Impact of Krishi Vigyan Kendra Frontline Demonstrations on Mustard Productivity in Jammu Region, J&K (UT)

ABSTRACT

The Krishi Vigyan Kendra (KVK) cluster frontline demonstrations (FLDs) are essential in encouraging farmers to adopt advanced agricultural practices by showcasing proven technologies in real field conditions. These demonstrations help bridge the gap between agricultural innovations developed in research institutions and their adoption by small-scale farmers. This study evaluates the impact of FLDs provided by KVK Samba in Jammu and Kashmir on mustard productivity. Based on yield data and farmer feedback, the study reveals a significant increase in mustard yields among participants due to the adoption of improved cultivation methods, better seed varieties, and efficient resource management. The average productivity for beneficiaries increased by approximately 40 per cent from 8.76 quintals to 12.25 quintals after FLDs, marking a statistically significant improvement. Additionally, beneficiaries experienced a slight increase in average sale prices from 5075.00 rupees to 5166.66 rupees after FLDs. The study also notes key changes included reduced thinning, optimized fertilizer application, and improved seed management, contributing to higher yields and enhanced crop management. These findings underscore the vital role of extension services in facilitating the adoption of advanced farming techniques and provide useful insights for policymakers and agricultural agencies focused on boosting mustard production and improving farmer livelihoods in Jammu and Kashmir.

Key words: Demonstrations, production, livelihoods, significant, farming techniques.

INTRODUCTION

Oilseeds and edible oils are essential commodities in India, extensively utilized across various industries and contributing significantly to the nation's agricultural sector and export markets (Thapa *et al*., 2019). India stands as one of the leading oilseed producers globally, with an estimated annual production of 36.56 million tonnes (Anonymous, 2021). Oilseeds are second only to grains in terms of importance within India's agricultural economy, accounting for 14.1 per cent of the world's total oilseed production with rapeseed-mustard accounting for 3 per cent (Shekhawat *et al.*,2012). Mustard is a particularly important crop, representing 27.8 per cent of India's oilseed sector, ranking just below groundnut and primarily cultivated during the rabi season (Chauhan *et al.*, 2020). It is a vital source of income for small and marginal farmers, especially in rain-fed and resource-limited areas, contributing to their livelihood security. The average yield of mustard in India is approximately 7.5 quintals per hectare (Anonymous, 2018-19). In Jammu and Kashmir (J&K), mustard cultivation spans 55,236 hectares with around 27,000 hectares in the Jammu region, which features both temperate and subtropical climates. To enhance the productivity of mustard and other oilseeds, farmers must adopt efficient agricultural practices. These include selecting high-yielding, disease-resistant crop varieties, utilizing proper crop rotation techniques, ensuring timely planting, maintaining balanced plant nutrition and implementing effective pest and weed control measures. While advanced agricultural technologies have the potential to significantly boost crop yields and improve farmers' livelihoods, many farmers remain unaware of these innovations due to their high cost and limited accessibility. To help bridge this gap, the Indian Council of Agricultural Research (ICAR) introduced Krishi Vigyan Kendras (KVKs), which provide vocational training and promote the use of modern farming practices. In Jammu and Kashmir, 17 KVKs have been established, seven of which are managed by the Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-J). These centres focus on offering training sessions and awareness programs aimed at demonstrating new agricultural technologies. A key initiative of KVKs is the Frontline Demonstration (FLD) program, which seeks to encourage the adoption of proven technologies among farmers. FLDs are implemented directly in farmers' fields with oversight from agricultural experts to demonstrate the effectiveness of modern techniques. The current research on the cluster frontline demonstrations conducted by KVK Samba on mustard production during the rabi season aims to evaluate how these efforts are impacting yields and improving the livelihoods of local farmers. Therefore, the present study entitled "Impact assessment of the KVK cluster frontline demonstrations on Mustard Crop" was undertaken to evaluate the impact of KVK activities on mustard crop.

MATERIAL AND METHODS

Research design serves as the blueprint for the collection, measurement, and analysis of data (Kothari, 2004). In this study, an ex-post facto research design was employed, utilizing a multistage random sampling technique. The research was conducted in Jammu region of Jammu and Kashmir (J&K) Union Territory. Out of ten district fallen under Jammu region, Samba district was purposively selected because Krishi Vigyan Kendra (KVK) Samba had implemented the highest number of Frontline Demonstrations (FLDs) on mustard during 2019-20 Cluster FLDs program, compared to other KVKs in the Jammu region. A list of 166 mustard-growing beneficiaries was obtained from KVK Samba, from which 60 beneficiary farmers were randomly selected. An equal number of non-beneficiary mustard farmers were chosen from neighbouring villages, resulting in a total sample size of 120 farmers (60 beneficiaries and 60 non-beneficiaries). Data were collected from these farmers through semi-structured interviews conducted in various locations, such as community centres, fields, or homes, with responses recorded on the spot. Secondary data were also sourced from KVK Samba. To ensure the reliability of the interview schedule, the research instrument was pre-tested to identify and correct any ambiguities or issues before the actual data collection process.

RESULTS AND DISCUSSION

Farmers in the study area cultivated both high-yielding and traditional mustard (desi) varieties as shown in table 1. Among the beneficiaries, the adoption rate of the RB-50 variety was highest at 55 per cent, likely because it was majorly provided by KVK Samba under the Frontline Demonstration (FLD) program. RB-50 is preferred for its higher economic returns, aligning with innovation attributes identified by Rogers (2003).

Table 1. Response of respondent farmers regarding adoption of mustard varieties during rabi 2019-20.

Parameter	Beneficiary (n=60)	Non-Beneficiary (n=60)	Difference	Statistics
Average area under mustard (ha) ± S.D.	0.17±0.10	0.18±0.14	-0.01	t=0.650 *p*=0.516
Recommended varieties (% farmers)				
RH-749	9(15)	2(3)	12	z=2.965** *p*=0.003
RB-50	33(55)	00	55	----
Giriraj	18(30)	00	30	----
Other variety (Desi Sarson)	00	58(97)	97	----

Figures in parentheses are the percentages of farmers and rounded off to the nearest whole *number.*

**: Deviation significant at p<0.05, **: Deviation significant at p<0.01*

Table 2 shows the extent of adoption of recommended plant production and protection measures varied among mustard growers. For seed rate, 55 per cent of beneficiaries and 15 per cent of non-beneficiaries followed the recommended practices, with a significant difference at the 1 per cent level of significance and a difference value of -17 between the two groups. In terms of irrigation practices, 20 per cent of beneficiaries and 3 per cent of non-beneficiaries adhered to the recommended methods, also showing a significant difference at the 1 per cent level with a difference value of 17. The lower adoption of irrigation practices may be due to the fact that many mustard-growing villages are located in the kandi region, which lacks adequate irrigation facilities and mustard requires less water compared to other crops. The study also revealed that most beneficiary farmers applied farmyard manure (FYM), urea, DAP and MOP in their mustard fields. About 47 per cent of beneficiaries and 7 per cent of non-beneficiaries followed the recommended FYM dosage, showing a significant difference at the 1 per cent level with a difference value of 40. For urea, 80 per cent of beneficiaries and 33 per cent of non-beneficiaries adhered to the recommended dosage, with a significant difference of 47. Similarly, 67 per cent of beneficiaries and 28 per cent of non-beneficiaries adopted the recommended DAP dose, with a significant difference of 39. Regarding MOP, 70 per cent of beneficiaries and 35 per cent of non-beneficiaries used the recommended dosage, with a difference value of 35. These differences are likely due to the beneficiaries' regular contact with KVK Samba and their participation in training programs on proper fertilizer dosages to enhance crop growth. In terms of weed control, only 3 per cent of beneficiaries used the recommended dose of weedicide “pendimethalin” with most farmers opting for manual weeding due to the availability of family labor, which helps with field operations. Regarding pesticide use, 50 per cent of beneficiaries and 8 per cent of non-beneficiaries applied the recommended dose of dimethoate, showing a significant difference of 42 at the 1 per cent level and 7 per cent of beneficiaries and 3 per cent of non-beneficiaries used the recommended dose of cypermethrin. In terms of fungicide use, 37 per cent of beneficiaries and 12 per cent of non-beneficiaries applied the recommended dose of ridomil-Mz, with a significant difference of 25. Similarly, 28 per cent of beneficiaries and 3 per cent of non-beneficiaries used the recommended dose of fungicide “carbendazim”, with a significant difference of 25. Additionally, 65 per cent of beneficiaries and 37 per cent of non-beneficiaries followed the recommended stacking period of 7-8 days, with a significant difference of 28 at the 1 per cent level. These findings align with previous research conducted by Chaudhary *et al.* (2018) Monayemmiah *et al.* (2015), Sharma *et al.* (2014), Meena and Shekhawat (2015) and Singh (2003).

Table 2. Adoption of seed rate, water, manure, weedicide, pesticide, and disease management practices by the respondent farmers during rabi 2019-20.

Extend of Adoption (% farmers)	Beneficiary (n=60)	Non-Beneficiary (n=60)	Difference	Statistics
Avg. area under mustard (ha)± S.D.	0.17±0.10	0.18±0.14	-0.01	t=0.650 *p*=0.516
Recommended seed rate (5kg/ha)	33(55)	9(15)	40	z=5.93** *p*=0.001
Recommended irrigation practices (2 irrigations)	12(20)	2(3)	17	z=3.768** *p*=0.001
Recommended FYM dosage (100qtl/ha)	28(47)	4(7)	40	z=6.370** *p*=0.001
Recommended urea dosage (100-105kg/ha)	48(80)	20(33)	47	z=6.703** p=0.001
Recommended DAP dosage (60-65kg/ha)	40(67)	17(28)	39	z=5.522** p=0.001
Recommended MOP dosage (20-25 kg/ha)	42(70)	21(35)	35	z=4.955** p=0.001
Weedicide Recommended Pendimethalin dosage (700-750 g/ha)	2(3)	00	3	-
Pesticide				
Recommended dimethoate dosage (600 ml/ha)	30(50)	5(8)	42	z=3.965** *p*=0.008
Recommended cypermethrin (600 ml/ha)	4(7)	2(3)	4	z=1.297 *p*=0.193
Disease				
Recommended ridomil-Mz dosage (600 g/ha)	7(12)	4(7)	5	z=1.205 *p*=0.226
Recommended carbendazim dosage (600g/ha)	17(28)	2(3)	25	z=4.884** *p*=0.001
Recommended stacking practices (7-8days)	39(65)	22(37)	28	z=3.960** *p*=0.008

Figures in parentheses are the percentages of farmers and rounded off to the nearest whole number.

**: Deviation significant at p<0.05, **: Deviation significant at p<0.01*

Table 3 illustrates the impact of Frontline Demonstration (FLD) on mustard crop performance in terms of productivity. The average productivity for beneficiaries increased from 8.76 (±1.69) quintals before FLD to 12.25 (±1.84) quintals after FLD, showing a significant difference at the 1 per cent level. Additionally, there was a significant difference in productivity between beneficiaries and non-beneficiaries, with beneficiaries yielding 12.25 (±1.84) quintals compared to 8.06 (±1.41) quintals for non-beneficiaries, also at the 1 per cent significance level. In terms of the average sale price, beneficiaries saw a slight increase from 5075.00 (±247.39) rupees before FLD to 5166.66 (±240.19) rupees after FLD, but this change was not statistically significant. Likewise, the average sale price for beneficiaries and non-beneficiaries, 5166.66 (±240.19) and 5100 (±219.08) rupees respectively, showed no significant difference. This can be due to the reason that the non-beneficiaries had also adopted the recommended mustard cultivation practices and were up to date with the new technologies and were also in frequent contact with the extension personnel due to which their average mustard production was also good. Further, the rate for mustard produce has remained constant in the region from almost 2-3 years which is why the difference in average rate for the mustard produce between both the groups is only of Rs. 66.66.

Table 3. Distribution of respondents on the basis of productivity of mustard crop before and during FLD.

Parameter	Beneficiaries (n=60)		Non-Beneficiaries (n=60) (3)	Statistics (p-value) (1-2)	Statistics (p-value) (2-3)
	Before (Before FLD) (1)	After (FLD) (2)			
Average Productivity (qtl/ha±S.D)	8.76±1.69	12.25±1.84	8.06±1.41	t=45.244** *p*=0.000	t=13.936** *p*=0.001
Average Sale Price (Rs/qtl±S.D)	5075.00±247.39	5166.66±240.19	5100±219.08	t=2.295 *p*=0.30	t=0.623 *p*=0.537

**: Deviation significant at p<0.05, **: Deviation significant at p<0.01*

CONCLUSION

Based on the findings and discussions of the present study, the following conclusions can be drawn. The majority of mustard growers had significant farming experience. Additionally, most of the farmers, both beneficiaries and non-beneficiaries, adopted the RB-50 variety of mustard, which was recommended by KVK Samba. The traditional desi-sarson variety was also widely adopted. Both groups showed a high level of adoption in field preparation practices. Furthermore, all beneficiaries sourced their mustard seeds from KVK Samba, while non-beneficiaries preferred using their own (desi) seeds, as they were more time-efficient and readily available. The adoption of practices such as FYM, urea, DAP, MOP, and seed treatment was higher among beneficiaries. In contrast, non-beneficiaries showed lower adoption of MOP, but higher adoption of FYM, urea, DAP, and insecticides. Regarding the average productivity and sale price of mustard crops, beneficiaries had higher productivity and sale prices compared to non-beneficiaries. This discrepancy may be due to the fact that non-beneficiaries had less knowledge of mustard cultivation practices, whereas beneficiaries received timely expert assistance whenever needed. A similar study was also recorded in ten villages of Sahibganj district of Jharkhand covering 641 farmers and 250 ha area to evaluate the impact of scientific production techniques on productivity and profitability and the results revealed that the yield of mustard under CFLD ranged from 10.82 q to 12.36 q ha-1 whereas in Farmer's Practice (FP) it ranged between 7.3 to 8.5 q ha-1. The per cent increase in yield was recorded in the range of 45.06 to 48.21. The extension gap and technological index ranged between 3.52 to 3.86 q ha-1 and 27.29 to 36.35 per cent, respectively (Jha *et al*., 2021).

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