



## Performance appraisal of interventions on rapeseed-mustard promoted through front line demonstrations under rainfed farming

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### Abstract

Present investigation was carried out to assess the performance and overall impact of technological interventions promoted through Front Line Demonstrations (FLDs) on rapeseed mustard by Krishi Vigyan Kendra (KVK), SKUAST-J, Doda in rainfed areas of Doda District. In all, 149 farmers on whose fields FLDs were laid out on improved varieties of rapeseed mustard, recommended seed rate, application of recommended doses of fertilizer and plant protection measures from rabi 2010-11 to rabi 2013-14 constituted the sample for the present investigation. Extension Gap (ExtGp), Technology Gap (TecGp) and Technology Index (TecInx) were calculated to assess the performance and overall impact of demonstrated technological interventions on rapeseed mustard. Technology Gap (TecGp) in the range of 431-499 Kg ha<sup>-1</sup> for rapeseed and 380-640 Kg ha<sup>-1</sup> for mustard, Extension Gap (ExtGp) in the range of 194-254 Kg ha<sup>-1</sup> for rapeseed and 107-215 Kg ha<sup>-1</sup> for mustard; and Technology Index (TecInx) in the range of 35.92-42.50 per cent for rapeseed and 31.67-53.33 per cent for mustard were found. The percent increase in the yield of rapeseed for the technological interventions demonstrated through FLDs has been found to be in the range of 39.11 to 66.90 %. Similarly, in case of mustard crop, the per cent increase in yield has been found to be 23.62 to 42.82 % over the farmers' practice.

**Keywords:** *Front line demonstration, interventions, technology gap, technology index*

### Introduction

Rapeseed-mustard crops are cultivated in more than 50 countries of the world spreading over six continents and covering an area of 34.14 million hectares with an average yield of 1800Kg/hectare. In India, rapeseed mustard is grown on an area of 6.34 million hectares with total production of 7.82 million tones with an average productivity of 1234 Kg/hectares. It is cultivated in 26 states in the Northern and Eastern plains of the country. Rajasthan is the largest rapeseed mustard producing state followed by Utter Pradesh, Haryana Madhya Pradesh. In Jammu and Kashmir, rapeseed mustard crop is grown on an area of 59,700 hectares with total production of 47,200 tones and productivity of 790 Kg/ha (Ministry of Agriculture and Cooperation GOI, 2012-13).

In the hilly Doda District of Jammu and Kashmir,

rapeseed mustard is mostly grown under rainfed conditions under the constrained production system. The sowing of mustard is affected by the snow and the crop remains covered under the snow after germination in the temperate areas. In the District, rapeseed mustard is cultivated in an area of 2905 ha and production of 1452 Quintals with an average production of 499 Kg/ha (Anonymous, 2013-14).

The productivity of mustard is very low in Doda district due use of local varieties. Besides, application of high seed rate, imbalanced/ no application of fertilizers, non-adoption of plant protection measures etc are the major factors leading to the low yield of the crop. Thus, in Doda District there is much need of popularization of the scientific technology of rapeseed mustard cultivation with more emphasis of production and productivity through extension approaches.

Front Line Demonstration is an important mandate of Krishi Vigyan Kendras (KVKs) which aims to demonstrate the production potentialities of the pre-released or newly released crop production, protection and management practices on the farmers' field by the scientists. Krishi Vigyan Kendra Doda at Bhaderwah, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu has also been instrumental in laying out FLDs on rapeseed and mustard for demonstrating the potentialities of crop production, protection and management practices, generation of production data and analyzing the constraints therein. With this in perspective the present investigation was carried out in Doda District to assess the performance and overall impact of technological interventions demonstrated through FLDs by Krishi Vigyan Kendra, Doda.

### Materials and Methods

The present investigation was carried out to assess the performance as well as overall impact of

technological interventions promoted through Front Line Demonstrations (FLDs) on rapeseed-mustard by KVK, Doda in the cluster villages of the District. Majority of the rapeseed-mustard in the area is grown under rainfed conditions and constrained production system. In all, 149 beneficiary farmers on whose fields FLDs were laid out by the KVK on improved varieties of rapeseed-mustard, use of appropriate seed rate, use of recommended doses of fertilizer and application of plant protection measures from rabi 2010-11 to rabi 2013-14 constituted the sample for the present investigation. The data on the farmers practice for the same season was also recorded as control for the purpose of comparison. Extension Gap (ExtGp), Technology Gap (TecGp) and Technology Index (TecInx) were calculated to assess the performance as well as overall impact of technological interventions on rapeseed mustard demonstrated through FLDs as suggested by Samui *et.al.*, (2000) using the formulae as given below :

$$\text{Technology Gap (TecGp)} = \text{Potential Yield} - \text{Demonstration Yield (PY-DY)}$$

$$\text{Extension Gap (ExtGp)} = \text{Demonstration Yield} - \text{Farmer's Yield (DY-FY)}$$

$$\text{Technology Gap (TecInx)} = \frac{(\text{Potential Yield} - \text{Demonstration Yield}) \times 100}{\text{Potential Yield}}$$

### Results and Discussion

#### Overview of FLDs on rapeseed-mustard lay out by KVK

A total of 149 FLDs on different technological interventions on rapeseed mustard were laid out by the KVK. During Rabi 2010-11, ten demonstrations

on Gobhi Sarson variety DGS-1 and 21 demonstrations on mustard variety KS-101 were laid down thereby constituting total number of 31 demonstrations in the cluster villages of District Doda. During Rabi 2011-12, ten demonstration on Gobhi Sarson variety DGS-1 and 20 on mustard variety KS-101 were laid

Table 1: FLDs on rapeseed mustard laid out by KVK

Season/Year	Crop	Variety	Intervention	Total no. of FLDs
Rabi 2010-11	Gobhi-Sarson	DGS-1	Variety, Seed rate, Insecticide, Fertilizer	10
	Mustard	KS-101	Variety, Seed rate, Insecticide, Fertilizer	21
Rabi 2011-12	Gobhi-Sarson	DGS-1	Variety, Seed rate, Insecticide, Fertilizer	10
	Mustard	KS-101	Variety, Seed rate, Insecticide, Fertilizer	20
Rabi 2012-13	Gobhi-Sarson	DGS-1	Variety, Seed rate, Insecticide	10
	Mustard	Pusa Bold	Variety, seeds rate, Insecticide	40
Rabi 2013-14	Mustard	KS-101	Variety, Seed rate, Fertilizer	38
Total				149

out thereby making a total of 30 demonstrations on rapeseed mustard. Likewise, during Rabi 2012-13, fifty number of demonstration were laid out of which 10 were on Gobhi Sarson variety DGS-1 and 40 were on mustard variety Pusa bold. However, during Rabi 2013-14, 38 demonstrations on mustard variety KS-101 were laid out (Table 1).

### Technological interventions on rapeseed-mustard promoted through FLDS under rainfed farming:

Major technological interventions promoted through FLDS by KVK Doda in the cluster villages of the District have been presented in Table 2. It has been observed that majorly four technological interventions viz; improved variety, appropriate seed

rate, balanced fertilizer dose and application of plant protection measures i.e. chloropyriphos 20EC @ 1.2 Litre ha<sup>-1</sup> for the management of mustard aphid were demonstrated through FLDS.

Farmers in the area have commonly been reported using local seed/ farm saved seed for the last 10-15 years with higher seed rate of 8-10 Kg ha<sup>-1</sup> and even many farmers reported more seed rate. Seed rate of 5 Kg ha<sup>-1</sup> was demonstrated with the balanced fertilizer doses and use of adequate need based plant protection measures. All these interventions were demonstrated under rain fed production system prevalent in the District with existing practice of no use of chemicals for weed management (Table 2).

Table 2. Technological interventions on rapeseed mustard promoted through Front Line Demonstration under rainfed farming

Inputs	Quantity per hectare	
	Demonstration	Farmers' practice
Variety	KS-101, DGS-1, PB	Local
Seed rate	5 Kg ha <sup>-1</sup>	8-10 Kg ha <sup>-1</sup>
Fertilizer		
a) N	50 Kg ha <sup>-1</sup>	No fertilizer Use
b) P	30 Kg ha <sup>-1</sup>	
c) K	15 Kg ha <sup>-1</sup>	
Weed management	Manual	No weed management
Plant protection measures	Chloropyriphos for aphid management @ 1.2 liter ha <sup>-1</sup>	No measures
Water management	Rainfed	Rainfed

### Technology Gap (TecGp), Extension Gap (ExtGp), Technology Index (TecInx) of rapeseed mustard under FLDS:

A total 149 number of FLDS were analyzed for their Technology Gap (TecGp), Extension Gap (ExtGp) and Technology Index (TecInx).

**Technology Gap (TecGp):** Technology Gap (TecGp) has been conceptualized as the different between the potential yield and actual yield of the technological interventions under study. An overview of data presented in Table 3 revealed that average Technology Gap (TecGp) for the technological interventions demonstrated during the period under

investigation was found to be 500.28 Kg ha<sup>-1</sup>. It has also been found that the Technology Gap (TecGp) for rapeseed ranged from 431-510 Kg ha<sup>-1</sup> whereas, Technology Gap (TecGp) for mustard ranged from 380-640 Kg ha<sup>-1</sup>. It is obvious from further glance at the data incorporated in Table 3 that, Technology Gap (TecGp) in case of rapeseed during Rabi 2010-11 was 431 Kg ha<sup>-1</sup>. Further, Technology Gap (TecGp) of 510 Kg ha<sup>-1</sup> and 499 Kg ha<sup>-1</sup> have been observed during Rabi 2012-13 and 2013-14 respectively for rapeseed crop. Technology Gap (TecGp) for the technological interventions demonstrated in case of mustard crop during Rabi 2010-11 was found to be 483 Kg ha<sup>-1</sup>. Likewise, during Rabi 2011-12, Technology Gap (TecGp) in

case of mustard crop was found to be 559 Kg ha<sup>-1</sup>. Further, a Technology Gap (TecGp) of 640 Kg ha<sup>-1</sup> and 380 Kg ha<sup>-1</sup> has been observed during Rabi 2012-13 and 2013-14 seasons respectively for mustard crop. These findings revealed that a gap exists between the actual farmer's yield and realizable yield potential of technological interventions under demonstration. Use of improved varieties, application of appropriate seed rate, application of plant protection measures carry inherent potential to enhance the present level of rapeseed mustard productivity which has not been found percolating down to the farmers' level at desired pace due to lack of awareness among the farmers and other system based bottlenecks. Hence, to exploit the potential of improved production and protection technologies efforts through FLDs ought to be increased for creating desirable level of awareness and interest among the farming community. These results were supported by Meena *et al.* (2012) and Bairathi *et al.* (2013) who also reported a significant degree of Technology Gap (TecGp) in the mustard crop with respect to the technologies demonstrated through FLDs.

**Extension Gap (ExtGp):** Extension Gap (ExtGp) can be conceptualized as the difference between Demonstration Yield (DY) and Farmer Yield (FY). An overview of data presented in Table 3 reveals that an average Extension Gap (ExtGp) for the period investigated under demonstrations was found to be 202 Kg ha<sup>-1</sup>. Extension Gap (ExtGp) in case of rapeseed ranged from 194-281 Kg ha<sup>-1</sup>. Whereas, Extension Gap (ExtGp) for mustard ranged from 107-215 Kg ha<sup>-1</sup>. It is obvious from further glance at data incorporated in Table 3 that Extension Gap (ExtGp) in case of rapeseed during Rabi 2010-11 was found to be 254 Kg ha<sup>-1</sup>. Further, Extension

Gap (ExtGp) of 194 Kg ha<sup>-1</sup> and 281 Kg ha<sup>-1</sup> has been observed during rabi 2012-13 and 2013-14 respectively for the technological interventions demonstrated in case of rapeseed crop. Further observation of the data presented in Table 3 corroborate that, Extension Gap (ExtGp) in case of mustard crop during rabi 2010-11 was 215 Kg ha<sup>-1</sup>, whereas, during rabi 2011-12, it was 174 Kg ha<sup>-1</sup>. Besides, Extension Gap (ExtGp) of 107 Kg ha<sup>-1</sup> and

189 Kg ha<sup>-1</sup> has been found during rabi 2012-13 and 2013-14 seasons respectively in case of mustard crop for the technological interventions demonstrated. These findings were in confirmation with those of Singh and Kumar (2012) and Meena *et al.* (2012) who also reported a significant extension gap in case of mustard crop covered under FLDs.

**Technology Index (TecInx):** Technology Index (TecInx) depicts the feasibility of evolved technology at the farmers' fields. The lower the value of Technology Index (TecInx), the more is the feasibility of the technology at farmers' level. An overview of data presented in Table 3 reveals that average value of Technology Index (TecInx) for the period investigated under FLDs was found to be 41.7 %. The value of Technology Index (TecInx) in case of rapeseed ranged from 35.9 to 42.5%. Likewise, in case of mustard crop, the value of Technology Index (TecInx) ranged from 31.7-53.3%. It can be vividly explicated from the further glance at the data incorporated in Table 3 that the value of Technology Index (TecInx) in case of rapeseed during Rabi 2010-11 was 35.9%. Similarly, Technology Index (TecInx) of 42.5 % and 41.6 % has been reported during Rabi 2012-13 and 2013-14 respectively in case of rapeseed crop. Further observation of the data presented in Table 3 corroborate that, the value of Technology Index (TecInx) in case of mustard during Rabi 2010-11 was 40.3%, whereas, during Rabi 2011-12, it was 46.6%. Likewise, Technology Index (TecInx) of 53.3% and 31.7% has been observed during Rabi 2012-13 and 2013-14 seasons respectively in case of mustard crop. These findings were confirmed by those of Singh and Kumar (2012), Meena *et al.* (2012) and Jain (2014) who also reported considerable degree of Technology Index (TecInx) in case of technologies demonstrated through FLDs on rapeseed mustard.

### **Per cent increase in yield of FLDs**

Average percentage increase in yield of rapeseed mustard by the introduction of technological interventions through FLDs over farmers' practice for the period under study was found to be 41.3 %. Increase in rapeseed over farmers' practice ranged from 39.1 to 66.9 %. Increase in mustard over

farmers' practice was 23.6 to 42.8 %. A further glance at the data incorporated in Table 3 makes obvious that per cent increase over farmers' practice in case of rapeseed during Rabi 2010-11 was 49.3 per cent. The results of FLDs indicated a significant impact over farming community of District Doda and helped in the further popularization of the technological interventions for promoting the scientific cultivation of rapeseed mustard. Similar results of yield enhancement of rapeseed mustard of the FLDs in rapeseed mustard crop were reported by Meena *et al.* (2012) and Bairwa *et al.* (2012).

### Conclusion

It can be concluded from the findings of the study that Technology Gap (TecGp) in rapeseed has been found in the range of 431-499 Kg ha<sup>-1</sup> whereas; in mustard it has been found to be 380-640 Kg ha<sup>-1</sup>. Similarly Extension Gap (ExtGp) in the range of 194-254 Kg ha<sup>-1</sup> has been found in rapeseed and 107-215 Kg ha<sup>-1</sup> in mustard. The Technology Index (TecInx) in the range of 35.9-42.5 % in rapeseed and 31.7-53.3 % in mustard has been reported. Percent increase in the yield of rapeseed for the technological interventions demonstrated through FLDs has been found to be 39.1 to 66.9 %. Similarly, in mustard per cent increase in yield was found to be 23.6 to 42.8 % over farmers' practice. A high degree of Technology Gap (TecGp) indicates that the interventions demonstrated needs location specific refinements for their desired impact on the production and productivity of rapeseed mustard in the study area. Besides, farmer level trainings for replication of the results of the FLDs to the similar areas have been suggested for promotion of the technologies promoted through Front Line Demonstrations. To minimize the extension gaps, more farmer contact programmes on the rapeseed mustard production technology need to be conducted. Technology Index (TecInx) is inversely proportional to the feasibility of technology demonstrated. As such the low value of Technology Index depicts the feasibility under farmers' condition subject to modifications through continued research.

Table 3. Technology Gap (TecGp), Extension Gap (ExtGp), Technology Index (TecInx) of rapeseed mustard under FLDs

Year	Season	Crop	Variety	Yield Kg (Kg ha <sup>-1</sup> )		Percentage increase over Farmer Practice	Technology Gap (Kg ha <sup>-1</sup> )		Extension Gap (Kg ha <sup>-1</sup> )		Technology Index
				Demonstration	Farmer Practice		Farmer Practice	Farmer Practice	Farmer Practice	Farmer Practice	
2010-11	Rabi	Gobhi Sarson	DGS-1	769	515	49.3	431	254	35.9		
		Mustard	KOS-101	717	502	42.8	483	215	40.3		
2011-12	Rabi	Gobhi Sarson	DGS-1	690	496	39.1	510	194	42.5		
		Mustard	KOS-101	641	467	37.3	559	174	46.6		
2012-13	Rabi	Gobhi Sarson	DGS-1	701	420	66.9	499	281	41.6		
		Mustard	Pusa Bold	560	453	23.6	640	107	53.3		
2013-14	Rabi	Mustard	KOS-101	820	631	29.9	380	189	31.7		
		Average		699.7	497.7	41.3	500	202	41.7		



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