D-5883
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RESEARCH ARTICLE Agricultural Science Digest,

Impact of CFLD Pulses on Blackgram Productivity and Profitability in Farmers' Field of Gariyaband District

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10.18805/ag.D-5883

ABSTRACT

Background: Among the pulses grown in the *kharif* season, blackgram occupies 8654 ha area in the Gariyaband district. But because of improper cultivation practices, blackgram yield is quite low (430 kg/ha). Thus Cluster Frontline Demonstrations were planned and carried out to disseminate latest package of practices to the farmers inorder to boost blackgram production and productivity.

Methods: 50 cluster frontline demonstrations were conducted during *kharif* season of 2020-21 and 2021-22 in farmer's field at Mauhabhatta and Kamepur villages of Gariyaband district, Chhattisgarh State. The demonstrations were carried out in 20 ha area to show the higher production potentiality of the technique using improved variety Indira Urd-1.

Result: The results revealed that improved seed of Indira Urd -1 treated with Rhizobium +PSB and recommended plant protection cover, recorded average yield of 6.82 q/ha as compared to 4.35q/ha in control plot. The demonstrated technology gave higher net returns and B:C ratio of 28087 Rs/ha and 3.02 in comparison to control (16245 Rs/ha, 1.67). The average extension gap, technology gap and technology index recorded were 2.47 q/ha, 5.18 q/ha and 43.16% respectively. The results indicate that adoption of improved production technologies minimized the yield gap and provided higher economic returns to the farming community.

Key words: Blackgram, Cluster frontline demonstration, Extension gap, Indira Urd-1, Productivity, Technology gap.

INTRODUCTION

Pulses play a significant role in the group of food crops to address national food and nutritional security and tackle environmental challenges. Blackgram is an important pulse crop grown throughout the country. The crop can withstand adverse climatic conditions and improves the soil fertility by fixing atmospheric Nitrogen in the soil. Blackgram is a crucial part of the Indian diet, since it is a supplement to cereal based diet and contains vegetable protein. About 26% of it is protein, which is almost three times that of cereals and other minerals and vitamins (Reddy, 2010).

Black gram is an important kharif pulse crop in Gariyaband district of Chhattisgarh cultivated in an area of 8654 ha, but due to unavailability of improved varieties and non adoption of improved cultivation practices in the district, it's productivity is (430 kg/ha) which is far below the average national productivity (585 kg/ha). It is identified that there are several factors responsible for low pulse productivity and high yield gap which are mostly related to inputs and their efficient management (Ali and Gupta, 2012). Other factors for low productivity include biotic stresses, uncertainty of rainfall and poor fertility levels of the soil. The problem is compounded by the fact that majority of the farmers in the rainfed regions are resource poor with low risk bearing capacity and they generally do not apply recommended practices. The productivity of blackgram per unit area could be boosted by adopting improved practices in a systematic manner along with high yielding varieties (Rai *et al*., 2015). In this view, Krishi Vigyan Kendra, an innovative science based institution, plays a crucial role in connecting the research scientists and farmers. The cluster frontline demonstration (CFLD) is an important method of transferring the latest package of practices to the farmers. Further more, these demonstrations are carefully planned with provisions made for the prompt distribution of the technology displayed throughout the farming community through the planning of extension activities like field days and group meetings. The goal of the present study, conducted by Krishi Vigyan Kendra, Gariyaband, was to increase blackgram production and productivity by showcasing improved technological practices through cluster frontline demonstrations.

MATERIALS AND METHODS

The study was carried out at Mauhabhatta and Kamepur villages of Gariyaband District of Chhattisgarh State during *Kharif* season 2020-21 and 2021-22. The variety Indira Urd -1 was selected for conducting the demonstrations. Indira Urd-1 variety is resistant to Powdery Mildew and is suitable for

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How to cite this article: Abraham, S., Chourasia, M., Arya, M., Sahu, E., Jamrey, P. and Mishra, T. (2024). Impact of CFLD Pulses on Blackgram Productivity and Profitability in Farmers' Field of Gariyaband District. Agricultural Science Digest.
doi: 10.18805/ag.D-5883.

Submitted: 19-09-2023 **Accepted:** 23-01-2024 **Online:** 23-02-2024

both *Kharif* and *Rabi* season with an average yield of 12-13 q/ha and duration of 70-75 days. Before starting the demonstrations, farmers were trained on scientific cultivation practices. Each demonstration was laid out in an area of 0.4 ha area and in 0.2 ha area adjacent to the farmers' fields, the crop was cultivated with farmers' practice. The package of improved technologies like required seed rate, improved variety, seed treatment with biofertilizers, nutrient management, weed management and plant protection measures were followed by the farmers in the demonstrations. The method demonstrations on seed treatment with biofertilizers were conducted at each village to make the farmers aware about its effects and benefits on pulse crop production. Sowing was done from third to last week of August as sowing in the month of July leads to heavy infestation of yellow mosaic virus. Scientific interventions under cluster frontline demonstrations (Table 1) were taken as recommended by Indira Gandhi Krishi Vishwa Vidyalaya, Raipur. To study the impact of Cluster frontline demonstrations, data from CFLD and farmers' practices were analyzed. The extension gap, technology gap and technology index were calculated using the formula suggested by Samui *et al*. (2000) as :

Technology gap = Potential yield- Demonstration yield

Extension gap = Demonstration yield-Farmers' yield

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

The fields were regularly monitored and periodically observed by the Scientists of KVK. At the time of harvest, yield data were collected from both the demonstrated plots as well as from the farmers' practice. The cost of cultivation and profit details of both the systems were collected from the farmers for working out the benefit cost ratio. The economic parameters were calculated based on the prevailing market prices of inputs and minimum support prices of outputs.

RESULTS AND DISCUSSION

The results (Table 2) of cluster frontline demonstrations conducted during 2020-21 and 2021-22 indicate that the demonstrated plots have given a good impact over the farmers' practice. An average increase of 57.38 per cent yield was recorded. The data clearly showed that the yield enhancement was due to the impact of advanced technology over the farmer practice. Similar trend of yield enhancement under frontline demonstrations was documented by (Bairwa *et al*., 2013; Saikia *et al*., 2018 and Meena and Singh, 2017).

Technology gap

An average technology gap of 5.18 q/ha was calculated during the demonstration period. The data reflects that there is further potential for increasing yield by implementation of better technological interventions reducing the technological gap and ultimately lowering down technology index. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions (Mukherjee, 2003). Hence, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations (Rachhoya *et al*., 2018).

Extension gap

An extension gap of 2.59 to 2.35 q/ha was recorded during 2020-21 and 2021-22.On an average, extension gap

Table 1: Technological gap in CFLDs and farmers' practice of blackgram.

Particulars	Existing practices	Technological interventions	Technological gap
Land preparation	Ploughing with cultivator and levelling	Ploughing with cultivator and levelling	No gap
Variety	Local	Indira Urd-1	Full gap
Time of sowing	3rd of August- 1st week September	3rd to last week of August	Partial gap
Seed rate	7.5 kg/ha	15-20 kg/ha	Partial gap (50%)
Seed treatment	No seed treatment	Seed treatment with Rhizobium + PSB culture @5 g/kg seed	Full gap
Fertilizer	Improper use	20 N, 40 P_2O_5 and 20 K_2O	Partial gap (50%)
Weed management	Improper weed control measures	Pre-emergence application of pendimethlain + 1 hand weeding	Partial gap (50%)
Plant protection measures	Injudicious use of insecticides and fungicides based on advice of input dealers	Spray of Imdacloprid @ 70 ml/ acre to control white fly	Partial gap with high cost

Table 2: Impact of technological intervention on yield of blackgram and gap analysis.

Year	Yield (q/ha)			Increase over farmer's practice (%)	Technology gap (%)	Extension gap (%)	Technology index (%)
	Potential	CFLD	Farmer's practice				
2020-21	12	6.59	4.0	64.75	5.41	2.59	45.08
2021-22	12	7.05	4.7	50	4.95	2.35	41.25
Average	12	6.82	4.35	57.38	5.18	2.47	43.17

Table 3: Economic analysis of CFLDs and farmers' practice of blackgram.

Year	Gross cost (Rs/ha)		Gross returns (Rs/ha)		Net returns (Rs/ha)		B:C ratio	
	FP	Demo	FP	Demo	FP	Demo	FP	Demo
2020-21	12500	13800	24000	39540	11500	25740	1.92	2.87
2021-22	13800	14700	28200	42300	14400	27600	2.03	2.88
Average	13150	14250	26100	40920	12950	26670	1.98	2.88

observed during both the years was 2.47 q/ha which is a wide gap. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology. This finding is in corroboration with the findings of Hiremath and Nagaraju (2010); Meena *et al*. (2020); Singh *et al*. (2019).

Technology index

Technology index is another important tool for judging the adoption and impact of different technologies. It is derived as the ratio between technology gap and potential yield in terms of percentage. Lower value of technology index means better performance of technological intervention. In the present study, technology index varied from 45.08 to 41.25 per cent The data reveals that the demonstrated technology showed better results in second year in comparison to the first year. Similar results were also obtained by Kumar *et al*. (2010) and Jha *et al*. (2020). Large variation in technology index might be due to variation in existing weather condition, soil fertility status and insect-pests infestation.

Economics acts as a cornerstone for both embracing and rejecting technology which depends upon number of factors like seed yield, variable input costs, labour costs and output sale prices. Compared to farmers' practices, improved technological interventions increased the average cost of cultivation by 8.36 per cent (Table 3). It was observed that cluster frontline demonstrations recorded higher gross returns (Rs 40920/ha) and net returns (Rs 26670/ha) in comparison to farmers practice (Rs.26100/ha and Rs. 12950/ha). The benefit cost ratio was also recorded higher in recommended practice with 2.88 as compared to 1.98 in farmer's practice. Similar economic benefits after adoption of improved technologies like high cost benefit ratio, high yield and maximum net return under frontline demonstrations on pulses were documented by (Lathwal 2010; Jha *et al*., 2020; Dwivedi *et al*., 2011; Meena and Singh, 2017 and Singh *et al*., 2019). The results are also in conformity with the findings of (Singh *et al*., 2018); Jayalakshmi *et al*., 2018). Likewise Singh *et al*. (2020) also reported higher net returns as well as benefit cost ratio in other pulses as compared to farmers practice.

CONCLUSION

It is concluded from the above findings that Cluster frontline demonstrations on Blackgram var. Indira Urd-1, can reduce the technology gap to a considerable extent by adopting scientific methods of blackgram cultivation thus leading to increase productivity of blackgram in the district. It was observed that potential yield can be achieved by imparting scientific knowledge to the farmers, providing the quality need based inputs and their proper utilization. Horizontal expansion of improved technologies may be achieved by implementation of various extension activities like training programme, field day, exposure visit *etc*. organized in CFLD programmes. As the gaps still exists, the CFLDs should be continued in coming years so that gaps may be minimized as more and more area is covered under blackgram. Therefore, cluster front line demonstrations (CFLD) were effective in updating knowledge, skills and attitude of farmers and enhancing production and productivity of blackgram in the district.

Conflict of interest

All authors declare that they have no conflict of interest in publication of this article.

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