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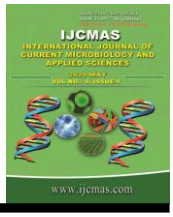

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Yield Gap Analysis of Rapeseed-Mustard through Cluster Front Line Demonstrations in Siwan District of Bihar, India

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A B S T R A C T

The present study was carried out at KVK, Bhagwanpur Hat Siwan Bihar to know the yield gaps between improved package and practices (IP) under Cluster Font Line Demonstrations (CFLDs) and farmers practices (FP) of rapeseed mustard. The study found, the yield of rapeseed mustard in IP under irrigated condition range from 9.5 to14 ,where as in FP it range between7.5 to 9.5q/ha. The percent increase in yield IP over FP was recorded in the range of 26.67to 55.56.The extension gap and technological index were range between2.00-5.0 q/ha and 54.76percent respectively. The trend of technological gap reflected to farmer cooperation in carrying out demonstrations with on ranging result in subsequent years. The cost benefit ratio was 2.52 and 2.77under demonstration, while it was2.09 to 2.35under control plots. By conducting Cluster Front Line Demonstrations (CFLDs) of proven technologies, yield potential of rapeseed-mustard crop should be enhanced to a great extend with increase in the income level of farming community.

Introduction

In India, the mustard - rapeseed is the most important oil seed crop after groundnut accounting around 25 per cent of total oilseed production**.** It is one of the important oilseed crop of the Indo-Gangetic plains. Indian mustard (Rai) cultivation has occupied about 85-90 per cent of total area under cultivation of mustard - rapeseed. India's Agricultural Production: Nine Oilseeds: Rapeseed & Mustard: Bihar data was reported at 0.100 Ton mn in Mar 2017.

This records an increase from the previous number of 0.090 Ton mn for Mar 2016. India's Agricultural Production: Nine Oilseeds: Rapeseed & Mustard: Bihar data is updated yearly, averaging 0.090 Ton mn from Mar 2002 to 2017, with 16 observations. The

data reached an all-time high of 0.110 Ton mn in 2014 and a record low of 0.060 Ton mn in 2003. India's Agricultural Production: Nine Oilseeds: Rapeseed & Mustard**.** Besides, the utilities of oil obtained from mustard-rapeseed, the seeds, sprouts, leaves, tender plants are also useful to human health, when they are consumed as spices and vegetables. They contain selenium, calcium, magnesium, iron, phosphorus, zinc, magnesium, manganese, etc**.**

Several biotic-abiotic and socio- economic constraints inhibits exploitation of the yield potential and these need to be addressed. Siwan district has the sizeable area under mustard cultivation but the productivity level is very low. The seasons for low productivity about newly released crop production technologies and their management practices in the farmers fields.

Keeping the above point in view, the CFLDs on rapeseed-mustard using production improved technologies was conducted with the objective of showing the productive potential of the new production technologies under actual farm situation.

Materials and Methods

The present study was carried out the KrishiVigyan Kendra, Bhagwanpur Hat, Siwan, Bihar during rabi season from 2015-2016 to 2018-19 (Four consecutive years) in the farmers field in twelve adopted village viz. Rampur kothi, Mahamadpur, Saripatti, Bhikhampur, Bhopatpur, Nagauli, Sondhani, Arua, Barkagaw, SihautaBangra and Chorauli of Siwan district of Bihar.

During the four year of study, an area of covered 0.4 ha.(one acre) under Cluster Front Line Demonstration (CFLD) with active participation of farmers of different villages were conducted.

Before conducting CFLD a list of farmers was prepared from group meeting and specific skill training was impaired to the selected farmers regarding different aspect of cultivation etc., were followed as suggested by Chaudhary.1999 and Venkatta Kumar *et al.,* 2010**.** Materials for present study with respect to CFLDs and farmers practices has been given in Table No-1. In case of local check plots, existing practices being used by farmers were followed. In general soil of area under study are sandy loam and medium fertility status.

In demonstration plots use quality seed of improved variety, timely weeding, need based application of pesticides used of balance fertilizers (using micro nutrient sulphur)and use of suitable fungicides is Bavistin 35%WP for seed treatment as suggest by Chattopadhyay *et al.,* (2003)was used as technical interventions.

For the controlling of aphid (*Lipaphids crrysimi)* Diamethoate 30 EC was used in demonstrated plots given in package and practices for the Zone I ,Bihar region were emphasized and comparison has been made with the existing practices.

Visits of farmers, the district agriculture line department and extension functionaries was organized at demonstration plots to disseminate the massage at large scale. The demonstrated farmers were facilities by KVK scientists in performing field operation like sowing, spraying, weeding, harvesting etc. during the course of training and visits.

The necessary steps for selection of site and farmers layout of demonstrations etc., were followed as suggested by Chaudhary (1999). traditional practices were mentioned in case of local checks. The data outputs 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 cast ratio(B:C:R) worked out (Sanui *et al.,* 2000)as given below:

Technology gap = Potential Yield- Demonstration Yield

Extension gap = demonstration Yield – Farmers yield

$$\text{Technology Index} = \frac{\text{Potential Yield- Demonstration Yield}}{\text{Potential Yield}} \times 100$$

Results and Discussion

The result of 399 Cluster Front Line Demonstrations (CFLDs) conduct during 2015-16 to 2018-19 in 110ha area. On farmers field twelve village of Siwan district indicated that the cultivation practices comprised under-CFLD viz- used of improved variety (RajendraSuflam), line sowing, balance used of fertilizers, sulphur, weedicide, and control of mustard aphid through insecticides at economic threshold level, production on an average 40.34% more yield of mustard as compared to local practises(12.10 q/ha). The data of table 2.revwal that the yield of rapeseed- mustard fluctuated successively over the field of demonstrated plots.

The maximum yield was recorded 14.00q/ha over local practices (7.5q/ha). The increase in percentage of yield was range between 26.67% to 55.56% during four year study.The similar results of yield enhancement in rapeseed 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 result clearly indicates the positive effect of CFLDs over the existing practices toward in enhancing the yield of rapeseed- mustard in Siwan area, with its positive effect on yield attribute (Table 3). Benefit Cost ratio was recorded higher under demonstration against control of all the year of study. These results were also supported by Singh *et al*., (2008), who found that the improvement 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 CFLDs ought to be increased awareness among the farmers.

The extension gap showed an increasing trend. Theextension gap ranging between 2.00-5.0 q/ha during the study period emphasizes the need to educate the farmers through various means for adoption of improved agricultural technologies to reverse the trend. The trend of technology gap (ranging between 7.0 to 11.5 q/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). The technology index, showed the feasibility of the evolved technology at the farmer's field.

The lower the value of technology index,the more is the feasibility of technology.The wider gap in technology index (ranging between 33.33-54.76%) during the study period in certain region, may be attributed to the difference in soil fertility status, weather condition, non-availability of irrigations 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 plots i.e. farmers practices in all the years of study. The benefit cost ratio of demonstrated and control plots were 2.74 and 2.33,2.77 and 2.23,2.73 and 2.35, 2.53 and 2.2.09, during 2015-16, 2016-17,2017-18 and 2018-19 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 Mishra(2003) in sorghum.

Table.1 Comparison between demonstration package and existing farmers practices under Rapeseed - Mustard practices

Particulars	Rapeseed-Mustard Demonstration package	Farmers practices
Farming situation	Irrigated medium land	Irrigated medium land
Variety	RajendraSuflam	Local
Time of sowing	25 October to Last November	05November to 10 December
Method of sowing	Line sowing	Broad casting
Seed rate	5 Kg/ ha.	6-7 Kg/ha.
Fertilizes dose	(60kgN,40 kg$P_2O_{5,}$:40kgK_2O,30 kg Sulphur and 20kg Boron.	80 kgN,60kgP_2O_5
Plant protection	Need based used of mancozeb 20% WP for fungal disease and Dimethoate to protect the crop against aphid.	Nil.
Weed management	Pendamathilian @0.3 kg a.i/ha pre emergence followed by one hand weeding at 25DAS.	Two hand weeding at 22 and 35DAS.

Table.2 Productivity, technology gaps, extension gaps, technology index and benefit cost ratio of Rapeseed –Mustard (Rajendrasuflam) grown under CFLDs and existing package of practices

Year	Area(ha)	No.of beneficiary	Grain Yield(Q/ha)			% increase Over control	Technology gap(q/ha)	Extension gap(q/ha)	Technology index (%)	B:C ratio	
			Potential	FLD	Control					FLD	Control
2015-16	30	144	21	11.2	8.5	31.76	9.8	2.7	46.67	2.74	2.33
2016-17	30	100	21	14	09	55.56	7.0	5.0	33.33	2.77	2.23
2017-18	30	85	21	14	9.5	47.36	7.0	4.5	33.33	2.73	2.35
2018-19	20	70	21	9.5	7.5	26.67	11.5	2.0	54.76	2.53	2.09
Average =				**12.10**	**8.62**	**40.34**	**8.82**	**3.55**	**42.02**	**2.69**	**2.25**

Table.3 Yield parameters under demonstration package and existing farmer's practices

Yield parameters	Demonstration package	Existing farmers practices
No.ofsiliqua/plant	132.67-136.33	77.33-91.00
No.of seeds/ siliqua	9.67-12.67	7.67-9.00
Test weight (g)	4.34-5.15	3.70-4.10

The result of Cluster Front Line Demonstrations convincingly brought out that the yield of rapeseed –mustard could be increased by 26.67% to55.56% with the intervention of balanced nutrient coupled with the improved seed and disease management in the Siwan district of Bihar. From the above finding, it can also be concluded that use of scientific methods of mustard cultivation can reduced the technology gap to a considerable extent thus leading to increased productivity of the district. Moreover, extension agencies in the district need to provide proper technology support to the farmers through different educational and extension methods to reduce the extension gap for higher oilseed production in the district.

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