J. Soils and Crops 33 (2) 388-391, December 2023

ISSN 0971-2836 (Print)
ISSN 2582-2756 (Online)

CLUSTER FRONTLINE DEMONSTRATIONS TO ENHANCE PRODUCTION TECHNOLOGIES OF RAYA (MUSTARD)

Vikash Hooda[1], Sushil Kumar[2], Santosh Kumar Singh[3] and Sardul Singh Mann[4]

ABSTRACT

The most essential factor for stimulating the increase in agricultural productivity is the level of adoption of more advanced agricultural technologies, which is a critical component of the innovation diffusion process. Farmers are not finally accepting and adopting the vast majority of agricultural technology that have been developed. It is common to find a discrepancy between the advice given by scientists and their actual application by farmers. The current study was conducted in 2021–2022 to evaluate how CFLDs affected the production of mustard crops. In district Fatehabad, there were three clusters of 100 demonstrations total, covering a 40 ha area. For the purpose of calculating gap analysis, costs, and returns, the yield information and economics of demonstration and check plots were recorded and examined. The findings showed that mustard yield under demonstration plots was significantly higher than check plots (farmer's practice). On an overall basis, demonstration plots outperformed check plots in yield by 14.23 per cent. The average extension gap was 2.35 q ha^{-1}, which highlighted the necessity for farmers to be educated through a variety of extension methods in order for them to incorporate better agricultural technologies. Three clusters had an average technology index of 23.80 per cent. A favourable B:C ratio demonstrated the intervention's economic viability. From the aforementioned data, it may be inferred that cluster demonstrations, which encourage farmers to adopt the kinds of scientific production techniques that were on display in the CFLD plots, can boost mustard crop production.

(Key words: CFLD, KVK, technology gap, B: C ratio)

INTRODUCTION

In many parts of the world, the economics of agriculture depends heavily on oilseed. The United States, Brazil, Argentina, China, and India are the world's top five producers of oilseeds, making for 82 per cent of global production. Due to its high fat content, oilseed crops, the second-largest group of agricultural crops after cereals, play a significant role in the Indian agricultural economy. Rapeseed mustard is the third-most significant category of oilseed crops worldwide, behind soybean and palm oil. India's main edible oilseed crop is mustard, which produces about one-third of the country's total oil production. Oil content in Indian mustard seeds ranges from 30 per cent to 48 per cent. This oil is rich source of energy and it is also used in medicinal and remaining part is also used to make feeds for the animals. It is very commonly used medium for prickles because it serves as food preservatives (Gopale *et al.,* 2022).

Due to the discrepancy between local supply and actual use of edible oils, India must turn on imports. Since these crops are primarily grown in the rain-fed and resource-limited regions of the nation, they make a significant contribution to the livelihood security of the small and marginal farmers in these areas. Rapeseed and mustard are the main source of income, especially for the marginal and small farmers in rain-fed areas. Increasing home output can significantly reduce the need for imports. Different cultural practices like selection of improved variety and best sowing time tends to fully exploit the genetic potentiality of the variety as it provides the optimum growth conditions. Sowing during the second fortnight of October month was recorded best for enhancing the morpho-physiological parameters, yield and harvest index (Gopale *et al.,* 2021).

On a nationwide scale, 8.06 million hectares of Indian mustard (*Brassica juncea*) are produced, producing 11.75 million tonnes and 1457 kg ha^{-1}, respectively (Anonymous, 2022) . Rajasthan state has the most land planted with this crop, followed by Uttar Pradesh, Haryana, Gujarat, Maharashtra, Punjab, Assam, and West Bengal. With a production of 1.37 million tonnes across a surface area of 0.71 million hectares and an average yield of 1914 kg ha^{-1} in the year 2021–22 (Anonymous, 2022), Haryana is the third-most significant state in the nation. India's domestic use of edible oils has significantly expanded over the years as a result of population growth and rising living standards. In 2021-22, it reached a level of 20.82 lakh tonnes compared to net domestic availability of edible oils of 115.71 lakh tonnes, while imports satisfied the 141.94 lakh tonnes of required edible oil (Anonymous, 2022).

It reveals that there is still a substantial gap between

1, 3 & 4. DES, Krishi Vigyan Kendra, Fatehabad-125 050, CCSHAU, Hissar
2. TA, Krishi Vigyan Kendra, Fatehabad-125 050, CCSHAU, Hissar (Corresponding author)

the supply of edible oil and the demand for it; this shortfall is filled by big imports that cost a significant amount of foreign currency. The government made the decision to promote the newest production technology in oilseed production in order to overcome stalling oilseed output and attain self-sufficiency in the production of edible oilseeds. The National Mission on Oilseeds and Oil Palm (NMOOP) empowered a project called "Cluster Frontline Demonstrations on Oilseeds" for ICAR-ATARI in Jodhpur, which was then carried out by KVK. The primary objectives of that project were to boost oilseed production in this Zone and achieve self-sufficiency in the production of edible oils through CFLDs.

The stated objectives of CFLDs were aimed at demonstrating to farmers the new technologies that Research Institutes and SAUs had recommended, in order to increase production, productivity, and interest in growing oilseed crops, which are losing importance as a result of the yield stagnation that farmers are currently confronting. In order to increase the proximity between scientists and farmers, Krishi Vigyan Kendra (Farm Science Centre) is crucial. The primary goal of Krishi Vigyan Kendra is to shorten the time gap between technology production and its dissemination to farmers in order to continuously improve productivity and income from the agricultural sector and associated sectors.

Keeping above facts in view, 100 CFLDs were conducted at the farmer's fields on Mustard crop by KVK, Fatehabad of Haryana with the objectives of to evaluate the effect of CFLDs on improving mustard crop production and to evaluate the technological gap in mustard production and its expansion.

MATERIALS AND METHODS

The present examinations on CFLDs were conducted during *rabi* 2021- 22 season by KVK, Fatehabad of Haryana state. An aggregate of 100 demonstrations were conducted in three clusters namely Fatehabad, Bhuna and Bhattu Blocks of Fatehabad district over an area of 40 hectares. The CCS HAU recommended package of practices for oilseed were followed in all the demonstration plots. The demonstrations at growers' fields were regularly covered at different stages of crop by KVK scientists. The yield data and economics of demonstration and check plots were recorded and analysed. Different parameters like extension gap, technology gap and technology index as suggested by Dayanand *et al.* (2012) were used for calculating gap analysis, costs and returns. CFLDs were conducted at the planter's field, so that the maximum number of growers can observe the demonstrations in the fields and interest for cultivation of mustard crop can be generated among the growers as the main idea of FLD is seeing in believing.

The logical tool used for assessing the performance of the FLD is as under:

Extension Gap = Demonstration yield – Check Plot (Farmers' practice) yield

Technology Gap = Potential yield – Demonstration yield

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

RESULTS AND DISCUSSION

CCSHAU's Hisar mustard variety RH 0725, which has a production potential of 26.25 q ha^{-1}, was used in CFLDS experiments. Using mustard varieties grown locally, checks have been made locally. Farmers have been given a set of procedures to follow in order to implement the CCS HAU Hisar recommendations. The mustard technologies and input materials given to farmers based on their requirements were used to demonstrate these financial literacy tests, as shown in Table 1.

According to the findings of the farmers' field cluster frontline demonstrations, mustard yield was significantly higher under demonstration plots than check plots in all three clusters. In comparison to check plots, Cluster-II had the highest yield increase (16.48%), followed by Cluster-III (13.37%), and Cluster-I (12.85%). In demonstration plots a yield of 14.23 per cent more than in check plots was observed. Singh *et al.* (2014) also suggested that the use of high yielding improved variety under FLD programmes leads to increase in the production as well as productivity also. FLD practices created great awareness and motivated the other farmers to adopt appropriate oilseed production technologies. Rana *et al.* (2017) assessed the management of stem rot disease in mustard crop and concluded that the seed treatment with Carbendazim @ 2.0 g kg^{-1} seed controlled stem rot disease more efficiently in mustard crop among two recommended practices *i.e.* soil treatment followed by seed treatment with *Trichoderme harzinium* and only seed treatment with Carbendazim @ 2.0 g kg^{-1}. The demonstrations resulted in significant average increase in yield of mustard crop and also higher net returns over checkplots. The adoption of a set of practices for mustard crops, such as improved variety, seed treatment and integrated pest and disease management, may be the cause of the demonstrated plots' increased yield.

Gap analysis was calculated to assess the extension gap and technology gap. The perusal of the data in Table 2 reveals that extension gap in cluster-II was higher (2.95 q ha^{-1}) followed by cluster –III (2.30 q ha^{-1}) and cluster-I (2.25 q ha^{-1}). Shivran *et al.* (2020) evaluated performance analysis of improved varieties of Indian mustard in terms of gap analysis, yield enhancement and economic viability through front-line demonstrations. The average yield gaps for technology, extension and technology index were significant and resulted in realizing higher benefit: cost ratio compared to the farmers' practice during six years study period. The overall extension gap was observed 2.35 q ha^{-1}, which emphasized the need to educate the farmers through various extension means for adoption of improved mustard production technologies, to bridge the wide extension gap.

The technology gap showed the feasibility of the technology at farmers' field. The lower the value of technology gap, more will be the feasibility of technology distributed. The data in Table 2 reveals that technology index ranged from 20.95 to 25.71 per cent in three clusters. The average technology index of three clusters was 23.80 per cent. Low value of technology index reflects adequacy of technology. This means that technology demonstrated through CFLDs was feasible in that region and needs to popularize through various extension departments for the benefits of farmers.

Data regarding economic indicators *i.e.* cost of cultivation, gross returns, net return and benefit: cost ratio are depicted in Table 3. Economic return was observed to be a function of grain yield and sale price or Minimum Support Price. The data in Table 3 clearly shows that net return of demonstration plots was Rs. 99200 ha^{-1} as compared to check plots (farmers' practice) which was Rs.82000 ha^{-1}. This shows that Rs. 17200 ha^{-1} additional returns was obtained from demonstrated plots. The higher additional returns obtained under demonstrations could be due to improved technology, nonmonetary factors, timely operations of crop cultivation and scientific monitoring. Favorable benefit : cost ratio proved the economic viability of intervention. The B: C ratio was 4.1 under demonstration, while it was 3.73 under control plots. Singh *et al.* (2014) also concluded that the FLD programme was found to be useful in imparting knowledge and adoption level of farmers in various aspects of oilseed production technologies. FLD practices created greater awareness and motivated the other farmers to adopt appropriate oilseed production technologies.

Table 1. Particulars of mustard grown under frontline demonstrations and farmers practices

Particulars	Farmers' practice (Local check)	Front Line Demonstrations (Improved technology)
Variety	Local/RH-30	RH-0725
Seed rate (kg $Acre^{-1}$)	1-1.5 kg	1.5 Kg
Seed treatment	No	Carbendazim @ 2g kg^{-1} seed
Line spacing	30 cm	30 cm
Sowing time	1st week of October	25th September to15th October
Nutrient management (N:P:K)	50 kg Urea + 50 kg DAP	52 kg Urea +50 kg SSP +10 kg Zn SO_4
Pest management	As suggested by Dealers / Farmers	As per recommendations of CCS HAU Hisar

Table 2. Clusterwise grain yield and gap analysis of frontline demonstrations on mustard crop

Clusters	No. of Demo	Yield (q ha^{-1})		Increase in yield (%)	Extension gap (q ha^{-1})	Technology gap (q ha^{-1})	Technology index (%)
		Demo	Farmer'spractice				
I	35	19.75	17.50	12.85	2.25	6.50	24.76
II	40	20.75	17.80	16.48	2.95	5.50	20.95
III	25	19.50	17.20	13.37	2.30	6.75	25.71
	100	**20.00**	**17.50**	**14.23**	**2.35**	**6.25**	**23.80**

Table 3. Economic analysis of cluster frontline demonstrations on mustard crop

Sr. No.	Treatments	Yield (q ha^{-1})	Gross Cost (Rs.ha^{-1})	Gross Return (Rs.ha^{-1})	Net Return (Rs.ha^{-1})	B: C ratio
1.	Farmers'practice	17.5	30000	112000	82000	3.73
2.	Demonstrated technology	20	32000	131200	99200	4.1

From the above data it is inferred that the Cluster Front Line demonstration program was successful in influencing farmers' attitudes toward growing mustard. Farmers' skill and knowledge was increased as a result of the demonstration plots of mustard crop being grown by using improved technologies. Through cluster demonstrations, farmers can be encouraged to adopt the cutting-edge production techniques that were shown to work in the CFLD plots, thereby increasing mustard crop production and productivity. It has been found that scientific knowledge transmission, provision of high-quality, need-based inputs, and proper application of those inputs can all increase potential yield. For a quicker and more extensive spread of the advised practices among other farmers, the front line demonstration concept may be applied to all farmer categories, including progressive farmers. The availability of soil moisture, rainfall amounts, climatic anomalies, and disease infestation are also to blame for differences in crop yield. Additionally, it was found that farmers in the study area were ignorant of seed treatment for mustard crops, which led to significant losses from diseases spread by seeds like stem rot. It is further recommended that farmers be informed about seed treatment. As a result, the technologies presented under CFLDs helped to increase the area under mustard cultivation as well as production and productivity.

REFERENCES

Anonymous, 2022. Agricultural statistics at a glance. Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture. https://agricoop.nic.in.

Anonymous, 2022. Area, production and productivity of crops in Haryana. https:/HYPERLINK "http://www.agriharyana.in/"/www.agriharyana.in

Anonymous, 2022. Commodity Profile of Edible Oil. Department of Agriculture & Co-operation, Ministry of Agriculture, Government of India. https://agricoop.nic.in.

Dayanand, R.K. Verma and S.M Mehta, 2012. Boosting mustard production through Front Line Demonstrations. Indian Res. J. Ext. Edu. **12**(3): 121-123.

Gopale, R., R.D. Deotale, A.N. Raut, S.R. Patil and S.R. Kamdi, 2021.Response of different sowing dates on morpho-physiological parameters and yield in mustard genotypes. J. Soils and Crops. **31**(2):297-304.

Gopale, R., R.D. Deotale, A.N. Raut, S.R. Kamdi, S.B. Baviskar and A. Aade, 2022. Response of sowing dates on chemical biochemical, yield and yield traits in mustard genotypes. J. Soils and Crops. **32**(1):171-179.

Rana, D.K., J. Kumar, Y.P. Singh, R.K. Singh andB. Yadav, 2017. Assessment and demonstrations on management of stem rot disease in mustard crop. J. Comm. Mob. Sustain. Dev. **12**(2):193-196.

Singh, A.K., C. K Singh, Y.P Singh and D.K Singh, 2014. Impact of frontline demonstration on adoption of improved practices of oilseed crops. Indian Res. J. Ext. Edu. **14** (3):75-77.

Shivran, R.K., U. Singh, N. Kishor, B.S. Kherawat, R. Pant and K. Mehra, 2020. Gap analysis and economic viability of front-line demonstrations in Indian mustard (*Brassica juncea* L.) under hyper arid partial irrigated zone of Rajasthan. Int. J. Bio-resource Stress Manage. **11**(4):353-60.

Rec. on 01.06.2023 & Acc. on 13.06.2023