IJPS INTERNATIONAL JOURNAL OF PLANT SCIENCES
Volume **9** | Issue 1 | January, 2014 | 180-182

RESEARCH ARTICLE

Yield gap analysis of mustard through front line demostration in district Sonbhadra, U.P.

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SUMMARY

The front line demonstration of mustard was conducted on 25 hectare area with the active participation of 60 farmers during 2005-06 to 2009-10 in five adapted villages of district Sonbhadra. All the scientific practices were followed on the demonstration plot and traditional practices were maintained on the control plot as a local check. The data on yield parameters were collected from FLD plots as well as control plots and finally the extension gap, technology gap and technology index were worked out. The five year average yield of demonstration plot was recorded 15.24 q/ha over local check (9.32 q/ha) with an additional 40.75 % increase in average mustard productivity. The average technology gap and technological index were found 9.76 and 40.62, respectively. The result shows that the study (FLD) had positive effect over the existing practices toward enhancing the yield of mustard in district Sonbhadra. Higher range of extension gap and technology gap were also observed during the study. Therefore, a proper extension strategy may reduce the extension and technology gap leading toward enhanced production and productivity of mustard in the district Sonbhadra.

Key Words : Front line demonstration, Adoption, Technological gap, Extension gap, Technology index, Mustard

How to cite this article : Ram, Siya and Anand, R.K. (2014). Yield gap analysis of mustard through front line demostration in district Sonbhadra, U.P. *Internat. J. Plant Sci.*, **9** (1): 180-182.

Article chronicle : Received : 27.09.2013; **Revised :** 07.11.2013; **Accepted :** 16.11.2013

Oilseed crops play an important role in agricultural economy of India. It accounts for 14.1 % gross cropped area of the country (Singh *et al.*, 2007) and production of 24.88 million ton (Jha *et al.*, 2011). Among the oilseeds crops, mustard occupies a prominent position in Indian oilseeds scenario. Mustard is the major source of income, especially for the marginal and small farmers in the rain-fed areas. Because of low water requirement, mustard crop fit well in the rainfed cropping system. The contribution of mustard to the total oilseed acreage (5.53 m ha) and production (6.41 m ton) in India during 2009-10 was 23.7% and 26.0%, respectively (DRMR, 2011). Rajasthan, Uttar Pradesh, Haryana and Madhya Pradesh are the major mustard producing states with a production share of 48.6 %, 13.4 %, 11.4 % and 9.8 %, respectively. Due to the ever increasing population of country the demand of edible oil is increasing with an annual growth of 3.54 %, with this rate up to the year 2030 102.30 million ton of oil seeds would be required. If the contribution of rapeseed-mustard to the total annual oilseeds production is considered 20-25%, then production of 16.4 to 20.5 million ton mustard would be required. This target could be achieved through area expansion and/or increase in productivity of rapeseed-mustard (DRMR, 2011). But, there is a very little scope of area expansion of mustard crop. Therefore, production would be increased mostly through increase in productivity per unit of land. This can be achieved by decreasing the yield gap and technology gap through a proper extension strategy.

Keeping the above point in view, the front line demonstration on mustard was conducted on different sites of district Sonbhadra during 2005-06 to 2009-10 with the objectives of showing the productive potentials of the new

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Table A : Comparison between demonstration package and existing practices under mustard FLD

Particulars	Mustard	
	Demonstration package	Farmers practice
Farming situation	Semi irrigated	Semi irrigated
Variety	NDR -8501	Varuma, Pusa bold and Pvt. Hybrid.
Time of sowing	10-15 Oct.	5-10 Nov.
Method of sowing	Line sowing	Broadcasting
Seed treatment	2 gram thiram + 1 gram Bavistin per kg seed.	Without seed treatment.
Seed rate	5kg/ha	7.5 kg/ha
Fertilizer close	NPKS (40:30:0:20)	20:20:0:00
Plant protection	Need based application of immidachloprid 17.8 SL or dimethoate 30 EC + sulfex to protect the crop from sucking pests and disease	Nil
Weed management	Pandimethalin @ 0.3 kg A.I. / ha as pre-emergence followed by one hand weeding at 35 DAS	Nil

production technologies under real farm situation over the locally cultivated mustard crop.

MATERIAL AND METHODS

District Sonbhadra falls under Vindhyan Zone of Uttar Pradesh. It is one of the backward districts of Uttar Pradesh. The district lies between 23.52^0 and 25.32^0 North latitude and $82.72^{\,0}$ and 83.33^0 East longitude. The district is characterized by warm and humid climate from June to September and dry and cool weather from October to February-March. April to June is characterized by hot winds. The mean maximum and minimum temperature was 45.8^0C and 2.8^0C, respectively. The average rainfall received in the district in during the study period was much below from the normal average of 997mm. Oil seed and pulses has an important role in the cropping system and socio economic condition of the district. Mustard and sesamum are very important oil seed crops of the study area which give good benefit to the farmers under the rainfed conditions. Maximum part of the study area is covered with red laterite soil (61 %) followed by black cotton soil (36%).

Present study was carried out by Krishi Vigyan Kendra Sonbhadra (U.P.) during *Rabi* season from the year 2005-06 to 2009-10 (five consecutive years) in the farmers field of five adopted villages namely Dehri, Durawal Kala, Mandaha, Bishrekh and Fulwari of Sonbhadra district. During these five years of study, an area of 25.0 ha was covered under front line demonstration with active participation of 60 Farmers. Before conducting front line demonstration (FLDs) farmers were selected on the basis of survey and group discussion in the villages, after that specific skill training was imparted to the selected farmers regarding different aspects of cultivation of mustard. In demonstration plots, use of improved variety quality seeds, line sowing and timely weeding as well as balanced fertilization (using micronutrient with sulphur) was emphasized and comparison has been made with the existing practices (Table 1). The necessary step for selection of site and farmers, layout of demonstration etc. were followed as suggested by Chaudhary (1999). The traditional practices were maintained in case of local checks. The data on output were collected from both FLD plots as well as control plots and finally the extension gap, technology gap, technology index along with the benefit - cost ratio were worked out as per the formula adopted by Chaudhary (1999), (Singh *et al.*, 2007) and Dwivedi *et al.* (2013).

Technology gap = Potential yield – Demonstration yield
Extension gap = Demonstration yield – Farmers yield

$$\textbf{Technology index} = \frac{\textbf{Potential yield – Demonstration yield}}{\textbf{Potential yield}} \textbf{ x 100}$$

RESULTS AND DISCUSSION

The result presented in Table 1 revealed that the yield of mustard fluctuated successively over the years in demonstration plot. The average yield of five years recorded 15.24 q/ha over control 9.32 (q/ha) and the maximum yield was observed (19.89 q/ha) during 2009-10 and minimum (10.66 q/ha) during 2005-06. The increase in percentage of yield was ranged between 27.69 – 48.46 per cent during the five year of study with an average increase of 40.75 per cent. The result is in conformity with the finding of Tiwari and Saxena (2001) and Tiwari *et al*. (2003). The results clearly indicated the positive effect of FLDs over the existing practices toward enhancing the yield of mustard in the study area, with its positive effect on yield attributes. The yield parameters *viz*., number of siliqua per plant, number of seed/siliqua and test weight of demonstration plot were ranged between 90-105, 30-33 and 3.30 to 3.60, respectively which were higher in comparison to control plot (Table 2).

The extension gap showed an increasing trend. The extension gap ranged between 2.70-9.64 q/ha during the period of study (Table 1), which emphasizes the need to disseminate the improved mustard technologies by educating the farmer through various extension strategies, so that this type of extension gaps could be narrowed down. A higher range of technology gap (5.11-14.34 q/ha) was also observed with the average of 9.76 q/ha, which reflects farmers cooperation in carrying out such demonstrations with encouraging results in subsequent years. The higher range of observed technology

Table 1 : Productivity, technology gap, extension gap and technology index in mustard under FLD

Year	Area (ha)	No. of farmer	Seed yield (q/ha)			% Increase over cont.	Tech. Gap (q/ha)	Ext.gap (qt./ha)	Tech. index (%)
			Potential	Demo.	Cont.				
2005-06	5.0	12	25.0	10.66	7.50	42.13	14.34	3.16	57.36
2006-07	5.0	12	25.0	12.46	9.75	27.69	12.55	2.70	50.20
2007-08	5.0	12	25.0	15.65	8.35	46.64	9.35	7.30	37.40
2008-09	5.0	12	25.0	17.57	10.75	38.81	7.43	6.82	37.72
2009-10	5.0	12	25.0	19.89	10.25	48.46	5.11	9.64	20.44
Average	25	60	25.0	15.24	9.32	40.75	9.76	5.92	40.62

Table 2 : Yield parameters under demonstration package and existing farmers practices

Sr. No.	Yield parameters	Demo. package	Existing farmers practices
1.	No. of siliqua per plant	90-105	70-78
2.	No. of seeds per siliqua	30-32	24-26
3.	Test weight	3.30-3.60	2.57-2.8

gap may be attributing to the dissimilarity in soil fertility status and weather conditions. Similar findings were also reported by Ahmad *et al*. (2013) and Katare *et al*. (2011).

The technology index showed the feasibility of the evolved technology at the farmers field. The lower the value of technology index more is the feasibility of technology (Singh *et al*., 2007). In this regard higher fluctuations in technology index (20.44 - 57.36) was observed in the present study, which may be due to the dissimilarity in socio economic, climatic, edaphic, biological factors (insect-pests attack) and availability of irrigation water. This finding is in conformity with that of Dwivedi *et al*. (2013) in which they reported an average technology index of 40.75 % for the mustard crop in rain fed conditions of Vindhyan region of Uttar Pradesh.

From the findings of present study, it can be concluded that use of latest technologies of mustard cultivation can reduce the technology gap to a considerable extent resulting in to increased productivity of mustard in the district Sonbhadra. It requires collaborative extension efforts to enhance adoption level of location and crop specific technologies among of the farmers for bridging these gaps. Therefore, extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods for better oilseed production in the district.

Acknowledgement:

The authors acknowledge the financial support rendered by Zonal Project Director, ICAR, Zone IV, Kanpur. Authors are thankful to the farmers who conducted demonstration on their field. Thanks are also due to Programme Coordinator, K.V.K. Sonbhadra, Director Extension and Hon'be Vice chancellor, N. D. University of Agriculture and Technology, Faizabad, U.P. for providing necessary facilities and their continuous encouragement.

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