



## Evaluation of frontline demonstrations on rapeseed (*Brassica napus* L.) in south western district of Punjab

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### Abstract

Rapeseed-mustard is an important crop of India but its productivity is low due to poor knowledge level of the farmers regarding improved technologies. Frontline demonstrations are important tool for technology transfer to the farmers and its imperative to demonstrate high yielding, nutritionally better varieties to improve productivity. KVK, Sri Muktsar Sahib conducted frontline demonstrations on new canola variety during 2015-16 with the objective to endorse canola, assessment of its performance in the district and to collect farmer's feedback information. The results obtained from the study revealed that average yield of canola under FLDs was 19.3 q/ha as compare to 15.5 q/ha recorded in farmer's practice thereby giving average yield increase of 24.2 per cent. Additional investment of Rs 1246 ha<sup>-1</sup> along with scientific monitoring of demonstrations resulted in additional return of Rs 13784 ha<sup>-1</sup> over farmers practice.

**Key words:** Canola, frontline demonstrations, Muktsar, rapeseed

### Introduction

Rapeseed mustard is the second most important edible oilseed crop in India after groundnut and accounts for nearly 30% of the total oilseeds produced in the country. India is one of the largest rapeseed mustard growing countries in the world, occupying the first position in Area and second position in Production after China (Thakur and Sohal., 2014). This group of oilseed crops offers higher return with low cost of production and low water requirement, so it has greater potential to increase the availability of edible oil from the domestic production. In spite the high quality of oil and also its wide adaptability for varied agro-climatic conditions, the area, production and yield of rapeseed-mustard in India have been fluctuating due to various biotic and abiotic stresses together with India's domestic price support programme. When compared to other edible oils, the rapeseed/mustard oil has the lowest amount of harmful saturated fatty acids. It also contains adequate amounts of the two essential fatty acids, linoleic and linolenic, which are not present in many of the other edible oils. But most of the Indian varieties under cultivation have high erucic acid (about 50%) and high glucosinolates (>100 µmoles/g defatted seed meal) which are undesirable. Erucic acid may cause health problems and high glucosinolates in the oil cake are not desired for animal feed.

The concept of canola oil has gained popularity in recent years. Canola is a specific type of rapeseed associated

with high quality oil, represents one of the world's major sources of vegetable oil. It has less than 2% erucic acid and its meal has less than 30 µg of glucosinolates. It contains 40-45% oil and 36-40% protein. Canola oil is now very acceptable as alternatives to soyabean oil (Amin and Khalil, 2005; Muhammad *et al.*, 2007). In addition to oil production, the leaves and stems of canola provide high quality forage matter because of their low fiber and high protein content (Wiedenhoeft and Bharton, 1994) and can be used as animal feeds (Banuelos *et al.*, 2002). In *Brassica* breeding programme, improvement of seed quality is one of the most important objectives. High yielding new varieties are also imperative to meet potential edible oil requirement of the country which is still increasing due to increase in population, increase in per capita consumption and slow increase in local production of oilseed crops (Shengwu *et al.*, 2003). The canola varieties have been introduced for general cultivation by public and private sector in the country. Punjab Agricultural University, Ludhiana also developed zero erucic mustard and a new high yielding canola type variety GSC-7 was released for general cultivation in the state during 2014. However, farmers are less aware about canola which need to be popularized. Among the various methods, frontline demonstrations (FLDs) are important tool for transfer of latest technology to the farmers.

Krishi Vigyan Kendra (KVK) are grass root level organization meant for application of technology through assessment, refinements and demonstration of proven

technologies under different micro farming situation in the district (Das, 2007). The main aim is to reduce the time lag between technology generation and its transfer to the farmers for increasing productivity and income. FLDs on new released production, protection and management practices at farmers' field is important mandate of KVKs. Front line demonstrations on canola (GSC-7) were conducted by KVK Muktsar during 2015-16 with the objective to popularize canola in the district, identification of adoption gaps and feedbacks from farmers for further improvement in the research and extension programme.

## Material and Methods

The study was carried out in Sri Muktsar Sahib district of Punjab, (lie between 30° 69' and 29° 87' latitude & 74° 21' and 74° 86' longitude, 184 m above mean sea level). The area is characterized by semi-arid type of climate with hot and dry early summers from April-June followed by hot and humid period during July-September and cold winters during December-January. Winter experiences frequent frosty spells especially during December and January and minimum temperature records as low as 0.5°C. Forty five frontline demonstrations (FLDs) on canola were conducted in all the four blocks of the district. Before laying out the FLDs the gaps in adoption of recommended technology were identified through personal interview of the selected farmers. The list of innovative farmers was made and scrutinized according to their knowledge level and finally selected for demonstrations. The selected farmers were trained and detailed information was given for successful mustard cultivation as per recommendations of Punjab Agricultural University, Ludhiana. Critical inputs i.e. seed of rapeseed variety GSC 7 and recommended fungicide was supplied by KVK. Scientists regularly visited demonstration plots as well

as farmer's field to diagnose the farmers' problems and to ensure timely application of critical inputs. Feedback information was also collected from the farmers for further improvement in research and extension programmes. The extension activities like awareness camps, kisan goshties and field days were organized at the demonstrations sites to provide information to the other farmers of the area. The primary data were collected from the farmers' fields and analyzed to compare performance of FLD plots and farmers' practice. Different parameters were calculated to find out technology gaps (Yadav *et al.*, 2004)

Extension gap = Demonstrated yield - Farmers' practice yield

Technology gap = Potential yield - Demonstration yield

Additional return = Demonstration return - Farmers practice return

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

## Results and Discussion

Rapeseed-mustard is important crop of south-western part of the Punjab and farmers grow this crop to meet their house hold requirement of mustard oil. The data presented in the table 1 showed that farmers were lacking in timely application of important inputs to mustard crop which resulted in low crop productivity. Most of the farmers were not aware about canola and they grow un-recommended varieties. The sowing method was not appropriate, most of the farmers used wheat sowing drill by missing one pore which sow mustard at 30 cm (row to row) as compare to recommended spacing of 45 cm resulted in low plant. As we consider nutrient management, farmers use 50 kg urea/acre instead of 90 kg which was the major cause for

Table 1: Detail of the practices for mustard cultivation under front line demonstration and farmers practices

| S.No. | Particulars              | Farmers' practice                                          | FLDs (recommended practice)                                                                                                        |
|-------|--------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Variety                  | Un-recommended/ recommended but old but old                | GSC-7                                                                                                                              |
| 2     | Seed rate (kg/ha)        | 2.5                                                        | 3.75                                                                                                                               |
| 3     | Spacing                  | Row to row- 30 cm                                          | 45 x 10 cm                                                                                                                         |
|       |                          | Less plant population                                      | Thining at first irrigation                                                                                                        |
| 4     | Sowing time              | November month                                             | 10-30 October                                                                                                                      |
| 5     | Nutrient management      | 125 kg urea/ha at first irrigation                         | 225 kg Urea/ha (½ at sowing+ ½ at first irrigation)                                                                                |
|       |                          | No use of SSP                                              | 187.5 kg SSP at sowing                                                                                                             |
| 6     | Weed management          | Mechanically                                               | Isoproturon 75 WP @1L/ha                                                                                                           |
| 7     | Pest and disease control | Use of fungicides is limited and over dose of insecticides | Two sprays of Blitox (copper oxychloride) 250 g at 75 & 105 days and one spray of Score 25 EC (difenoconazole) @ 100 ml at 90 days |

low yield of the crop in the area. Sulphur is very important nutrient for oilseed crops and it is recommended that farmers should apply 187.5 kg SSP/ha to meet the requirement of both phosphorus and sulphur in mustard. But most of the farmers didn't apply single super phosphate fertilizers. It was also observed that farmers use overdose of un-recommended insecticides and ninety percent farmers didn't use fungicides. Similar observations were reported by Singh *et al.*, 2011.

### Grain Yield

The grain yield of demonstrated plots and farmer's practice is presented in table 2. Data revealed that average grain yield of demonstrated plots was higher from farmers practice in all the blocks of Sri Muktsar sahib district. The average yield of GSC 7 ranged from 18.8-19.8 q/ha as compared to 15.3-16.3 q/ha in different block showing

suitability of this variety to all the area of district. The average yield of FLDs plots was highest in Muktsar block (19.8 q/ha) followed by lambi (19.5), gidderbaha (19.0) and malout block (18.8). Overall, 45 FLDs conducted in different villages gave average yield of 19.3 q/ha as compare to 15.5 q/ha of farmers practice thus out yielding check by 24.2 %. The results were in agreement with findings of other workers (Singh *et al.*, 2007, Singh *et al.*, 2011). The better yield in FLDs plots may be due to knowledge and adoption of full package of practices viz timely sowing, balanced dose of fertilizers (N & P), weed management and need based plant protection. The lesser yield of mustard at farmer's practice over FLD may be due to use of local or old varieties as compared to recommended high yielding resistant varieties.

Extension gap ranged from 3.3-4.3 q/ha in different blocks

Table 2 . Grain yield and gap analysis of frontline demonstrations on rapeseed

| Block      | No. of FLDs | Avg. Yield (ha) |                  | % increase over farmers practice | Extension gap (q/ha) | Technology gap (q/ha) | Technology index |
|------------|-------------|-----------------|------------------|----------------------------------|----------------------|-----------------------|------------------|
|            |             | FLDs            | Farmers practice |                                  |                      |                       |                  |
| Gidderbaha | 10          | 19.0            | 15.3             | 24.6                             | 3.8                  | 3.0                   | 33.7             |
| Muktsar    | 10          | 19.8            | 15.5             | 27.4                             | 4.3                  | 2.3                   | 25.3             |
| Malout     | 11          | 18.8            | 15.0             | 25.0                             | 3.8                  | 3.3                   | 36.5             |
| Lambi      | 14          | 19.5            | 16.3             | 20.0                             | 3.3                  | 2.5                   | 28.1             |
| Avg.       |             | 19.3            | 15.5             | 24.2                             | 3.8                  | 2.8                   | 30.9             |

which showed that farmers should be educated for adoption of improved production technology in rapeseed. On the basis of these gaps extension programmes were planned for next year. Technology gaps were also calculated separately for each blocks and these ranged from 2.3-3.0 q/ha. These gaps may be attributed to the variation in soil fertility status. Similarly technology index was worked out and average figure comes out to be 30.9 %. This value was on higher side may be due to poor quality irrigation water, but it showed the feasibility of the new variety at farmer's fields. However, the adoption levels for the improved technology in oilseeds necessitate the need for better dissemination (Kiresur *et al* 2001)

### Economics analysis

Rapeseed-mustard is important *Rabi* crops of Punjab and its area may expand in coming years, owing to high yielding varieties coupled by market price. The economics of the FLD programme on canola was also worked out (table 3). The total returns from demonstrated plots were Rs. 77000 ha<sup>-1</sup> as compared to Rs. 62030 ha<sup>-1</sup> in farmers practice. Average additional investment in demonstration plots was Rs. 1246 ha<sup>-1</sup>, which was mainly due to fungicides and fertilizer application. The net returns varied from Rs 40925-46900 ha<sup>-1</sup> in FLDs in comparison to Rs. 26750-35165 ha<sup>-1</sup> in check plots. The average net return

Table 3 . Economic analysis of the frontline demonstrations on rapeseed

| Block      | Total returns (Rs/ha) |                  | Input cost (Rs/ha) |                  | Net return (Rs/ha) |                  | Additional gain (Rs/ha) |
|------------|-----------------------|------------------|--------------------|------------------|--------------------|------------------|-------------------------|
|            | FLDs                  | Farmers practice | FLDs               | Farmers practice | FLDs               | Farmers practice |                         |
| Gidderbaha | 76000                 | 61000            | 31735              | 30100            | 44265              | 30900            | 13365                   |
| Muktsar    | 79493                 | 62387            | 32135              | 30500            | 47358              | 31887            | 15471                   |
| Malout     | 73125                 | 58500            | 32200              | 31750            | 40925              | 26750            | 14175                   |
| Lambi      | 78000                 | 65000            | 31100              | 29835            | 46900              | 35165            | 11735                   |
| Avg.       | 77000                 | 62030            | 31792              | 30546            | 45207              | 31423            | 13784                   |

of FLDs plots was Rs. 45207 ha<sup>-1</sup> as compared to Rs. 31423 ha<sup>-1</sup> in farmers' practices. The average additional gain in demonstration plots was Rs. 13784 ha<sup>-1</sup>.

## Conclusion

Canola variety GSC 7 gave higher yield and net returns in FLDs than farmers practice in all the four blocks of Sri Muktsar Sahib district. The increase in yield was attributed to higher potential yield of new variety, timely sowing, nutrient management, weed management and pest management. Canola has additional health benefits as compare to traditional mustard varieties. So, new canola variety fits under subtropical conditions of south-western part of Punjab and by conducting demonstrations, productivity of rapeseed-mustard can be increased. Promotion of canola will substantially increase farmer's income as well as it will improve health of the consumer.

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