RESEARCH NOTE

Yield Gap Analysis of Rapeseed-Mustard in North Bank Plain Zone of Assam

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ABSTRACT

The present study was carried out at Krishi Vigyan Kendra, Lakhimpur, Assam to know the yield gaps between improved package of practices (IP) under Front Line Demonstration (FLD) and farmer's practice (FP) of rapeseed and mustard crops. The study found that the yield of rapeseed –mustard in IP under irrigated conditions ranged from 9.8 to 10.8q/ha whereas in FP it ranged between 6.2 to 6.5 q/ha. The per cent increase in yield with IP over FP was recorded in the range of 36.73 to 41.67. The extension gap and technological index were ranging between 3.6-4.5q/ha and 10.0-18.33 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 2.5-3.2 under demonstration, while it was 1.8 to 2.2 under farmers practice. By conducting front line demonstration of proven technologies, yield potential of rapeseed and mustard crops could be enhanced to a great extent with increase in the income level of the farming community.

Key words: *Front line demonstration; Rapeseed-mustard; Extension gap; Technology gap; Yield gap;*

Among the oilseed crops, rapeseed-mustard occupies a prominent position in Indian oilseeds scenario. India is the largest rapeseed and mustard growing countries in the world occupying the first position in area and second position in production. India accounts for 21.7% of the total acreage and 10.7 per cent of the total production of the world (*USDA, 2010*). Rapeseed and mustard have caught the fascination of farmers in Assam and this is more particularly in areas where the rice crop transplanted in July-August, is subjected to damage by floods. In areas where the early maturity rice varieties are being grown also, rapeseed becomes a popular succeeding crop. However, the productivity of the crop is less and it varies from year to year. Rapeseed is grown entirely as a rainfed crop, because of non–availability of irrigation facilities. Moreover, about 90 per cent of the crop is cultivated by the farmers in marginal and sub-marginal land. Production of rapeseed is also limited owing to non adoption of recommended agronomic practices like timely sowing, optimum fertilizer application, seed rate etc. which also reduce the yield to a greater extent.

Lakhimpur district of Assam has a sizeable area under rapeseed and 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 field. Keeping the above points in view, the FLD's on rapeseed and mustard using improved production technologies was conducted with the objective of showing the production potential of the new production technologies under actual farm situation.

METHODOLOGY

The study was carried out by Krishi Vigyan Kendra, Lakhimpur during Rabi season from 2008-09 to 2010-2011 (3 consecutive years) in the farmers field of 5 different villages of Lakhimpur district in agro climatic zone I of Assam. During these three years of study, an area of 15 hectare was covered with plot size 0.5 ha under front line demonstration with active participation of 30 farmers. Before conducting FLDs, a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers.

In general, the soils of the experimental sites were sandy loam in texture, acidic in reaction (pH 5.3-5.6),

medium in organic carbon (0.70-0.75%) and available nitrogen (324-342 kg N/ha), low in available phosphorus (14.5-19.2 kg P_2O_5/ha) and potassium (110-135kg K_2O/ ha). Sowing was done on the 2nd week of October in all the years and fertilizers urea, SSP and MOP were applied at the rate of 60:40:40kg/ha (NPK). Borax was applied at the rate of 10kg/ha. Comparison between demonstration package and existing practices under rapeseed –mustard FLD is given in Table 1.

Table 1. Comparison between demonstration package and existing practices under rapeseed –mustard FLD

Particulars	Rapeseed-mustard	
Farming situation	Demonstration Irrigated medium land	Farmers Practice Rainfed medium land
Variety	TS-36	Local
Time of sowing	15th -20th Oct	15 -30th Nov.
Method of sowing	Line sowing	Broadcasting
Seed rate	10kg/ha	13kg/ha
Fertilizer dose	NPK 60:40:40kg/ha	Only FYM
Borax	10kg/ha	No Borax
Plant protection	Need based application	No plant protection
Interculture	One weeding 15-20 days after sowing	No weeding

In demonstration plots use of quality seeds of improved varieties, line sowing and timely weeding, need based pesticide as well as balanced fertilizer were emphasized and comparison has been made with the existing practices (Table 1). Visit of farmers and the extension functionaries was organized at demonstration plots to disseminate the 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 traditional practices were maintained in case of local checks. The data 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 (*Samuiet al, 2000*) as given below.

Technology gap= Potential yield - Demonstration yield

Extension gap= Demonstration yield - Farmer's yield

$$\text{Technology index} = \frac{\text{Potential yield} - \text{Demo.yield}}{\text{Potential yield}}$$

RESULTS AND DISCUSSION

Results of 30 Front Line Demonstrations conducted during 2008-09 to 2010-11in 15 ha area on farmers fields of five different villages of Lakhimpur district indicated that the cultivation practices comprised under FLD viz use of improved variety, line sowing, balanced application of fertilizers and control of aphid through insecticide at economic threshold level, produced on an average 38.83% more yield of rapeseed as compared to local practices. The data of Table 2 reveal that the yield of rapeseed-mustard did not fluctuate significantly over the years in demonstration plot. The maximum yield was recorded (10.8q/ha) during 2010-11 and minimum yield was recorded in year 2009-10 (9.8 q/ha) and the average yield of three years was recorded 10.37 q/ha over local check (6.33q/ha). The increase in percent of yield was ranged from 36.73 to 41.67 during the three years of study. On an average basis, 38.83 percent increase in yield was recorded. The results are in conformity with the findings of *Katare et al (2011), Meena et al (2012)* and *Tomar et al (2003)*. The results clearly indicate the positive effects of FLDs over the existing practices toward enhancing the yield of rapeseed –mustard in North Bank Plain zone of Assam with its positive effect on yield attributes (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)*. The findings revealed that a gap exists between the actual farmer's yield and realizable yield potential of the variety. 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 3.6-4.5q/ha during the period of study emphasizes the need to educate the farmer through various means for adoption of improved agricultural production to reverse the trend of wide extension gap. The trend of technology gap (ranging between 1.2-2.2q/ha) reflects the farmer's 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. Similar finding was recorded by *Mitra et al (2010)* and *Katare et al (2011)*.

The technology index showed the feasibility of the

Table 2. Productivity, technology gap, extension gap, technology index and benefit-cost ratio of rapeseed-mustard grown under FLDs and existing package of practices.

Year	Area	No of farmers	Seed yield (q/ha)			% increase over control	Tech. gap (q/ha)	Ext. gap (q/ha)	Tech. index (%)	B:C ratio	
			Potential	FLD	FP					FLD	FP
2008-09	5.0	10	12.0	9.8	6.2	36.73	2.2	3.6	18.33	2.5	1.8
2009-10	5.0	10	12.0	10.5	6.5	38.09	1.5	4.0	12.50	3.0	2.2
2010-11	5.0	10	12.0	10.8	6.3	41.67	1.2	4.5	10.00	3.2	2.0
Average	-	-	-	10.37	6.33	38.83	1.63	4.03	13.61	-	-

* FP: Farmers practice

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

Yield parameters	Demo. package	Farmers practice
Plant height (cm)	105-108	100-102
No of branches per plant	5-6	2-3
No of siliqua per plant	69-72	52-56
No of seeds per siliqua	15.0-18.0	11.0-13.0
Test weight (g)	3.3-3.5	2.5-2.7

evolved technology at the farmer's fields. The lower value of technology index the more is the feasibility of technology. As such fluctuation in technology index (ranging between 10.00-18.33) during the study period in certain region may be attributed to the dissimilarity in soil fertility status, weather conditions, non-availability of irrigation water and insect pest attack in the crop. The benefit cost ratio of front line demonstrations presented in Table 2 clearly showed higher benefit cost ratio of recommended practices than control plot in all the years of study. Hence, favorable benefit cost ratios proved the economic viability of the interventions and convinced the farmers on the utility of interventions.

CONCLUSION

From the above findings it can be concluded that use of scientific methods of mustard cultivation can reduce the technology gap to a considerable extent thus leading to increased productivity of rapeseed –mustard in the district. Moreover, Krishi Vigyan Kendra in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better oilseed production in the district.

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