# Impact analysis of frontline demonstrations on pulses in Punjab

**DHARMINDER SINGH, KB SINGH*, NS GILL* and IS GREWAL****

**Department of Extension Education**
****Department of Mathematics, Statistics and Physics**
**Punjab Agricultural University, Ludhiana 141004 Punjab, India**
***Krishi Vigyan Kendra (PAU), Moga 142001 Punjab, India**
Email for correspondence: dharminder@pau.edu

 *Received: 12.1.2017/Accepted: 16.3.2017*

## ABSTRACT

Frontline demonstrations (FLDs) are the important extension techniques to convince the farmers about latest farm technologies. The present study was conducted to assess the impact of frontline demonstrations on summer moong and gram crops conducted in Moga district of Punjab. Study revealed that improved cultivation practices comprised under FLDs viz recommended varieties, seed rate, timely sowing and plant protection technology resulted in average increase in yield of 15.7 per cent in summer moong and 13.5 per cent in gram crop over the check plots. Technology gaps, extension gaps and technology indices were calculated to analyse the performance of these frontline demonstrations at farmers' fields. Lower average technology index of 7.81 per cent indicates the feasibility of summer moong crop in existing farming situation in the district. The improved production technology of these pulses gave higher gross return and net return with higher benefit-cost ratio in FLD plots as compared to check plots.

**Keywords:** Frontline demonstrations; technoloy index; economic returns; pulses; impact

## INTRODUCTION

India is the largest producer and consumer of pulses. Although country has produced about 19.78 MT pulses from 25.21 Mha of land during 2013-14 (Anon 2015a) still 20 per cent of the total demand is met through imports. Pulses cultivation is known to have several advantages. Their ability to fix atmospheric nitrogen improves soil fertility. These can be grown in limited moisture conditions with low input requirement. Paddy-wheat is the predominant cropping system in Punjab. The continuous cultivation of water guzzling crops like paddy has resulted in depletion of underground water. In view of this Punjab governemnt has enacted Punjab Preservation of Sub-Soil Water Act 2009 to enforce the recommended time of paddy transplanting in the state ie 15 June (Sharma 2015). It necessitates the introduction of suitable crops to be cultivated in between wheat and paddy.

In the Punjab state pulses occupy an area of 45 thousand hectares with production of 40 thousand tonnes (Anon 2015a). Summer moong and gram are popular pulses of diet in the state. Pulses are important source of proteins for majority of Indian population and contribute significantly to nutritional security of the country. It has been proposed to enhance the area under moong bean from existing 20 thousand hectares to 60 thousand hectares under diversification programme in central districts of Punjab (Kaur 2015). Summer moong fits well in the existing cropping systems viz paddy-potato, basmati-wheat and paddy-wheat in the state.

## METHODOLOGY

The study was conducted in Moga district of Punjab from 2008-09 to 2012-13. During this period 60 frontline demonstrations (FLDs) were conducted by the Krishi Vigyan Kendra on pulses in the district out of which 43 FLDs on summer moong and 17 FLDs on gram crop were conducted to demonstrate the improved production technologies of these crops covering an area of 19.6 and 5.0 hectares respectively.

Farmers were selected from all the blocks of district Moga through survey, group meetings and conducting discussions with them. The necessary steps for selection of site, selection of farmers, layout of demonstrations etc were followed as suggested by Choudhary (1999). Selected farmers were guided about improved production technology recommended by Punjab Agricultural University, Ludhiana, Punjab through training programmes, farm literature and personal contact method for conducting frontline demonstrations at their fields. Existing local cultivation practices were followed in case of check plots.Regular visits by KVK scientists to FLD plots were made to supervise various important farm operations in these FLDs. The extension activities like group meetings and field days were also organized at the demonstration sites as to provide opportunities for other farmers of the area to interact and to seek benefits from these demonstrations. Feedback from the farmers was taken so that further research and extension activities were improved. The data were collected both in FLDs as well as check plots and the extension gap, technology gap, technology index and benefit-cost ratio were worked out (Samui et al 2000).

## RESULTS and DISCUSSION

The data given in Tables 1 and 2 depict the comparison between demonstration and farmers' practices. Recommended package of practices for cultivation of summer moong and gram were emphasized upon during the conduct of frontline demonstrations (Anon 2015b).

In case of summer moong (Table 1) recommended varieties SML 668 and SML 832 were demonstrated at farmers' fields with the local variety as farmer practice. Demonstrations were laid following recommended time of sowing from 20 March to 10 April to avoid pre-monsoon rainfall at the harvesting stage. In check plots farmers usually delayed the sowing of summer moong till end of April and followed broadcasting method of sowing. It was also observed that farmers applied more than recommended dose of urea in their fields and did not use any herbicide for weed control. Also they did not use the recommended pesticides for insect pest management in summer moong.

Similarly demonstration practices of gram FLDs were also compared with farmers' practice (Table 2). It can be seen that farmers used local varieties and sowed their crop late in the month of November. Farmers used same seed rate of 30-40 kg/ha. But they did not practice the seed treatment.

**Yield gap analysis of FLDs**

In case of moong higher crop yield was recorded in FLD plots as compared to check plots. The highest yield (11.25 q/ha) in FLD plots was recorded in the year 2011-12. The per cent increase in yield of FLD plots over check plots varied from 10.5 per cent in the year 2012-13 to 27.2 per cent during 2009-10. The technology gap ie difference between potential and demonstration yield was also calculated and it ranged from 0.12 q/ha in 2008-09 to 2.25 q/ha during 2012-13. Lowest extension gap of 0.42 q/ha was recorded in 2012-13 whereas highest of 2.2 q/ha in 2009-10 (Table 3).

In case of gram (Table 3) FLDs gave higher yield of 14.2 q/ha during the year 2011-12 than 12 q/ha during 2009-10. The increase in yield (15.2%) of FLD plots over check was more in the year 2009-10 than 11.8 per cent in 2011-12. Technology and extension gaps showed decreasing trend during various years. Similar results of increase in yield of different crops in frontline demonstration were also reported by Singh et al (2015), Kumar et al (2015) and Chauhan et al (2013).

The variation in technology gap in different years may be attributed to the difference in response of a particular variety to soil fertility status, weather condition, water quality and management practices of the farmers. Wide extension gap in summer moong and gram FLDs emphasizes the need to educate farmers through various extension methods for adoption of improved cultivation practices. The technology index shows the feasibility of the evolved technology at the farmers' fields. Lower the value of technology index more is the feasibility of technology. While comparing the technology indices of summer moong varieties SML 832 and SML 668 it can be inferred that variety SML 668 had lesser technology index and hence could have more feasibility in the district. Similarly in gram higher value of technology index indicates the lesser feasibility of gram crop in the district.

**Cost-benefit analysis:** Economic returns from FLD plots were compared with check plots and data are given in Table 4. The expenditure incurred on different crop inputs viz seed, herbicide, seed treatment, land preparation and pesticides was considered for calculating the cost of cultivation whereas gross returns

Table 1. Comparison between demonstration package and existing farmers' practices of summer moong

| Parameter | Demonstration package | Farmers' practice |
|---|---|---|
| Farming situation | Irrigated medium soil | Irrigated medium soil |
| Varieties | Recommended varieties of PAU (SML 668 and SML 832) | Local |
| Time of sowing | 20 March - 10 April | End of March-April |
| Seed rate (kg/ha) | 37.5 kg (SML 668) and 30 kg (SML 832) | 30-50 kg |
| Seed treatment | Captan/Thiram (3 g/kg seed) | Absent |
| Sowing method | Drill at 22.5 cm row to row spacing | Broadcast/drill |
| Fertilizer application | As per recommendations of PAU or on soil test basis | Urea (60-75 kg/ha) |
| Weed management | Application of Stomp herbicide followed by one hand weeding at 30 DAS | Hand weeding |
| Plant protection | Need-based use of recommended pesticides | Blanket sprays of chemicals for insect pest management |

Table 2. Comparison between demonstration package and existing farmers' practices of gram crop

| Particulars | Demonstration package | Farmers' practice |
|---|---|---|
| Farming situation | Irrigated medium soil | Irrigated medium soil |
| Varieties | Recommended variety of PAU (GPF 2) | Local |
| Time of sowing | 10-25 October | End of December-November |
| Seed rate (kg/ha) | 40 kg (GPF 2) | 30 kg |
| Seed treatment | Captan/Thiram (3 g/kg seed) | Absent |
| Sowing method | Drill at 30 cm row to row spacing | Broadcast/drill |
| Fertilizer application | As per recommendations of PAU or on soil test basis | Urea (60-75 kg/ha) |
| Plant protection | Need-based use of recommended pesticides | Blanket sprays of chemicals for insect pest management |

were calculated on the basis of actual market sale price of the produce availed by the farmers. It can be observed that cost of cultivation was less in FLD plots of summer moong in comparison to check plots. It may be attributed to the use of non-recommended pesticides and their indiscriminate application for insect pest management on summer moong crop in check plots. However the average cost of cultivation in FLD plots of gram was more in comparison to check plots. It may be due to adoption of seed treatment and application of recommended fungicides at flowering stage in FLD plots. Net returns in FLD plots were on higher side during all the years. The benefit-cost ratio (B:C ratio) was calculated during different years in summer moong and gram. In summer moong B:C ratio was 2.9, 3.7, 3.4 and 2.8 for the year 2008-09, 2009-10, 2011-12 and 2012-13 respectively. Similarly in gram crop the B:C ratio was worked out to be 2.6 and 3.1 during the year 2009-10 and 2011-12 respectively. The results are in agreement with the study of Chauhan et al (2013) and Kumar et al (2015). This may be due to adoption of recommended package of practices in FLD plots.

The results of the study clearly indicate the positive effects of frontline demonstrations over the existing practices toward enhancing the yield of summer moong and gram in the district.

## REFERENCES

Anonymous 2015a. All India area, production and yield of total oilseeds and total pulses. E-pulses data book, Indian Institute of Pulses Research, Kanpur, Uttar Pradesh, India.

Anonymous 2015b. Package of practices for crops of Punjab: Rabi 2015. Punjab Agricultural University, Ludhiana, Punjab, India, pp 34-49.

Chauhan RS, Singh SRK, Mishra YD, Singh P, Bhargava MK and Singh HP 2013. Impact analysis of frontline demonstrations (FLDs) on gram (chickpea) in Shivpuri district of Madhya Pradesh. Journal of Community

Table 3. Yield gap analysis of frontline demonstrations of summer moong and gram

| Year | Variety | Number of farmers | Yield (q/ha) | | | Per cent increase | Technology gap (q/ha) | Extension gap (q/ha) | Technology index (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Potential | Demonstration | Check | | | | |
| **Summer moong** | | | | | | | | | |
| 2008-09 | SML 668 | 14 | 11.25 | 11.13 | 9.83 | 11.0 | 0.12 | 1.3 | 1.07 |
| 2009-10 | SML 668 | 4 | 11.25 | 10.3 | 8.1 | 27.2 | 0.95 | 2.2 | 8.44 |
| 2011-12 | SML-832 | 15 | 11.50 | 11.25 | 9.8 | 14.3 | 0.25 | 1.45 | 2.17 |
| 2012-13 | SML-832 | 10 | 11.50 | 9.25 | 8.83 | 10.5 | 2.25 | 0.42 | 19.56 |
| Mean | | | | 10.48 | 9.14 | 15.75 | 0.89 | 1.34 | 7.81 |
| **Gram** | | | | | | | | | |
| 2009-10 | GPF-2 | 3 | 19.0 | 12 | 10.4 | 15.2 | 7.0 | 1.6 | 36.8 |
| 2011-12 | GPF-2 | 14 | 19.0 | 14.2 | 12.7 | 11.8 | 4.8 | 1.5 | 25.26 |
| Mean | | | | 13.1 | 11.55 | 13.5 | 5.9 | 1.55 | 31.03 |

Table 4. Economic analysis of frontline demonstrations of summer moong and gram

| Year | Average cost of cultivation (Rs/ha) | | Average gross return (Rs/ha) | | Average net return (profit) (Rs/ha) | | B:C ratio (gross return/gross cost) |
|---|---|---|---|---|---|---|---|
| | Demonstration | Local check | Demonstration | Local check | Demonstration | Local check | |
| **Summer moong** | | | | | | | |
| 2008-09 | 11500 | 13000 | 33390 | 29490 | 21890 | 16490 | 2.9:1 |
| 2009-10 | 12250 | 13500 | 46350 | 36450 | 34100 | 22950 | 3.7:1 |
| 2011-12 | 12500 | 13750 | 42750 | 37240 | 30250 | 23490 | 3.4:1 |
| 2012-13 | 12500 | 13250 | 35150 | 33554 | 22650 | 20304 | 2.8:1 |
| **Gram** | | | | | | | |
| 2009-10 | 14500 | 13625 | 38400 | 33344 | 29900 | 19719 | 2.6:1 |
| 2011-12 | 15400 | 14600 | 48280 | 43180 | 32880 | 28580 | 3.1:1 |

Mobilization and Sustainable Development**8(2):** 205-208.

Choudhary BN 1999. Krishi Vigyan Kendra– a guide for KVK managers. Division of Agricultural Extension, ICAR, New Delhi, India, pp 73-78.

Kaur I 2015. Need of crop diversification to achieve sustainable agriculture in Punjab: a brief review. Indian Journal of Economics and Development **11(1):** 41-51.

Kumar P, Singh K and Kaur P 2015. Economic impact of frontline demonstration on pulses in Punjab- a step towards diversification. Indian Journal of Economics and Development **11(1):** 111-116.

Samui SK, Maitra S Roy DK, Mandal AK and Saha D 2000. Evaluation of frontline demonstration on groundnut. Journal of the Indian Society of Coastal Agricultural Research **18(2):** 180-183.

Sharma N 2015. Agrarian crisis and diversification strategy for sustainable agricultural development in Punjab. Indian Journal of Economics and Development **11(1):** 31-40.

Singh D, Gill NS and Singh KB 2015. Yield gap analysis of cotton crop through frontline demonstrations in central plain zone of Punjab. Indian Journal of Social Research **56(2):** 245-249.