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Research Article

Yield gap analysis of rapeseed-mustard through front line demonstrations in Mandsaur district

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SUMMARY : Front line demonstrations (FLD) of oilseeds on farmers' field was initiated during 1990-91 under the financial support of Department of Agriculture and Cooperation, Govt. of India. The basic objective of FLDs is to demonstrate improved proven technology of recently released, early maturing, high yielding, bold seeded, disease resistant varieties with IPNM, IWM and IPM at farmers field through KVKs to bring in enhanced application of modern technologies to generate yield data and collection of farmers feedback. Front line demonstration is an appropriate tool to demonstrate recommended technologies among the farmers. Krishi Vigyan Kendra, Mandsaur (M.P.) conducted 64 demonstrations on mustard *variety Vasundhra,Pusa Jai Kisan,Pusa Jaggnath and Pusa Agrani* since 2007-08 to 2011-12 in five adopted villages Guraria dida,Udpura,Surkhera,Lasudawan and Barkhedadev dungari. The critical inputs were identified in existing production technology through farmers meetings and group discussions with the farmers. The average five years data revealed that an average yield of demonstration plot was obtained 19.30 q/ha. over local check (15.49/ha) with an additional yield of 3.81q/ha and the increase average mustard productivity by 24.60 per cent. The average technological gap and technological index were found to be 169.6 kg/ha. and 8.08 per cent, respectively.

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KEY WORDS :
Demonstration, Mustard, Local check, Gap analysis, Economics, Grain yields

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BACKGROUND AND OBJECTIVES

Mustard has been an important crop to India for a long period of time. At an average India produces around 5 million tones of rape/mustard annually. It stands at the 3rd position in the list of rape/mustard producing countries contributing around 11 per cent of the world's total production. Also it is the third largest producer of mustard/ rape oil in the world. Mustard is cultivated in mostly under temperate climates. It is also grown in certain tropical and subtropical regions as a cold weather crop. Indian mustard is reported to tolerate annual precipitation of 500 to 4200?mm, annual temperature of 6 to 27°C, and pH of 4.3 to 8.3. Rapeseed-mustard follows C3 pathway for carbon assimilation. Therefore, it has efficient photosynthetic response at 15–20°C temperature. At this temperature the plant achieve maximum CO_2 exchange range which declines thereafter. Moderately tolerant to soil acidity, preferring a pH from 5.5 to 6.8, thrives in areas with hot days and cool night and can fairly sustain drought. Mustard requires well-drained sandy loam soil. Rapeseed-mustard has a low water requirement (240–400?mm) which fits well in the rainfed cropping systems. Nearly 20 per cent area under these crops is rainfed. A review is prepared on advances on agronomic practices for enhancing the rapeseed-mustard production in India. A review of the work done on the different aspects in India and abroad especially under advance agronomic practices is done in this paper.

Total area under mustard cultivation is 29300 hectares with the productivity of 1073 kg/ha in Mandsaur district, which need to be increased total least 1.5 tons per hectare by 2015 (Hegde,2005) and this indicating the shortfall which is to be minimized either by increasing

the area under oilseeds or by increasing the productivity levels of oilseeds. Till date the productivity level of mustard is not sufficient on account of several biotic and a biotic stresses besides unavailability of quality seeds of improved varieties in time and poor crop management practices due to unawareness and non-adoption of recommended production and plant protection technologies. Therefore, it is very essential to demonstrate the high yielding varieties, resistant to biotic and a biotic stresses and other production technologies to which the farmers generally do not adopt. Recognizing the importance of oilseeds in Indian Agriculture and urgent need to ensure house hold nutritional security, the Ministry of agriculture, Govt.of India has taken the innovative methodology to boost up the production of oilseeds crops by establishment of Technology Mission on Oilseeds in 1986 which paved the way to meet different challenges and complexities in the oilseed sector (Hegde, 2005). A wide gap exists in oilseeds production between the available techniques and its actual application by the farmers which is reflected through poor yield in the farmers' fields. There is a tremendous opportunity for increasing the production and productivity of mustard crop by adopting the improved technologies.There are so many appropriate technologies generated at agricultural universities and research stations but the productivity of mustard is still very low due to poor transfer of technology from the points of its development to the points of its utilization and only a little new knowledge percolates to the farmers fields, hence, a vast gap has been observed between knowledge production and knowledge utilization. To achieve target of additional production of oilseeds, it is necessary to concentrate efforts on scientific cultivation of mustard, the most important122 Indian Res. J. Ext. Edu. 12 (3), September, 2012 oilseed crop of India. Therefore, front line demonstrations (FLD) of oilseeds on farmers' field was initiated during 1990-91 under the financial support of Department of Agriculture and Cooperation, Govt. of India. The basic objective of FLDs is to demonstrate improved proven technology of recently released, early maturing, high yielding, bold seeded, disease resistant varieties with IPNM, IWM and IPM at farmers field through KVKs to bring in enhanced application of modern technologies to generate yield data and collection of farmers feedback. Keeping the importance of FLDs, the KVK Mandsaur conducted demonstrations on oilseed crops mustard at farmer's field under irrigated situations in *Rabi* 2007-08, 2008-09, 2009-10, 2010-11and 2011-12.

Objectives :

- To exhibit the performance of recognized and recommended high yielding mustard varieties with full recommended package of practices for harvesting higher crop yields
- To compare the yield levels of local check (farmers' field) and FLD fields
- To collect feedback information for further improvement in research and extension programme.

RESOURCES AND METHODS

Front line demonstrations on Mustard were conducted at farmers' field in district Mandsaur (Madhya Pradesh) to assess its performance during *Rabi* seasons of the year 2007 -08, 2008-09, 2009-10, 2010-11 and 2011-12. Each demonstration was of one acre area and using recommended package of practices and the farmers were provided quality seed of Mustard variety *Vasundhra, PusaJai Kisan,Pusa jaggnath* and *pusa agrani* during all the years of the study. The sowing was done during first week of October to last week of October under assured irrigated conditions and harvested during first fortnight of March. The demonstrations on farmers' fields were regularly monitored by Krishi Vigyan Kendra, Mandsaur scientist's right from sowing to harvesting. The grain yield of demonstration crop was recorded and analyzed. Different parameters as suggested by Yadav *et al*. (2004) were used for calculating gap analysis, costs and returns. The detail of different parameters is as follows:

$$\text{Extension gap} = \text{Demonstration yield} - \text{Farmers practice yield}$$

$$\text{Effectivegain} = \text{Additional return} - \text{Additional cost}$$

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstration yield}$$

$$\text{Additional return} = \text{Dem.return} - \text{Farmers practice return}$$

$$\text{Incremental B : C ratio} = \frac{\text{Additional return}}{\text{Additional cost}}$$

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

OBSERVATIONS AND ANALYSIS

The experimental findings obtained from the present study have been discussed in following heads:

Grain yield :

The increase in grain yield under demonstration was 18.72 to 35.20 per cent than farmers' local practices. On the basis of five years, 24.60 per cent yield advantage was recorded under demonstrations carried out with improved cultivation technology as compared to farmers' traditional way of mustard cultivation.

Gap analysis :

An extension gap of 319-439 kg per hectare was found between demonstrated technology and farmers practices during different five years and on average basis the extension

gap was 381.20 kg per hectare (Table 1). The extension gap was lowest (319 kg/ha) during 2011-12 and was highest (439 kg/ha) during 2007-08. Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than the traditional farmers' practices.

Wide technology gap was observed during different years and this was lowest (0 kg/ha) during 2010-11 and was highest (417 kg/ha) during 2007-08. On five years average basis the technology gap of demonstrations was found as 169.6 kg per hectare. The difference in technology gap during different years could be due to more feasibility of recommended technologies during different years. Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology.

Economic analysis:

Different variables like seed, fertilizers, bio fertilizers and pesticides were considered as cash inputs for the demonstrations as well as farmers practice and on an average an additional investment of Rs. 1452 per ha was made under demonstrations. Economic returns as a function of grain yield and sale price varied during different years.

Maximum returns (Rs. 10034 per ha) during the year 2011-12 was obtained due to higher grain yield and higher sale rates as declared by GOI. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The lowest and highest incremental benefit: cost ratio (IBCR) were 2.99 and 6.92 in 2008-09 and 2011-12, respectively (Table 2) depends on produced grain yield and sale rates. Overall average IBCR was found as 5.534 the results confirm the findings of front line demonstrations on oilseed and pulse crops by Yadav *et al.* (2004) and Lathwal (2010).

Conclusion :

The front line demonstration (FLDs) plays a very important role to disseminate recommended technologies because it shows the potential of technologies resulting in an increase in yield at farmers' level. Under demonstrations some specific technologies like seed treatment, seed rate, improved varieties, balance use of fertilizer, intercultural and plant protection measures were undertaken in a proper way. These technologies were found to be the main reason for increase in the yield and thus it can be said that FLDs were the most successful tools for transfer of technology. The demonstration farmers acted also as primary source of information on the improved practices of black gram cultivation and also acted as source of good quality pure seeds in their locality and surrounding area for the next crop. The concept of front line demonstration may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community.

Table 1 : Grain yield and gap analysis of front line demonstrations on mustard at farmer's field

Year	No. of demo.	Variety/ technology	Potential yield (kg/ha)	Demo yield (kg/ha)	Farmers practice (kg/ha)	Increase (%)	Extension gap (kg/ha)	Technology gap (kg/ha)	Technology index (%)
2007-08	13	Vasundhra	2100	1683	1244	35.20	439	417	19.86
2008-09	13	Pusa Jai Kisan	2100	1792	1465	22.30	327	308	14.67
2009-10	12	Pusa Jagnnath	2100	2054	1575	30.41	479	46	2.19
2010-11	13	Pusa Agrani	2100	2100	1758	19.45	342	0	0
2011-12	13	Pusa Agrani	2100	2023	1704	18.72	319	77	3.67
Average	13		2100	1930.40	1549.20	24.60	381.20	169.6	8.08

Table 2 : Economic analysis of front line demonstrations on mustard at farmer's field

Year	Cost of cultivation (Rs./ha)		Additional cost in Demo.	Gross return (Rs./ha)		Net returns (Rs./ha)		Additional return in demo.	Effective gain	INC B:C ratio
	Demo.	FP	(Rs./ha)	Demo.	FP	Demo.	FP	(Rs./ha)	(Rs./ha)	(IBCR)
2007-08	8000	6500	1500	37026	26568	29026	20068	8958	7458	5.97
2008-09	10370	8565	1805	39424	32230	29054	23665	5389	3585	2.99
2009-10	10370	8965	1405	45188	35050	34818	26085	8733	7328	6.22
2010-11	10900	9800	1100	46200	38676	35300	29176	6124	5024	5.57
2011-12	12150	10700	1450	72828	61344	60678	50644	10034	8584	6.92
Average	10358	44530	1452	48133.2	38773.6	37775.2	29927.6	7847.6	6395.8	5.53

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