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Research Article

# Analysing yield gap and economics of black gram through front line demonstrations in Mandsaur district of Madhya Pradesh

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**SUMMARY :** This study was undertaken in Mandsaur district, situated in Malwa plateau semi-arid region of Western Madhya Pradesh. Total 65 front line demonstrations were conducted during 2007-08 to 2011-12 in *Kharif* season. During these five years (2007-2011), 26 hectares under black gram were demonstrated with improved management practices using improved varieties.Total 65 farmers were closely associated with black gram demonstrations. During five consecutive years of demonstration it was observed that the demonstration plots were always the higher yielder as compared to the plots maintained by the farmers on their own. On an average, there was an appreciable increase in yield level 21.80 to 40.00 per cent in blakgram under demonstration plots. Adoption of improved technology had significant impact on seed yield *vis-à-vis* yield gaps in black gram. Improved technology enhanced black gram yield from 174 kg to 440 kg/ha compared to farmers practice with an overall increase yield of 33.60 per cent.

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**KEY WORDS :**
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## BACKGROUND AND OBJECTIVES

Pulses production has been hovering around 13 -15 million tonnes during last decade, while annual domestic demand has risen to 18-19 million tonnes.The previous pulses production record was 14.91 million tonnes during the year 2003-04. India is one of the largest pulses producing countries in the world. Increased efforts to produce more food have resulted in an increase in the tremendous shift in cropping systems towards cereal-cereal based cropping systems. This has marginalized the pulses resulting in quantitative as well as qualitative degradation of productive base, land and farm resources. Though, pulses are important component of Indian agricultural economy only next to food grains in terms of increase, production and economic value. India is largest producer and consumer of pulses in the world, accounting for about 25 per cent of global production, 27 per cent of consumption and 34 per cent of food use (FAO). It is also the top importer, with an 11 per cent share of world imports during 1995-2001 (Gregory *et al.*, 2003). Besides this, the pulse production in India has fluctuated widely leading to steady decline in the per capita availability over the last 20 years (Gregory *et al*., 2003). Thus, there is a challenge for agricultural scientists, extension workers, planners and farming community to enhance and sustain the pulse productivity and diversify their cropping systems to meet out the national pulse requirements. Pulses being rich in quality protein, minerals and vitamins are inseparable ingredients of diet of majority of Indian population. Despite high nutritive value of pulses and their role in sustainable agriculture desired growth rate in production could not be witnessed. The domestic production of pulses is consistently below the targets and actual domestic requirements are also higher, due to this pulses are being imported. Black grams, also known as urdbean, mash etc. an important short-duration pulse crop grown in many parts of India. This crop is grown in cropping systems as a mixed crop, catch crop, sequential crop besides growing as sole crop under residual moisture conditions after the harvest of rice and also before and after the harvest of other summer crops under semi-irrigated and dry land conditions. Its seeds are highly nutritious with protein (25-26%), carbohydrates (60%), fat (1.5%), minerals, amino acids and vitamins. Seeds are used in the preparation of many popular dishes. It is one of the most important components in the preparation of famous south Indian dishes, e.g. dosa, idli, vada etc. besides, it adds about 42 kg nitrogen per hectare in soil. The front line demonstration programme (FLD's) in pulses is a noble initiative by Ministry of Agriculture, Govt. of India, which is conducted under close supervision of the scientists. The main objective of FLD's in pulses is to demonstrate and popularize the improved agro-technology on farmers' fields under varied existing farming situations for effective transfer of generated technology and fill the gap between improved technology and adopted/indigenous technology to enhance the pulse productivity and farm gains through pulses intensification and diversification for sustaining the production systems. Keeping in view the importance of pulses in food security and being vital component of our farming systems, KVKs to bring in enhanced application of modern technologies to generate yield data and collection of farmer's feedback. Keeping the importance of FLDs, the KVK Mandsaur conducted demonstrations on pulse crops black gram at farmers field under renfed situations in *Kharif* 2007-08, 2008-09, 2009-10, 2010-11 and 2011-12.

### Objectives :

- To exhibit the performance of recognised and recommended high yielding black gram varieties with Full recommended package of practices for harvesting higher crop yields.
- To compare the yield levels of local check (farmers' field) and FLD fields.
- To collect feedback information for further improvement in research and extension programme.

## RESOURCES AND METHODS

Front line demonstrations on black gram were conducted at farmers' field in district Mandsaur(M.P.) to assess its performance during *Kharif* seasons of the year 2007-08, 2008-09, 2009-10,2010-11 and 2011-12. In five villages (Guradiadiada, Udpura, Surkheda, Lasudawan and Barkheda dev Dungari) of three blocks *viz.*, Mandsaur-I, Malhargarh- II and Sitamau-III. During these Five years (2007-2011), 26 hectares under black gram were demonstrated with improved management practices using improved varieties. Total 65 farmers were closely associated with black gram demonstrations. Each demonstration was of 5.20 ha area and using recommended package of practices and the farmers were provided quality seed of black gram variety/Technology TAU-1,INM,J.U. 86 during all the years of the study. The\ sowing was done during July under renfed conditions and harvested during first fortnight of September. The demonstrations on farmers' fields were regularly monitored by Krishi Vigyan Kendra, Mandsaur scientist's right from sowing to harvesting. The grain yield of demonstration crop was recorded and analyzed. Different parameters as suggested by Yadav *et al*. (2004) were used for calculating gap analysis, costs and returns. The detail of different parameters are as follows:

$$\textbf{Technology gap} = \textbf{Potential yield} - \textbf{Demonstration yield}$$

$$\textbf{Extension gap} = \textbf{Demonstration yield} - \textbf{Farmers practice yield}$$

$$\textbf{Effective gain} = \textbf{Demonstration yield} - \textbf{Additional cost}$$

$$\textbf{Additional return} = \textbf{Dem. return} - \textbf{Farmers practice return}$$

$$\textbf{Invtrmental B : C ratio} = \frac{\textbf{Additional return}}{\textbf{Additional cost}}$$

$$\textbf{Technology index} = \frac{\textbf{Potential yield} - \textbf{Demonstration yield}}{\textbf{Potential yield}} \textbf{x100}$$

## OBSERVATIONS AND ANALYSIS

In front line demonstration programme fill the gap between improved technology and indigenous technology to enhance the pulse productivity and farm gains through FLD programmes use of quality seeds of improved varieties,

**Table 1: Comparison between demonstration package and existing farmers practice under black gram**

| Sr.No. | Particular | Demonstration package | Farmers practice |
|---|---|---|---|
| 1. | Farming situation | Rainfed light black soil or moram type | Rainfed moram type |
| 2. | Variety | J.U. 86 and TAU-1 | Use local seed |
| 3. | Time of sowing | 25 June to10 July | 25 June to15 July |
| 4. | Method of sowing | Line sowing with use seed cum fertilizer drill | Line sowing with use seed drill |
| 5. | Seed rate | 18 kg/ha. | 22 kg/ha. |
| 6. | Fertilizer dose | As per recommendation after soil testing | In balance use of fertilizers |
| 7. | Plant protection | Black gram seeds are treated with bavistin 1 g+2g thiram for every kg of seeds and spray of recommended insecticides for control sucking pest. | No seed treatment before the sowing |

line sowing and timely weeding, need based of pesticide as well as balanced fertilization were emphasized and comparison was made with the existing practices (Table 1). The necessary step for selection of site and farmers, layout of demonstration etc. were followed as suggested by Choudhary (1999). The traditional practices were maintained in case of local checks.

Area, production and productivity of black gram in Mandsaur district and Madhya Pradesh are shown in Table 2. Madhya Pradesh produced 193220 tonnes black gram in area of 553120 ha and given average productivity 349.80 kg/ha (last five years average as per given Table 2) and district Mandsaur produced 6410 tonnes black gram in area of 14210 ha and given average productivity 453.00 kg/ha However, about 2-3 million tons of pulses are imported annually to meet the domestic consumption requirement. Thus, there is need to increase production and productivity of pulses in the country by more intensive interventions.

**Grain yield:**

The increase in grain yield under demonstration was 21.80 to 40.00 per cent than farmers 'local practices. On the basis of five years, 33.60 per cent yield advantage was recorded under demonstrations carried out with improved cultivation technology as compared to farmers traditional way of black gram cultivation (Table 3).

**Gap analysis:**

An extension gap of 174- 440 kg per hectare was found between demonstrated technology and farmers practices during different five years and on average basis the extension gap was 296.40 kg per hectare (Table 3). The extension gap was lowest (174 kg/ha) during 2008-09 and was highest (440 kg/ha) during 2007-08. Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than the traditional farmers practices.

**Table 2: Black gram scenario (area, production and productivity) of the district and state**

| Sr.No. | Year | Area:000,ha | | Production:000,tonnes | | Productivity: kg/ha. | |
|---|---|---|---|---|---|---|---|
| | | Mandsaur | M.P. state | Mandsaur | M.P. state | Mandsaur | M.P. state |
| 1. | 2007-08 | 15.4 | 570.1 | 6.2 | 193.0 | 402 | 341 |
| 2. | 2008-09 | 14.4 | 516.6 | 5.6 | 195.7 | 387 | 379 |
| 3. | 2009-10 | 13.1 | 570.3 | 6.4 | 214.0 | 493 | 375 |
| 4. | 2010-11 | 14.2 | 557.2 | 7.0 | 214.6 | 493 | 385 |
| 5. | 2011-12 | 13.95 | 551.4(FFC) | 6.85 | 148.8(FFC) | 490 | 269(FFC) |
| 6. | Average (mean) | 14.21 | 553.12 | 6.41 | 193.22 | 453 | 349.80 |

**Table 3 : Grain yield and gap analysis of front line demonstrations on black gram at farmers field**

| Year | No. of demo. | Variety/ technology | Potential yield (kg/ha) | Demo yield (kg/ha) | Farmers practice (kg/ha) | Increase (%) | Extension gap (kg/ha) | Technology gap (kg/ha) | Technology index (%) |
|---|---|---|---|---|---|---|---|---|---|
| 2007-08 | 13 | TAU-1 | 1100 | 1085 | 645 | 40.00 | 440 | 15 | 1.36 |
| 2008-09 | 13 | INM | 1100 | 972 | 798 | 21.80 | 174 | 128 | 11.64 |
| 2009-10 | 13 | J.U. 86 | 1300 | 1175 | 854 | 37.59 | 321 | 125 | 9.62 |
| 2010-11 | 13 | J.U. 86 | 1300 | 1164 | 840 | 38.57 | 324 | 136 | 10.46 |
| 2011-12 | 13 | J.U. 86 | 1300 | 965 | 742 | 30.05 | 223 | 335 | 25.77 |
| Average | 13 | - | 1220 | 1072.20 | 775.80 | 33.60 | 296.40 | 147.80 | 11.77 |

Demo. =Demonstration FP=Farmers practice INM=Integrated nutrient management

**Table 4 : Economic analysis of front line demonstrations on black gram at farmers field**

| Year | Cost of cultivation (Rs./ha) | | Additional cost in demo. (Rs./ha) | Gross return (Rs./ha) | | Net returns (Rs./ha) | | Additional return in demo. (Rs./ha) | Effective gain (Rs./ha) | INC B:C ratio (IBCR) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Demo. | FP | | Demo. | FP | Demo. | FP | | | |
| 2007-08 | 8500 | 7000 | 1500 | 32100 | 25800 | 23310 | 18010 | 5300 | 3800 | 3.50 |
| 2008-09 | 9708 | 8370 | 1338 | 27216 | 22344 | 17508 | 13974 | 3534 | 2196 | 2.64 |
| 2009-10 | 10425 | 9510 | 915 | 35250 | 25620 | 24825 | 16110 | 8715 | 7800 | 9.50 |
| 2010-11 | 11210 | 10450 | 760 | 46560 | 33600 | 35350 | 23150 | 12200 | 11440 | 16.05 |
| 2011-12 | 12325 | 11450 | 875 | 36670 | 28196 | 24345 | 16746 | 7599 | 6724 | 8.68 |
| Average | 10433.6 | 9356 | 1077.6 | 35559.2 | 27112 | 25067.6 | 17598 | 7496.6 | 6392 | 8.07 |

Wide technology gap were observed during different years and this was lowest (15 kg/ha) during 2007-08 and was highest (335 kg/ha) during 2011-12. On five years average basis the technology gap of total 65 demonstrations was found as 147.80 kg per hectare. The difference in technology gap during different years could be due to more feasibility of recommended technologies during different years. Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology.

**Economic analysis:**

Different variables like seed, fertilizers, bio fertilizers and pesticides were considered as cash inputs for the demonstrations as well as farmers practice and on an average an additional investment of Rs. 1077.6 per ha was made under demonstrations (Table 4). Economic returns as a function of grain yield and MSP sale price varied during different years. Maximum returns (Rs. 12200 per ha) during the year 2010-11 was obtained due to higher grain yield. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The lowest and highest incremental benefit: cost ratio (IBCR) were 2.64 and 16.05 in 2008-09 and 2010-11, respectively (Table 4) depends on produced grain yield and MSP sale rates. Overall average IBCR was found as 8.07. The results confirm the findings of front line demonstrations on oilseed and pulse crops by Yadav *et al.* (2004) and Lathwal (2010).

**Conclusion :**

The front line demonstration (FLDs) plays a very important role to disseminate recommended technologies because it shows the potential of technologies resulting in an increase in yield at farmers' level. Under demonstrations some specific technologies like seed treatment, seed rate, improved varieties, balance use of fertilizer, intercultural and plant protection measures were undertaken in a proper way. These technologies were found to be the main reason for increase in the yield and thus, it can be said that FLDs were the most successful tools for transfer of technology. The demonstration farmers acted also as primary source of information on the improved practices of black gram cultivation and also acted as source of good quality pure seeds in their locality and surrounding area for the next crop. The concept of front line demonstration may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community.

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## REFERENCES

**Katare, Subhash, Pandey, S.K. and Mustafa, Mohd.** (2011). Yield gap analysis of rapeseed-mustard through front line demonstrations. *Agric. Update,* **6** (2):5-7.

**Lathwal, O.P.** (2010). Evaluation of front line demonstrations on black gram in irrigated agro ecosystem. *Annl. Agric. Res.,* **31** (1&2): 24-27.

**Meena, B.L., Meen, R.P.,Meena, R.H., Balai, C.M.** (2012). Yield gap analysis of rapeseed mustard through front line demonstrations in agro climatic zone IVa of Rajasthan. *J.Oilseed Brassica,***3**(1): 51-55.

**Mitra, B. and Samajdar, T.** (2010). Yield gap analysis of rapeseed – mustard through front line demonstration. *Agric. Exten. Rev.,* **22**: 16-17.

**Sharma O.P.** (2003). Moth bean yield improvement through front line demonstrations. *Agric. Extn.Rev.,***15** (5): 11-13.

**Singh, G., Sirohi, A.and Malik, Y.P.** (2008). Impact of improved technology on the productivity of Indian mustard. *J. Oilseeds Res.,* **25**: 125.

**Singh, S.N., Singh, V.K., Singh, R.K. and Singh, Rakesh, K.** (2007). Evaluation of on-farm front line demonstrations on the yield of mustard in Central Plains Zone of Uttar Pradesh. *Indian Res. J. Extn. Edu.,* **7**: 79-81.

**Yadav, D.B., Kamboj, B.K. and Garg, R.B.** (2004). Increasing the productivity and profitability of sunflower through front line demonstrations in irrigated agroecosystem oooof eastern Haryana. *Haryana J. Agron.,* **20** (1&2) : 33-35.