Evaluation of On-Farm Front Line Demonstrations on the Yield of Mustard in Central Plains Zone of Uttar Pradesh

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ABSTRACT

Mustard is one of the most important oilseeds crop in India, which plays a major role in supplementing the income of small and marginal farmers of Lucknow district in Central Uttar Pradesh. 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 under IISR, Lucknow had conducted frontline demonstrations at adopted farmers' fields.Cultivation practices comprised under FLD viz., use of improved variety, line sowing, balanced application of fertilizers and control of mustard aphid through insecticide at economic threshold level showed that percent increase in the yield of mustard ranged from 41.96% to 49.19% over local check during the course of study from 2002-03 to 2005-06. The technology gap of 3.6q/ha as minimum during 2006-07 to maximum of 8.1q/ha at the initial stage of study (2002-03) shows the gap in demonstration yield over potential yield, but the above gap reduced subsequently in the following years.

Key words : *Frontline demonstration, technology gap, extension gap, technology index, mustard.*

Oilseed crops and rapeseed-mustard group of crops account for 14.1 and 3% of the gross cropped area in India, respectively. Rapeseed-mustard is the major source of income especially even to the marginal and small farmers in rainfed areas. Because of its low water requirement (80-240 mm), rapeseed mustard crops fit well in the rainfed cropping system. Among the oilseed crops, rapeseed-mustard ranked next to ground nut (*Arachis hypogaea* L.) and soybean [*Glysine max* (L.)] in contribution to the oilseed production. They are being cultivated in 26 states in the northern and eastern plains of the country occupying about 6.75 million ha area during 2004-05. Nearly 34% area is rainfed under these crops (Kumar and Chauhan, 2005).

Indian mustard [*Brassica juncea* (*L.*) Czernj. & Cosson] is predominantly cultivated in Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and Gujarat. Uttar Pradesh accounts for 10.85% and 11.19% of area and production, respectively in the country with the average yield of 11.49 q/ha which is equivalent to the national average (11.17q/ha). The mustard production scenario in the country has undergone a sea change. The main contributors to such transformations have been (i) availability of improved oilseeds production technology and its adoption, (ii) expansion of cultivated area, (iii) price support policy and (iv) institutional support, particularly establishment of technology mission on oilseeds in 1986 (Hegde, 2004).

The improved technology packages were also found to be financially attractive. Yet, adoption levels for several components of the improved technology were low, emphasizing the need for better dissemination (Kiresur etal, 2001). Several biotic, abiotic and socio-economic constraints inhibit 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 tones (Kumar and Chauhan, 2005). Lucknow district has the sizeable area under mustard cultivation but the productivity level is very-very low. Keeping the above point in view, the FLD on mustard using new crop production 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.

METHODOLOGY

The present study was carried out by the Krishi Vigyan Kendra under IISR, Lucknow during rabi season from 2002-03 to 2006-07 (5years) in the farmers' fields of eight adopted villages viz., Dahiar, Pakra, Matera, Udhavatkhera, Beniganj, Ismailnagar, Rasoolpur and Dhanuansand of Lucknow district in Central Plains Zone of Uttar Pradesh. In total 194 frontline demonstrations in 40 ha area in

different villages were conducted. Materials for the present study with respect to FLDs and farmers' practices were given in Table 1. In case of local check plots, existing practices being used by farmers were followed. In general, soils of the area under study were sandy loam to loamy sand and medium to low in fertility status. The FLD was 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 commonly adopted by the farmers of this region were also collected.

In demonstration plots, a few critical inputs in the form of quality seed, balanced fertilizers, agro-chemicals etc. were provided and non-monetary inputs like timely sowing in lines and timely weeding 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.

Table 1. Particulars showing the details of mustard growing under FLD and existing practices

S.No.	Operation	Existing practice	Improved practices demonstrated
1.	Use of seed	Local seed	*Pusa Jaikisan*, an improved variety from IARI , New Delhi. Line sowing by country plough followed by thinning at 30
2.	Sowing method	Broadcasting	DAS 120:40:40 (Kg N: P: K/ha); P through single super phosphate as it contains 12% sulphur. Three sprayings of dimethoate 30EC@625, 850 and
3.	Fertilizer application	80:40:0 (Kg N:P:K/ha)	1000 ml dissolved in 625, 850 and 1000 liters of water/ha, respectively at
4.	Control of mustard aphid	No any control measure	15 days interval when aphid reached the economic threshold i.e. 44 aphids/ cm central twig.

Table 2. Exploitable productivity, technology gaps, technology index, extension gaps and cost benefit ratio of mustard as grown under FLD and existing package of practices.

Year	Area (ha)	No. of FLDs	Yield (q/ha)		%increase over existing	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)	Cost benefit ratio	
			FLD	Existing practice					FLD	Existing practice
2002-03	10	52	15.9	11.2	41.96	4.7	8.1	33.75	1.96	1.12
2003-04	05	26	16.6	11.5	44.35	5.1	7.4	30.83	2.06	1.15
2004-05	10	61	18.5	12.4	49.19	6.1	5.5	22.92	2.31	1.19
2005-06	05	30	19.2	13.2	45.45	6.0	4.8	20.00	2.42	1.24
2006-07	10	25	20.4	13.7	48.91	6.7	3.6	15.00	2.60	1.29

* Technology gap = Potential yield - Demonstration yield
* Extension gap = Demonstration yield - yield under existing practice
* Technology index = {(Potential yield - Demonstration yield)/Potential yield} x 100

* The soil texture of demonstration plots ranged from sandy loan to loamy sand and medium to low in fertility status.

RESULTS AND DISCUSSION

Results of 194 frontline demonstrations conducted during 2002-03 to 2006-07 in 40 ha area on farmers' fields of eight villages of Lucknow district indicated that the cultivation practices comprised under FLD viz., use of improved variety (*Pusa Jaikisan*), line sowing, balanced application of fertilizers (N:P:K@120:40:40 kg/ ha-1) and control of mustard aphid through insecticide at economic threshold level, produced on an average 45.97% more yield of mustard as compared to local check (12.4q/ ha). The results indicate that the frontline demonstration has given a good impact over the farming community of Lucknow district as they were motivated by the new agricultural technologies applied in the FLD plots. Data further showed that the yield of mustard in the following years increased successively which clearly speaks of the positive impact of FLD over existing practices of mustard cultivation (Table 2). Moreover from first year onwards, farmers cooperated enthusiastically in carrying out of FLDs which lead to encouraging results in the subsequent years. 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 highest extension gaps which ranged from 4.7q/ ha to 6.7q/ha during the period of study 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.

The technology index shows the feasibility of the evolved technology at the farmers' fields. The lower the value of technology index more is the feasibility of the technology. As such, reduction of technology index from 33.75% (2002-03) to 15.00% (2006-07) exhibited the feasibility of technology demonstrated (Table 2).

CONCLUSION

By conducting frontline demonstrations of proven technologies, yield potential of mustard can be increased to a great extent. This will substantially increase the income as well as the livelihood of the farming community. There is a need to adopt multi-pronged strategy that involves enhancing mustard production through improved technologies in Lucknow district. This should be brought to the access of farmers through transfer of technology centers like KVKs.

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