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Yield gap analysis of rapeseed-mustard through front line demonstrations in agro climatic zone IVa of Rajasthan

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Abstract

The present study was carried out at Krishi Vigyan Kendra, Rajsamand to know the yield gaps between improved package and practices (IP) under Front Line Demonstration (FLD) and farmer's practice (FP) of rapeseed-mustard crop. The study found, the yield of rapeseed-mustard in IP under irrigated conditions ranges from 15.89 to 18.64q/ha whereas in FP it ranges between 12.53 to 14.02q/ha. The per cent increase in yield with IP over FP was recorded in the range of 26.82 to 33.14. The extension gap and technological index were ranging between 3.36-4.64q/ha and 22.33-33.79 per cent, respectively. The trend of technology gap reflected the farmer's cooperation in carrying out demonstrations with encouraging results in subsequent years. The cost benefit ratio was 3.19 to 3.52 under demonstration, while it was 2.36 to 2.69 under control plots. By conducting front line demonstration of proven technologies, yield potential of rapeseed –mustard crop could be enhanced to a great extent with increase in the income level of the farming community.

Key words: *Rapeseed-mustard, FLD, technological gap, extension gap, technological index*

Introduction

Edible oilseed crops have significant contribution in Indian agriculture. Oilseeds form the second largest agricultural commodity in India after cereals sharing 14% of the gross cropped area and accounting for nearly three per cent of gross national product and 10% value of all agricultural products. The continuous increase in import of oil-seeds crops, mustard occupies a prominent position in Indian oilseeds scenario. The total area under rapeseed-mustard was 6.79 million hectares with a total production of 7.44 million tones, contributing 30.64% of the total production of oilseed in India (Anonymous, 2005). Indian mustard [*Brassica juncea* (L) Czern & Coss] is the major oilseed crop grown in Rajasthan during *rabi* season. In Rajasthan, the productivity of rapeseed-mustard was 1266kg/ha during 2008-09, 27.37lakh ha area under cultivation and total production was 34.65 lakh tons (2009-10). The yield levels also have been variable ranging from 854 (2002-03) to 1142 kg/ha (2009-10) during the past eight years. Though rapeseed-mustard group of crops occupy prominent position in the state oilseeds scenario but vast yield gap exists between potential yield and yield under real farming situation.

The available agricultural technology does not serve the very purpose until its reaches and adopted by its ultimate users the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users (Prasad *et. al.*, 1987). Conducting of Front Line Demonstrations on farmer's field help to identify the constraints and potential of the rapeseed–mustard in specific area as well as it helps in improving the economic and social status of the farmers. The aim of the front line demonstration is to convey the technical message to farmers that if they use recommended package and practices then the yield of this crop can be easily doubled than their present level.

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 *et al*., 2001; Sharma, 2003). Several biotic, abiotic and socio-economic constraints inhibit exploitation of the yield potential and these needs to be addressed. Rajsamand district has the sizeable area under mustard cultivation but the productivity level is very low. The reasons for low productivity are poor knowledge about newly released crop production and protection technologies and their management practices in the farmers' fields. Keeping the above point in view, the FLD,s on rapeseed-mustard using improved production technologies was conducted with the objective of showing the productive potentials of the new production technologies under actual farm situation.

Materials and Methods

The present study was carried out by the Krishi Vigyan Kendra, Rajsamand during *Rabi* season from 2006-07 to 2010-11(five consecutive years) in the farmers' fields in fifteen adopted villages *viz.*, Pipli Ahiran, Meghakhera, Gogathala, Bethumbi, Jeetawas, Jeewakhera, Lathiakheri, Madara, Sakrawas, Mao, Sadri, Kabra, Charana, Chhanga khera and Makkhanpura of Rajsamand district in agro climatic zone IVa of Rajasthan. During these five years of study, an area of 136.8 ha was covered with plot size 0.40 ha (1 acre) under front line demonstration with active participation of 341farmers in different villages were conducted. Before conducting FLDs, a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspects of cultivation etc. were followed as suggested by Choudhary, 1999 and Venkattakumar *et al.*, 2010. Material for the present study with respect to FLDs and farmers' practices has been 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 are sandy loam and medium in fertility status.

In demonstration plots, use of quality seeds of improved varieties, line sowing and timely weeding, need based of pesticides, use of balanced nitrogenous fertilization (using micronutrient sulphur) and use of suitable fungicidal i.e. Mancozeb 75% WP for seed treatment as suggested by Chattopadhyay *et. al.* (2003) was used as technical interventions. For the control of aphid (*Lipaphis errysimi*), methyl parathion 2% dust was used in demonstrated plots given in package and practices for the Rajsamand region were emphasized and comparison has been made with the existing practices.

Visit of farmers and the extension functionaries was organized at demonstration plots to disseminate the

Table 1: Comparison between demonstration package and existing farmers practice under Rapeseed-Mustard FLDs

Particulars	**Rapeseed-Mustard**	
	Demonstration package	**Farmers Practice**
Farming situation	Irrigated medium land	Irrigated medium land
Variety	Bio 902, Vasundhara	Local
Time of sowing	16 September to 15 October	Last week of October
Method of sowing	Line sowing	Broad casting
Seed rate	2.5kg/ha	4-5kg/ha
Fertilizer dose	60kgN+40kgP_2O_5+40kgSulphur dust/ha	20kgN+20 kgP_2O_5/ha
Plant protection	Need based methyl parathion 2% dust @25kg/ha to protect the crop against mustard aphids (*Lipaphis errysimi*)	Nil
Weed management	Pendamethalin @0.3kg a.i./ha as pre emergence followed by one hand weeding at 35 DAS	Two hand weeding at 15 and 35DAS

Table 2: Productivity, technology gaps, extension gaps, technology index and cost benefit ratio of rapeseed-mustard (Bio 902 and Vasundhara) grown under FLDs and existing package of practices

Year	Area (ha)	No. of farmers	Seed yield (q/ha)			% increase over control	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)	B : C ratio	
			Potential	FLD	Control					FLD	Control
2006-07	15	37	24	15.89	12.53	26.82	8.11	3.36	33.79	3.33	2.62
2007-08	10	25	24	16.65	12.85	29.57	7.35	3.80	30.63	3.48	2.69
2008-09	66.8	167	24	17.90	13.95	28.32	6.11	3.95	25.42	3.52	2.73
2009-10	30	75	24	18.55	14.02	32.31	5.45	4.53	22.71	3.19	2.42
2010-11	15	37	24	18.64	14.00	33.14	5.36	4.64	22.33	3.22	2.36
Average				17.53	13.47	30.03	6.47	4.06	26.98		

Table 3: Yield parameters under demonstration package and existing farmers practice

Yield parameters	Demonstration package	Existing farmers practice
No. of siliqua/plant	80-85	65-70
No. of seeds/siliqua	15-20	10-15
Test weight (g)	5.1-5.5	3.30-3.85

message at large scale. 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 necessary step for selection of site and farmers, layout of demonstration etc. were followed as suggested by Choudhary (1999). The traditional practices were maintained in case of local checks. The data output were collected from both FLD plots as well as control plots (farmers practices) and finally the extension gap, technology gap, technology index along with the benefit cost ratio were worked out (Samui *et al*., 2000) as given below :

Technology gap =Potential yield – Demonstration yield

Extension gap =Demonstration yield – Farmers yield

Technology index={(Potential yield – Demonstration yield)/ Potential yield} x 100

Results and Discussion

Results of 341 Front Line Demonstrations conducted during 2006-07 to 2010-11 in 136.8 ha area o n farmers' fields of fifteen villages of Rajsamand district indicated that the cultivation practices comprised under FLD *viz.*, use of improved variety (Bio 902 and Vasundhara), line sowing, balanced application of fertilizers (60kgN+40kgP_2O_5+40kg Sulphur dust/ha) and control of mustard aphid through insecticide at economic threshold level, produced on an average 30.03% more yield of mustard as compared to local practices (13.47q/ha). The data of table 2 reveal that the yield of rapeseed-mustard fluctuated successively over the years in demonstration plots. The maximum yield was recorded (18.64q/ha) during 2010-11 and minimum yield was recorded in year 2006-07 (15.89q/ha) and the average yield of five years study period was recorded 17.53q/ha over local practices (13.47q/ha). The increase in per cent of yield was ranging between 26.82 to 33.14 during five years of study. The similar results of yield enhancement in rapeseed-mustard crop in front line demonstrations has been documented by Mitra and Samajdar (2010) in *tarai* zone of West Bengal. The results are also in conformity with the findings of Tiwari and Saxena (2001), Tiwari *et al.* (2003), Tomer *et al.* (2003), Singh *et al.* (2007) and Katare *et al.* (2011). The results indicated that the Front Line Demonstrations has given a good impact on the farming community of this district as they were motivated by the improved agricultural technologies used in the Front Line Demonstrations. The results clearly indicates the positive effects of FLDs over the existing practices toward in enhancing the yield of rapeseed-mustard in Rajsamand area, with its positive effect on yield attribute (Table 3). Benefit-Cost ratio was recorded higher under demonstration against control in all the years of study. These results were also supported by Singh *et al.* (2008) who found that the improved technologies of mustard crop have significant effect in higher productivity of mustard. The findings revealed that a gap exists between the actual farmer's yield and realizable yield potential of the variety. Use of improved variety carry potential to enhance the present level of mustard productivity which is not percolating down at desired pace due to lack of confidence among the farmers. Hence, to exploit the potential of improved production and protection technologies efforts through FLDs ought to be increased awareness among the farmers.

The extension gap showed an increasing trend. The extension gap ranging between 3.36 – 4.64 q/ha during the study period emphasizes the need to educate the farmers through various means for adoption of improved agricultural production technologies to reverse the trend. The trend of technology gap (ranging between 5.36 – 8.11q/ha) reflects the farmers cooperation in carrying out such demonstrations with encouraging results in subsequent years. The technology gap observed might be attributing to the dissimilarity in soil fertility status and weather conditions. Mukharjee (2003) have also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. Similar findings were also recorded by Mitra *et al.* (2010) and Katare *et al.* (2011). The technology index showed the feasibility of the evolved technology at the farmer's fields. The lower the value of technology index, the more is the feasibility of technology. The wider gap in technology index (ranging between 22.33 – 33.79) during the study period in certain region, may be attributed to the difference in soil fertility status, weather conditions, non-availability of irrigation water and insect-pests attack in the crop.

The benefit cost ratio of front line demonstrations

have been presented in Table 2 clearly showed higher BC ratio of recommended practices was than control plot i.e. farmers practice in all the years of study. The benefit cost ratio of demonstrated and control plots were 3.33 and 2.62, 3.48 and 2.69, 3.52 and 2.73, 3.19 and 2.42, 3.22 and 2.36 during 2006-07, 2007-08, 2008-09, 2009-10 and 2010-11, respectively. Hence, favourable benefit cost ratios proved the economic viability of the interventions and convinced the farmers on the utility of interventions. Similar findings were reported by Sharma (2003) in moth bean and Gurumukhi and Mitra (2003) in sorghum.

The results of front line demonstrations convincingly brought out that the yield of rapeseed-mustard could be increased by 26.82% to 33.14% with the intervention on balanced nutrition coupled with the improved seed and disease management in the Rajsamand region. From the above findings, it can also be concluded that use of scientific methods of mustard cultivation can reduce the technology gap to a considerable extent thus leading to increased productivity in the district. Moreover, extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for higher oilseed production in the district. Favourable benefit cost ratio itself explanatory of economic viability of the demonstration and convinced the farmers for adoption of intervention imparted.

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