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Impact of improved package of practices to sustain the productivity of mustard in north western plan zone of Uttar Pradesh

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Abstract

Mustard is a one of the important oilseeds crop in India, One of the major constraints of traditional mustard farming is low productivity due to non-adoption of recommended package of practices and improved varieties. To replace this anomaly, Krishi Vigyan Kendra Nagina, Bijnor under Sardar Vallabhbhai Patel University of Agricultural & Technology, Meerut (UP) had conducted frontline demonstrations (FLDs) at adopted farmer's fields during 2009-10 and 2010-11. The result revealed that the average yield of mustard increased 14.5 percent over farmer's practice during the demonstration period. The technology gap on average basis 650 kg/ha it shows the gap in demonstration yield over potential yield, but the above gap reduced subsequently follows the recommended package of practices. The front line demonstrations recorded higher average gross returns (Rs. 31000/ha) and net return (Rs. 18865/ha) with higher benefit cost ratio (2.56) compared to farmers practice (Rs. 28900/ha, Rs.15290/ha and 2.44, respectively). The results suggest that higher profitability and economic viability of mustard demonstrations under local agro-ecological situation.

Keywords: Frontline demonstration, Technology gap, Extension gap, Technology index mustard, Client Satisfaction Index.

Introduction

Mustard (*Brassica juncea*) is a one of the important oilseed crop of India. It is the second most important edible oilseed after groundnut and sharing 27.8% in the India's oilseed economy. The share of oilseeds is 14.1% out of the total cropped area in the country. The global area, production and productivity of rapeseed-mustard are around 33.11mha, 60.66 mt and 18.32 qha⁻¹, respectively. India contributes 28.3% and 19.8% in world areas and production, respectively (Shekhawat *et al.*, 2012) [8]. The total area in India was 6.30 million hectares along with 7.20 million tonnes of production. Uttar Pradesh accounts for 14.03% and 13.78% of area and production, respectively in the country with the average yield of 1123 kg/ha which is equivalent to the national average (1143 kg/ha). It is mainly grown in the states of Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and Gujarat. This group of oilseed crops is gaining wide acceptance among the farmers because of adaptability for both irrigated as well as rainfed areas and suitability for sole as well as mixed cropping. Besides, it offers higher return with low cost of production and low water requirement. Being a major rabi (*winter season*) oilseed crop and, it has greater potential to increase the availability of edible oil from the domestic production. But yet, adoption levels for several components of the improved technology were low, emphasizing the need for better dissemination (Kiresur *et al.*, 2001) [4]. Several biotic, abiotic and socio-economic factors inhibit the exploitation of the yield potential and these needs to be addressed. The state-wise yields obtained both under improved technology and farmers' practice ranges from 12 to 110% between states and the national average being 36%. The additional production that can be attained by exploiting the yield gap at national level is about 2 million tonnes (Kumar and Chauhan, 2005) [5]. Bijnor district has the sizeable area (2108 ha) under mustard cultivation but the productivity level is very low (1039 kg/ha) during 2010-11. Therefore, keeping the above point in view, the FLDs on mustard using integrated crop management technology was started with the objectives of showing the productive potentials of the new production technologies under real farm situation over the locally cultivated mustard crop.

Materials and Methods

The present study was carried out by the Krishi Vigyan Kendra, Nagina (Bijnor) under Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut during *rabi* season of 2009-10 and 2010-11 (02years) at the farmers' fields of different villages of Bijnor district in

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North-Western Plain Zone of Uttar Pradesh. Totally 21 frontline demonstrations were conducted in 10 ha area. Materials for the demonstrations with respect to FLDs and farmers' practices were given in Table 1. In case of farmers practice plots, existing practices being used by farmers were followed. In general, soils of the area under study were loam in texture and medium to low in fertility status. The FLDs were conducted to study the gaps between the potential yield and demonstration yield, extension gap and technology index. In the present evaluation study, the data on output of mustard cultivation were collected from FLD plots, besides the data on local practices which is commonly adopted by the farmers of this region were also collected. In demonstration plots, a few critical inputs in the form of sulphur, borax and agrochemicals etc. were provided and nonmonetary inputs like timely sowing in lines, thinning timing and proper weed management were also performed, whereas, traditional practices were maintained in case of local checks. 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 technologies demonstrated are mentioned in Table 1 and compared with local practices. The technology gap, extension gap and technology index were calculated using the following formulae's given by Samui *et al.*, 2000.

1. Technology gap = Potential yield - Demonstration yield
2. Extension gap = Demonstration yield - yield under existing practice
3. Technology index = $\{(Potential\ yield - Demonstration\ yield)/Potential\ yield\} \times 100$.

The satisfaction level of participating as well as neighbouring farmers' for the performance of improve demonstrated technology was also assessed. In all, 105 participating farmers' were selected to measure satisfaction level of farmers' for the performance of improve technology. The selected respondents were interviewed personally with the help of a pre-tested and well-structured interview schedule. Client Satisfaction Index was calculated as below.

4. Client satisfaction index = $(Individual\ score\ obtained / Maximum\ score\ possible) \times 100$.

The data collected were tabulated and statistically analysed to interpret the results. The economic-parameters (gross return, net return and B: C ratio) were worked out on the basis of prevailing market prices of inputs and Minimum Support Prices of outputs.

Results and Discussion

Mustard Yield

The data (Table 2) indicated that the frontline demonstration has given a good impact over the farming community of Bijnor district as they were motivated by the new agricultural technologies applied in the demonstrations. Results of 21 frontline demonstrations conducted during 2009-10 and 2010-11 in 10 ha area on farmers fields indicated that the cultivation practices comprised under FLD *viz.*, balanced application of fertilizers (N:P:K@ 120:60:60 kg/ha with 40 kg/ha sulphur), line sowing, timely weed management and timely control of mustard disease and insects *viz.* Alternaria blight, White rust & aphid through fungicide & insecticide, produced on an average 1550 kg/ha mustard yield, which was 14.5% higher compared to prevailing farmers practice (1295 kg/ha). Kumar and Yadav (2007) [6] also reported that recommended dose of phosphorus and sulphur increase the yield and quality of

Indian mustard.

Technology and Extension gap

The technology gap observed may be attributed to the dissimilarity in the soil fertility status and weather conditions. Hence, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations. The extension gaps ranged from 240 to 270 kg/ha during the period of demonstration emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinuance of old varieties with the new technology.

Technology index

The technology index shows the feasibility of the evolved technology at the farmers' fields. The lower value of technology index more is the feasibility of the technology. The data (Table 2) showed that maximum technology index value 30.91% was noticed in the year 2009-10 followed by 28.81% (2010-11) whereas, average value of technology index of 29.55%, it may be due to uneven & erratic rainfall and weather conditions of the area. The finding of the present study is in line with the findings of Hiremathand Nagaraju (2009) and Dhaka *et al.* (2010) [2].

Cost of cultivation, Gross and Net return

The economics (Cost of cultivation, gross & net return) of mustard under front line demonstrations were estimated and the results have been presented in Table 3. The front line demonstrations plots recorded higher average gross returns (Rs. 31000 / ha) and net return (Rs. 18865 / ha) with higher benefit cost ratio (2.56) compared to farmers practice.

Additional cost of cultivation & Return and BC Ratio

Further, data (Table 4) shows that the average additional cost of cultivation (Rs.1525/ha) under integrated crop management demonstrations and has yielded additional net returns of Rs. 5100 per hectare. The results suggest that higher profitability and economic viability of mustard demonstrations under local agro-ecological situation.

Farmer's satisfaction

The extent of satisfaction level of respondent farmers over performance of demonstrated technology was measured by Client Satisfaction Index (CSI) and results presented in Table 5. It is observed that majority of the respondent farmers expressed high (47.62%) to the medium (38.10%) level of satisfaction regarding the performance of FLDs, whereas, very few (14.29%) of respondents expressed lower level of satisfaction. The higher to medium level of satisfaction with respect to performance of demonstrated technology indicate stronger conviction, physical and mental involvement of in the frontline demonstrations which in turn would lead to higher adoption. The results are in close conformity with the results of Kumaran and Vijayaragavan (2005) [7] and Dhaka *et al.* (2010) [2].

Table 1: Details of package of practices followed in the Front Line Demonstrations

S.N.	Inputs	Quantity per hectare	
		Demonstration	Farmers practice
1	Mustard variety	Pusa Bold	Pusa Bold
2	Seed rate	5 kg/ha	6.5 kg/ha
3	Seed treatment (Metalaxyl)	1.5 g/kg seed	-
4	Di-ammonium phosphate (DAP)	130 kg/ha	100 kg/ha
5	Urea	200 kg/ha	200 kg/ha
6	MOP	100 kg/ha	-
7	Sulphur	40 kg/ha	25 kg/ha
8	Borax	1.0 kg/ha	-
9	Thinning	After 15 -20 days	After 40 - 45 days
10	Insecticides	Imidacloprid @ 250 ml/ha	Indosulphan @ 1.0 lit./ha
11	Fungicides (Mancozeb)	Mancozeb @ 2.0 kg/ha	Mancozeb @ 2.0 kg/ha
12	Weeding	Use of Pendimethalin	Manual weeding

Table 2: Yield performance of mustard under FLDs at farmers' field

Year	No. of demo.	Area (ha)	Yield (kg/ha)		% yield Increase over FP	Techno logy gap (kg/ha)	Extension gap (kg/ha)	Techno logy Index (%)
			Demo	FP				
2009-10	6	5	1520	1280	14.2	680	240	30.91
2010-11	15	5	1580	1310	14.8	620	270	28.18
Mean	21	10	1550	1295	14.5	650	255	29.55

Table 3: Economic performance of mustard under FLDs at farmers' field

Year	Cost of cultivation (Rs./ha)		Gross return (Rs./ha)		Net return (Rs./ha)	
	Demo	FP	Demo	FP	Demo	FP
2009-10	11820	10420	30400	25600	18580	15180
2010-11	12450	10800	31600	26200	19150	15400
Mean	12135	10610	31000	25900	18865	15290

Table 4: Additional economic performance of mustard under FLDs at farmers' field

Year	Additional Cost of cultivation (Rs./ha) in Demonstration	Additional Return (Rs./ha) in Demonstration	B C Ratio	
			Demonstration	Farmers practice
2009-10	1400	4800	2.57	2.46
2010-11	1650	5400	2.54	2.43
Mean	1525	5100	2.56	2.44

Table 5: Extent of farmers satisfaction over performance of FLDs (n=105)

Satisfaction level	Number	Per cent
High	50	47.62
Medium	40	38.10
Low	15	14.29

Conclusion

It may be concluded that the frontline demonstrations on integrated crop management technology in mustard crop has found more productive, profitable and feasible in North-Western Plain Zone of Uttar Pradesh as compared to prevailing farmers practice under real farming situations. Farmers were motivated by results of demonstrations of integrated crop management practices in mustard and they would adopt these technologies in the coming years. This will substantially increase the income as well as the livelihood of the farming community.

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