The Journal of Rural and Agricultural Research Volume 24 No. 1, 88-92 (2024)
Received April 2024; Acceptance June 2024

Impact of Cluster Front Line Demonstration on Rapeseed-Mustard in Azamgarh District of Uttar Pradesh

AKHILESH KUMAR YADAV*, K.M. SINGH[1], L.C. VERMA, R.K. SINGH[2], R. P. SINGH[3] AND R. NAYAK[3]
KVK, Azamgarh–II, (A. N. D. University of Ag. & Tech. Ayodhya, 224229 (U.P.)
**Corresponding Author: Email ID: akyadavkvk@gmail.com,*

Abstract

Mustard is one of the most important oilseeds crop in India, which plays a major role in supplementing the income for small and marginal farmers of Azamgarh district in Eastern Plain region of Uttar Pradesh. The development of the Agriculture is primarily depending on the application of the scientific technologies by making the best use of available resources. To increase the production, productivity and quality of agricultural produce, Cluster Front Line Demonstrations are being conducted at various farmers' field. Krishi Vigyan Kendra, Kotwa, Azamgarh conducted 283 cluster frontline demonstrations of Indian mustard during three consecutive years from 2018–19 to 2020–21. The critical inputs were identified in existing production technology through meetings and discussions with farmers. Prevailing farmers' practices were treated as control for comparison with recommended practices. The average yield registered 42.67 per cent higher over the farmers practice. The average of technology gap, extension gap and technology index were found to be 5.97 q /ha, 5.67 q/ha and 28.37 per cent, respectively. The technology gap may be attributed to dissimilarity in the soil fertility status, local climatic situations, varietal suitability and adoption of technological practices. The extension gap indicating the need to educate the farmers through various extension approaches for the adoption of improved technologies. The lower value of technology index indicated the feasibility of the demonstrated mustard crop technology. The highest grain yield (20.08 q/ha) was recorded in the year 2020-21, it was 54.10 per cent more over the farmers practice (13.50 q/ha). Average net profitability of worth Rs. 55915.00/ ha as compared with farmers practices (Rs. 35612.0/ha) were obtained and average benefit cost ratio i.e. *3.65 and 2.56 were recorded in demonstrated plot and farmers practice, respectively. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. By conducting front line demonstrations of proven technologies, yield potential of mustard cultivation can be enhanced to a great extent with increase in the income level of the farming community.*

Keywords: Mustard, CFLD, Extension gap, Technology gap, Technology index, Net returns and BCR

[1]Directorate of Extension, KVK, Azamgarh–II, (A. N. D. University of Ag. & Tech. Ayodhya, (U.P.)
[2]KVK, Jaunpur-II,
[3]KVK, Azamgarh-I (A. N. D. University of Ag. & Tech. Ayodhya, 224229 (U.P.)

Introduction

Rapeseed-Mustard (*Brassica juncea L.*) is one of the important *Rabi* season oilseed crop, belongs to family Cruciferae and genus Brassica. Rapeseed-Mustard seed is the world's second leading source of vegetable oil and protein meal after soybean. It is mainly grown in northern part of India, Rajasthan is the largest producing state followed by Uttar Pradesh. Rapeseed-Mustard crop required lower water requirement (240–400 mm) for completing life cycle, therefore, it is fits well for rain fed cropping system. Rapeseed-Mustard seed contains average 34-43% oil content and contributes for 32% of total edible oil. The total production of this crop in India is 10.21 million tons from in an area of 6.70 million hectares with a productivity of 1524 kg/ ha. In Uttar Pradesh, rapeseed and mustard occupies prime place amongst all the oilseed crops grown in the state, occupying 0.68 million hectares area and producing 1.01 million tonnes production with 1438 kg/ha productivity. The highest productivity is in Haryana (2028.0 Kg/ha), Gujrat (1976.0 Kg/ ha), M.P. (1745.0 Kg/ha) and Rajasthan (1675.0 Kg/ ha) during 2020-21. (Agricultural Statistics at a Glance, 2022). Though, rapeseed-mustard group of crops occupy prominent position in the state oilseeds scenario but vast yield gap exists between potential yield and yield under real farming situation. The available agricultural technology does not serve the very purpose until it reaches and adopted by its ultimate users of the farmers. Conducting of Cluster Front Line Demonstrations (C-FLDs) on farmer's field help to identify the constraints and establish production potential of the rapeseed-mustard in specific area as well as it helps in improving the socio - economic status of the farmers. The aim of the cluster front line 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. CFLD 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 (Kumar and Jakhar, 2020). Therefore, CFLD in oilseed is an effective technological intervention to demonstrate the production potential on farmers' field for harnessing the productivity potential of oilseed crops in the country. Several biotic, abiotic and socio-economic constraints inhibit exploitation of the yield potential and these needs to be addressed. The reasons for low productivity are poor knowledge about newly released crop production and protection technologies and their management practices in the farmers' fields. Keeping this in view, the present CFLD were planned with the objective to evaluation and analysis of technological interventions on yield and economics of mustard in Azamgarh district of Uttar Pradesh.

Materials and Methods

The cluster frontline demonstration on Mustard was conducted during *Rabi* season of 2018-19, 2019-20 and 2020-21 at selected farmer's field in different blocks of Azamgarh district. District located in the VIII eastern plain zone with 8 Tahsil, 22 Blocks and around 4101 villages. In general the soils under study were sandy loam to sandy clay loam in texture with neutral in reaction (7.2 to7.6 pH). The soil test report shows fertility status like available nitrogen, phosphorus and potassium were low to medium only and also deficient in sulphur status. Proven technological interventions were implemented at farmers' field in participatory mode by Krishi Vigyan Kendra (Acharya Narendra Deva University of Agriculture & Technology) Azamgarh (UP). A list of farmers was prepared on basis of group meeting and specific skill training was imparted to the selected farmers regarding various aspects on proven technologies. A total of 283 farmers of village Lasra Kala and Sikraur (block Martinganj), Karanpur and Tamauli (block Palhani), Rudari and Majgawan (Rani Ki Sarai block), Jairampur and Dharwara (block-Jahanganj), Serra and Devait (block-Menhnagar)and Jameen farenda and Tofapur (block-Bilariyaganj) and many other villages were associated under this programme during three years of demonstration an area of 108 ha. Material for the present study with respect to CFLDs and farmers' practices has been given in Table 1 and also analyzed gap between technological interventions and existing practices. In case of local check plots, existing practices being used by farmers

were followed. In general, soils of the area under study are sandy and sandy loam with medium fertility status. The high yielding varieties NDR 8501, Giriraj and RH 749 were demonstrated at farmers' fields with full package of practices viz. proper seed rate and sowing method (45 x 10 cm R x P), balanced dose of fertilizer (120: 40: 40: 30 N: P: K: S kg/ha), Trichoderma @ 10 g/kg of seed as seed treatment, timely irrigation, weed management and adopt improved plant protection measures. In these demonstrations control plots were also kept where farmers' practices were carried out (Table-1). Visit of farmers and the extension functionaries was organized at demonstration plots to disseminate the message at large scale. 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 data output were collected from both C-FLDs plots as well as control plots (farmers practices) and Finally, the recorded data were computed and analysed for different parameters using following formula (Samui *et al*. 2000) as mentioned here under:

Per cent increase yield =

$$\frac{\text{Grain yield under FLD} - \text{Grain yield under check}}{\text{Grain yield under check}} \times 100$$

Technology gap =Potential yield - Demonstrated yield

Extension gap =Demonstrated yield–Yield under check

Technology index =

$$\frac{\text{Potential yield - Demonstrated yield}}{\text{Potential yield}} \times 100$$

Additional cost of demonstration =

Cost of demonstration – Cost of check

Additional returns =

Net return in demonstration – Net return in check

Effective gain =

Additional return of demonstration – Additional cost of demonstration

$$\text{Benefit cost Ratio (BCR)} = \frac{\text{Gross Return (Rs./ha)}}{\text{Cost of Cultivation}}$$

Results and Discussion

Gap analysis in Recommended and Existing practices

The gap between the existing and recommended technologies of rapeseed-mustard crop in district Azamgarh was presented in table 1. Full gap was observed in case of use of HYVs, seed treatment, line sowing, thinning, weed control and partial gap was observed in seed rate, time of sowing, fertilizer dose, irrigation and plant protection measures, which definitely was the reason of not achieving potential yield. Farmers were not aware about recommended technologies. Farmers in general used local or old-age varieties instead of the recommended high yielding resistant varieties. Unavailability of seed in time and lack of awareness were the main reasons. Farmers applied higher seed rate than the recommended and they were not using seed treatment technique for the management of seed borne diseases and also not aware the application of micronutrient i.e. sulphur and boron for enhancement of yield and quality of mustard because of lack of knowledge and interest. Tiwari, K. N., Nutrient management issue and strategies. Fertilizer New. 2002; 47(8): 22-49.

Yield analysis gap

Determination of yield gaps and other indices carried out with an objective to educate the farming communities regarding production losses of mustard due to ignorance of technological interventions evolved for oilseed crops. Analysis of extension yield gap showed contrary result *viz*., wider gap 7.30 q/ha to during 2020-21, which recorded maximum mustard yield. The wider extension gap was obtained due to positive influence of proven technologies and more conducive years for better mustard production under both practices harnessed growth resources efficiently thereafter resulting higher yield. Wider extension gap emphasized the need to educate the farmers through various means for the adoption of proven production and protection technologies to minimize the extension gap. The data on yield gap given in table 2 reveals that the yield of rapeseed-mustard fluctuated successively over the years in demonstration plots and it could be increased by 41.5 to 54.1 per cent with use of technological interventions over farmers' practice. The maximum average yield was recorded (20.8 q/ha) during 202-21 and minimum yield was recorded in year 2019-20 (16.0 q/ha) under cluster front line demonstrations. On the basis of three years, 46.22 per cent yield advantages was recorded under demonstrations with

Table 1: Technological interventions in demonstrations and existing farmers practice under cluster front line demonstration programme

Particulars	Technological Interventions	Existing Farmers Practices	Gap in adoptions
Variety	Giriraj/RH-749	Continuous use of oldVariety - Varuna	Full
Seed Treatment	Seed treatment with carbendazim 2g/Kg seed or Trichiderma 10 g/kg of seed	No seed treatment	Full
Seed Rate	5 kg/ha	6-8 kg/ha	Partial
Sowing method	45 x 10 cm in line	Broadcasting method	Full
Time of Sowing	First fortnight of October	Last week of October tolast week of November	Partial
Fertilizer Management	120:60:60:25 (N:P::K:S kg/ha)	150:60:0:0: (N:P:K:S kg/ha)	Partial
Irrigation	2 required (First after at 30 DAS & 2nd at 60 DAS)	Not taken in account ofcritical stage	Partial
Weed Management	Pendimethalin @ 3.3 lit/ha after sowing within 24 hours, if weeds appears 2 weeding Ist at 25 DAS and 2nd at 40 DAS	No weeding	Full
Plant Protection	Mustard aphid control with Imidachloprid 17.8 SL @ 1ml/ liter of water,Alternaria blight control with Mencozeb + Carbendazim @ 2.5 kg/ha	As per on locally suggestions and imbalance dose	Partial

improved technological practices as compared to farmers' traditional way of mustard cultivation. The similar results of yield enhancement in rapeseed-mustard crop in front line demonstrations have been documented by Verma S. *et al.* (2012) and Katare *et al.* (2011). The results indicated that the cluster front line demonstrations has given a good impact on the farming community of this district as they were motivated by the improved agricultural technologies used in the front line demonstrations.

Technology gap

The technological gap analysis observed to be more informative in respect to demonstration yield subtracting from potential yield expressed real gap in between execution of technologies at farmers' field by the expert and researchers. The average gap shows in the demonstration yield over potential yield and it was 5.97 q/ha in these variety (Table 2). The trend of technology gap ranging between 9.10 and 1.60 q/ha in Giriraj and T 59 variety, respectively and it reflects the farmers' cooperation in carrying out such demonstrations with encouraging results in subsequent years. The frontline demonstrations were laid down under the supervision of KVK Scientists at the farmer's fields. The technology gap observed might be attributing to the dissimilarity in soil fertility status, local climatic situations, varietal suitability and adoption of technological practices. Technology gap imply researchable issues for realization of potential yield, while the extension gap imply what can be achieved by the transfer of existing technologies. (Chaudhary *et al*. 2018).

Technology index

The technology index showed the feasibility of the evolved technology at the farmer's fields. Higher technology index reflected the insufficient extension services for transfer of technology. The lower value of technology index shows the efficacy of good performance of technological interventions. The average technology index was observed 28.37 per cent under cluster front line demonstration (Table 2). The variety Giriraj, NDR 8501 and RH 749 showed technology index 45.5, 40.0 and 20.0 per cent, respectively. This variation indicates that result differ according soil fertility status, weather condition, non-availability of irrigation water and insect-pests attack in the crop. The results of the present study are in consonance with the findings

of Sekhawat *et al.*, (2012), Patel *et al*., (2013) and Singh (2015).

Economic analysis

The average cost of cultivation of demonstration plot and farmer's practices are presented in table no. 3. Different variables like seed, fertilizers, fungicide, bio-insecticide and chemical pesticides were considered as a technological intervention and on an average an additional average investment of Rs. 2915.0 was made under demonstration of rapeseed-mustard. The results of economic analysis of rapeseed-mustard production revealed that cluster frontline demonstrations recorded average higher gross return Rs.77140.00 per ha and net return Rs.55915.00 per ha with higher benefit cost ratio (3.65) as compared to local checks. The average higher additional net returns Rs. 20303.0 per ha and effective gain Rs. 17388.00 per ha obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The average benefit cost ratio of demonstrated and control plots were 3.65 and 2.56, respectively. The data indicated that the positive effect of cluster front line demonstration over the existing practices towards increasing the yield of rapeseed-mustard in Azamgarh district of Uttar Pradesh. Similar findings were also reported in frontline demonstrations on pulse crops by Sharma, *et al.* 2011 and Chaudhary *et al.* 2018.

Conclusion

Based on three years of CFLD, it indicates that the incorporation of scientific farm technology practices along with active participation of Scientists with farmers of the area has positive effect on increasing the yield and economic return of mustard in Azamgarh district. The results of cluster front line demonstrations average yield of rapeseed-mustard could be increased by 46.22% with the improved seed and other agronomic practices in the Azamgarh region of Uttar Pradesh. It requires collaborative extension efforts to enhance adoption level of location and crop specific technologies among of the farmers for bridging these gaps.

References

Agricultural Statistics at a Glance (2023). Ministry of Agriculture and farmers Welfare. Department ofAgriculture, Cooperation and Farmers Welfare, Directorate of Economics and Statistics, New Delhi.

Balai, C.M.; Meena, R.P.; Meena, B.L. and Bairwa, R.K. (2012). Impact of front line demonstration on rapeseedmustard yield improvement. *Indian Res. J. Ext. Edu.,* 12(**2**)**:**113-116.

Chaudhary, R. P.; Chaudhary, G. K.; Prasad, R.; Singh, R. and Chaturvedi, A. K. (2018). Impact Assessment of Front Line Demonstration on Mustard Crop. *Int. J. Curr. Microbiol. App. Sci.,* Special Issue-**7**: 4737-4742.

Katare, Subhash; Pandey, SK and Mustafa, M. (2011). Yield gap analysis of rapeseed-mustard through front line demonstrations. *Agric. Update*, **6**:5-7.

Kumar, V. and Jakhar, D. S. (2020). Impact assessment of frontline demonstrations on mustard (Brassica juncea L.) in Bhiwani district of Haryana. *International Journal of Current Microbiology and Applied Sciences* 9(**4**): 395-402.

Mitra, B. and Samajdar, T. (2010). Yield gap analysis of rapeseed–mustard through front line demonstration. *Agril. Extesion Review,* **22**: 16-17.

Samui, S. K, Mitra, S.; Roy, D.K.; Mandal, A. K. and Saha, D. (2000). Evaluation of FLD on groundnut. *J. Indian Soc. Coastal Agric. Res*; 18(**2**):180-183.

Sharma, A.K.; Kumar, V.; Jha, S. K. and Sachan, R.C. (2011). Front line demonstrations on Indian mustard: An assessment. *Indian Res. J. Ext. Edu.,* 11(**3**):25-31.

Shekhawat, K.; Rathore, S. S.; Premi, O. P.; Kandpal, B. K. and Chauhan, J. S. (2000). Advances in agronomic management of Indian mustard (*Brassica juncae* L.) An Overview. *Int. J Agron;* 1-14.

Singh, A.K.; Singh, R.P.; Singh, R.K. and Upadhyay, S.P. (2019). Efeect of cluster front line demonstration on rapeseed mustard in Gorakhpur district of Uttar Pradesh. *Indian Journal of Extension Education* 55(**3**): 123-127.

Tiwari, K.N. (2002). Nutrient management issue and strategies. *Fertilizer new.*,47(**8**): 22-49.

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.