs. 27122 and 24965/ha under demonstrated plot and farmers' practice, respectively. Significantly higher gross and net returns were observed in demonstrated plots than farmers' practice. These results corroborate with the finding of Verma *et al.* (2012). Average gross and net returns obtained in demonstration plots were Rs. 78671 and 51549/ha while in farmers plot were Rs. 68331 and 43366/ha, respectively (Table 3). Average benefit cost ratio 2.9

Table 2: Grain Yield and gap analysis of cluster front line demonstration on Mustard at farmers' field

Year	Yield (kg/ha)		% increase	TG	EG	TI
	D P	F P	in Yield	(kg/ha)	(kg/ha)	(%)
2017-18	2100	1830	14.8	1400	270	40.0
2018-19	2104	1900	10.7	1396	204	39.8
2019-20	2025	1810	11.9	1475	215	42.1
Average	**2076**	**1846**	**12.4**	**1423**	**229**	**40.63**

DP= Demonstrated Plot; FP= Farmers' practice; TG= Technology gap; EG= Extension gap; TI= Technology index

Table 3: Economic performance of Mustard crop under cluster front line demonstration at farmers' field

Year	Economics of demonstrated plot (Rs./ha)				Economics of farmers practice (Rs./ha)			
	Gross Cost	Gross Return	Net Return	BCR (R/C)	Gross Cost	Gross Return	Net Return	BCR (R/C)
2017-18	25160	77040	51880	3.06	22535	66200	43665	2.94
2018-19	28905	78868	49963	2.73	26825	68200	41375	2.54
2019-20	27300	80106	52806	2.93	25535	70593	45058	2.76
Average	**27122**	**78671**	**51549**	**2.90**	**24965**	**68331**	**43366**	**2.74**

was obtained under mustard demonstrated plot which was higher than farmers' practice (2.74). In the present demonstration, although average cost of cultivation increased by 8.6 per cent in mustard with improved technological interventions as compared to farmers practice, but additional net return and higher B:C ratio were recorded under demonstrated plot as compared to farmers' practice. The results are also in conformity with the findings of Singh *et al.* (2008) and Singh *et al.* (2019).

CONCLUSION

Based on three years of frontline demonstrations, it may be concluded that crop productivity and economic returns of mustard crop can be increased with scientific production and protection technologies. The enhanced benefit cost ratio, explained the economic viability of the demonstrations and was convincing for the farmers to adopt the intervention imparted. This study observed that CFLD programmes were very effective in motivating and changing the attitude of other farmers to adopt improved cultivation practices and crop management. Thus, it is suggested that the technology needs to be popularized to decrease the extension gaps, technology gap, technology index, adoptions gaps and there by yield gap so as to increase the income of farmers.

Paper received on : January 20, 2020
Accepted on : February 05, 2020

REFERENCES

Chaudhary, R.P., Chaudhary, G.K., Prasad, R., Singh, R. and Chaudhary, A.K. (2018). Impact assessment of frontline demonstrations on mustard crop, *International Journal of Current Microbial Application Science*, **7**, 4737-4742.

Dayanand, V.R.K. and Mehta, S.M. (2012). Boosting mustard production through front line demonstrations, *Indian Research Journal of Extension Education*, **12**(3), 121-123.

Dhaka, B.L. Meena, B.S. and Suwalka, R.L. (2010). Popularization of improved maize production technology through frontline demonstrations in southeastern Rajasthan, *Journal of Agriculture Science*, **1**(1), 39-42.

FAOSTAT. (2018-19). www.fao.org/faostat/

Kalita, S.K., Chhonkar, D.S. and Kanwat, M. (2019). Assessment of cluster front line demonstrations on rapeseed (*Brassica campestris* L.) in Tirap district of Arunachal Pradesh, *Indian Journal of Extension Education*, **55**(3), 17-22.

Katare, S., Pandey, S.K. and Mustafa, M. (2011). Yield gap analysis of Rapeseed-mustard through front line demonstrations. *Agriculture Update*, **6**, 5-7.

Kumar, R., Slathia, P.S., Peshin, R., Gupta, S.K., Gupta, S.K. and Nain M.S. (2018). Performance analysis of rapeseed mustard crop under different agro-climatic conditions of Jammu Division of J&K state, *Indian Journal of Agricultural Sciences,* **88**(3), 463-468.

Meena, R.P., Singh, B., Meena, R.K. and Shinde, K.P. (2020). Impact of frontline demonstrations on mustard production and profitability in Sri Ganganagar district of Rajasthan, India, *Global Journal of Bioscience and Biotechnology*, **9**(3), 106-110.

Mitra B. and Samajdar T. (2010). Yield gap analysis of rapeseed mustard through front line demonstration, *Agricultural Extension Review*, **12**(6), 16-17.

Rai, A.K., Khajuria, S.K., Lata, K., Jadhav, J., Rajkumar, K., and Khadda, B.S. (2016). Popularization of vegetable pigeon pea (*Cajanus cajan*) in central Gujarat through demonstration in farmers field, *Indian Journal of Agricultural Science*, **85**(3), 349-353.

Ranawat, Y., Ram, H., Sisodiya, S.S. and Punjabi, N.K. (2011). Adoption of improved maize cultivation practices by trained and untrained farmers of KVK, Udaipur, *Rajasthan Journal of Extension Education*, **19**, 144-147.

Singh, G., Sirohi, A. and Malik, Y.P. (2008). Impact of improved technology on the productivity of Indian mustard. *Journal of Oilseeds Research*, **25**, 125.

Singh, K.K., Singh, R.P.N. and Mishra, D. (2019). Evaluation of front line demonstration of Oilseeds in Raebareli District, *Indian Journal of Extension Education*, **55**(3), 49-52.

Singh, S.N., Singh, V.K., Singh, R.K. and Singh, R.K. (2007). Evaluation of on-farm front line demonstrations on the yield of mustard in Central Plains Zone of Uttar Pradesh, *Indian Research Journal of Extension Education*, **7**, 79-81.

Verma, S., Verma D.K., Giri S.P. and Vats A.S. (2012). Yield gap analysis in mustard crop through front line demonstrations in Faizabad District of Uttar Pradesh, *Journal of Pharmacognosy and Phytochemistry*, **1**(3), 79-83.