

Original Research Article

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Performance of cluster frontline demonstration on productivity and profitability of Blackgram (*Vigna mungo*) in Raigarh District of Chhattisgarh, India

S. P. Singh*, K. K. Paikra and Chanchala Rani Patel

Krishi Vigyan Kendra, Raigarh-496001, Indira Gandhi Krishi Viswavidyalaya,
Raipur (C.G.), India

*Corresponding author

ABSTRACT

The present study was carried out the evaluating the performance of improved cultivars with scientific package and practices on production, productivity and profitability of blackgram. Cluster frontline demonstrations were conducted during 2016-17 and 2017-18 with evaluation the performance of Indira urd pratham, variety of blackgram in Baramkela and Tamnar blocks of the district and record the feedback information of farmer's. The results revealed that average yield of blackgram under cluster frontline Demonstrations were 11.52 and 11.19 qha⁻¹ as compare to 8.75 and 8.45 qha⁻¹ recorded in farmer's practice, average yield increase of 31.66 and 32.43 per cent and additional return of 11934.00 and 12986.00 Rsha⁻¹, respectively. It was observed that the benefit cost ratio (B: C) of recommended practice (CFLD's) were 3.02 and 2.99 as compared to 2.55 and 2.2.48 in farmer's practice during consecutive years of study blocks. The average extension gap 2.75 qha⁻¹ and average technology gap 3.64 qha⁻¹ was recorded. Therefore, the results clearly indicates that the use of improved varieties and package and practices with scientific intervention under frontline demonstration programme contribute to increase the productivity and profitability of pulses in Chhattisgarh state.

Keywords

Cluster frontline demonstrations,
Improved variety,
Blackgram

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Introduction

Pulses on account of their vital role in nutritional security and major sources of vegetable proteins. India is the world's largest producer of pulses, it imports a large amount of pulses to meet the growing domestic needs. Thus, India is the largest importer, producer and consumer of pulses. India has to produce not only enough pulses but also remain competitive to protect the indigenous pulse production. Blackgram (*Vigna mungo*) contain 22-24% protein, which is almost twice the

protein in wheat and thrice that of rice. Pulses provide significant nutritional and health benefits, and are known to reduce several non-communicable diseases such as colon cancer and cardiovascular diseases (Jukanti *et al.*, 2012). Protein-energy malnutrition as well as micronutrient deficiencies can be addressed by increasing the consumption of pulses which are a rich source of proteins, minerals, iron and fibre. Net daily pulses availability for Indians has increased slightly from 32g per capita in 2000 to 37g per capita in 2009. In order for India to meet the 40 grams per day

per capita requirement of pulses, attention has to be paid to both production and consumption. Thus, a large part of their protein requirement could be met by pulses. Food security stands on the three pillars of availability, access and absorption (nutrition). Pulses availability has also increased 7-8.33 per cent slowly in account of food grain. Availability of pulses has increased in the past decade with the increasing emphasis on development of improved varieties and supportive policies (Source: Directorate of Economics and Statistics, 2016). It produces about 1.5–1.9 mt of black gram annually from about 3.5 m ha of area, with an average productivity of 600 kg ha⁻¹. Black gram output accounts for about 10 per cent of India's total pulse production. However, productivity is low due to lack of awareness in farming community regarding improved package and practices of pulse crops. Frontline demonstrations are important dissemination process for transfer of technology and to establish its production potentials on the farmer's field. Pulses can be grown on range of soil and climatic conditions and play important role in crop rotation, mixed and inter-cropping, maintaining soil fertility through nitrogen fixation, release of soil-bound phosphorus, and thus contribute significantly to sustainability of the farming systems. It is therefore, necessary to assess the technological gap in production and also to know the problems and constraints in adopting modern blackgram production technologies Islam *et al.*, (2011) and Kumar *et al.*, (2014). Production of major pulses is constrained by both biotic and abiotic stresses. For example, pod borers (*Helicoverpa armigera*), fusarium wilt, root rots, ascochyta blight and botrytis gray mold are some of the major biotic constraints to increasing the productivity of chickpea. The major constraints to productivity in pigeonpea are biotic stresses such as pod borer, pod fly, Fusarium wilt, and sterility mosaic disease. Similarly, pod borer,

aphids, cutworm, powdery mildew, rust and wilt are the major pests and diseases affecting lentil production in India. The richness of legumes in N and P, makes them attractive for insect pests and diseases (Sinclair and Vadez, 2012). Availability of quality seed of improved varieties and other inputs is one of the major constraints in increasing the production of grain legumes (David *et al.*, 2002). Keeping this in view, the present investigation was undertaken to study the awareness level of farmer's regarding blackgram cultivation, extent of adoption of improved practices, to find out the yield gap in black gram production technology (Devi *et al.*, 2014). Krishi Vigyan Kendra are grass root level organization meant for application of technology through assessment, refinements and dissemination of proven technologies under different micro farming situation in the district (Das, 2007). Cluster frontline demonstrations were conducted on blackgram (Indira urd pratham) during 2016-17 and 2017-18 with disseminate the technology in the district and to establish production potentials on the farmer's field, assessment of adoption and yield gap and record feedback information from farmer's for further improvement in the research and extension programme.

Materials and Methods

The present study was carried out in the Raigarh district is located on the Northern part of Chhattisgarh state and lies at 21°54'N latitude and 83°24' E longitude with an altitude of 215 m above the mean sea level (MSL). Cluster frontline demonstrations were conducted during 2016-17 and 2017-18 with evaluation the performance of Indira urd pratham, variety of blackgram in Baramkela and Tamnar blocks of the district. In this study, 140 farmer's were selected from aforesaid blocks during consecutive years under cluster frontline demonstration of

blackgram. All the technological intervention were taken as per prescribed package and practices for improved variety of blackgram crop (Table 1). The grain yield, gap analysis, input cost, net return and additional return parameters were recorded (Table 2 and 3).

Assessment of gap in adoption of recommended technology before laying out the cluster frontline demonstrations (CFLD's) through personal discussion with selected farmer's. The awareness programme (training) was organized for selection of farmer's and skilled development about detailed technological intervention with improved package and practice for successful blackgram cultivation. Scientists visited regularly cluster frontline demonstrations fields and farmer's fields also. The feedback information from the farmer's was also recorded for further improvement in research and extension programmes. The extension activities i.e. awareness programme (training), farmer's seminar and field day's were organized at the cluster frontline demonstrations sites.

The basic information were recorded from the farmer's field and analyzed to comparative performance of cluster frontline demonstrations (CFLD's) and farmer's practice. Different parameters were calculated to find out technology gaps (Yadav *et al.*, 2004).

Extension gap = Demonstrated yield- farmer's practice yield

Technology gap= Potential yield- Demonstration yield

Additional return = Demonstration return – farmer's practice return

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

Results and Discussion

The improved package and practices is more important with technological intervention for productivity and profitability of pulses. Detailed package and practices with technological intervention for recommended practice (Table 1). It was also observed that farmer's use injudicious and un-recommended insecticides and mostly didn't use fungicides. Similar observations were reported by Singh *et al.*, 2011.

Grain Yield

The grain yield of demonstrated field's and farmer's practice is presented in table 2. Data revealed that average grain yield of demonstrated field's was higher from farmer's practice in both blocks of Raigarh district.

The results revealed that average grain yield of blackgram under cluster frontline demonstrations were 11.52 and 11.19 qha⁻¹ as compare to 8.75 and 8.45 qha⁻¹ recorded in farmer's practice and average yield increase of 31.66 and 32.43 per cent, respectively.

The above finding were accordance with Dubey *et al.*, (2010). The extension gap 2.77 and 2.74 qha⁻¹, technology gap 3.48 and 3.81 qha⁻¹ and technology index 23.20 and 125.40 was recorded (Table 2).

This Extension gap should be assigned to adoption of improved dissemination process in recommended practices which outcome in higher grain yield than the farmer's practice.

The similarly observations were also obtained in blackgram crop by Bairwa *et al.*, (2013) and also Hiremath and Nagaraju (2010). Yield of the recommended practice and potential yield of the crop was compared to estimate the yield gaps which were further categorized in to technology and extension gaps.

Table.1 Detail of package and practices for blackgram cultivation

S. No.	Technological intervention	Farmer's practice	Recommended Practice (CFLD's)
1.	Variety	Existing / old recommended cultivar	Indira urd pritham
2.	Seed rate (kg ha^{-1})	25.0	20.0
3.	Seed treatment.	Not practice.	Carbendazime 50 WP @ 3g kg $^{-1}$ seed, Thiamethoxam 25WG 2gkg $^{-1}$, 5-10 g kg $^{-1}$ seed Rhizobium culture and 5-10 ml kg $^{-1}$ seed PSB culture.
4.	Sowing method/Spacing.	Broadcasting / un uniform plant population	30 x 10 cm, Sowing with seed cum fertilizer drill.
5.	Time of Sowing	15 July -15 August	15 July- 30 July
6.	Nutrient management.	Imbalance use of fertilizers and 20 kg urea ha $^{-1}$ at and 50 kg DAP at sowing.	Balance fertilization as per soil test values (STV) 50 kg Urea ha $^{-1}$ (in 2 split application), 310 kg SSP ha $^{-1}$ and 30 kg MOP ha $^{-1}$ at sowing.
7.	Weed management.	No weeding/ manually	Imazethapyr 10SL 75g a.i. ha $^{-1}$ at 15-20 DAS.
8.	Insect, pest and disease management.	No/ injudicious use of and insecticides and fungicides.	Two sprays of Thiamethoxam 25WG @ 0.5ml l $^{-1}$ of water at 30 and 45 days for sucking pest and one spray of Metalaxyl 35% WS 2g l $^{-1}$ of water for white blister.

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

Name of block	No. of demonstration	Average yield (ha)		% Increase in Recommended Practice (RP)	Extension gap (q ha $^{-1}$)	Technology gap (q ha $^{-1}$)	Technology index
		Recommended Practice (RP)	Farmer's Practice (FP)				
Baramkela	76	11.52	8.75	31.66	2.77	3.48	23.20
Tamnar	64	11.19	8.45	32.43	2.74	3.81	25.40
Average	-	11.35	8.60	32.04	2.75	3.64	24.3

Table.3 Economic analysis of the cluster frontline demonstrations on blackgram

Name of block	Total returns (Rs.ha $^{-1}$)		Input cost (Rs.ha $^{-1}$)		Net return (Rs.ha $^{-1}$)		Additional return (Rs.ha $^{-1}$) FLD's	B:C ratio	
	Recommended Practice (RP)	Farmer's Practice (FP)	Recommended Practice (RP)	Farmer's Practice (FP)	Recommended Practice (RP)	Farmer's Practice (FP)		Recommended Practice (RP)	Farmer's Practice (FP)
Baramkela	57600	43750	19073	17157	38527	26593	11934	3.02	2.55
Tamnar	60426	45630	20209	18399	40217	27231	12986	2.99	2.48
Average	59013	44690	19641	17778	39372	26912	12460	3.005	2.51

Note: MSP of blackgram @Rs.5000.00 qt $^{-1}$ in 2016-17 and Rs.5400.00 qt $^{-1}$ in 2017-18.

The observed technology gap may be attributed dissimilarity in soil fertility status, rainfall distribution, disease, insect, pest infestations and weed intensity well as the change in the locations of cluster frontline

demonstration sites. The technology index shows the feasibility of the variety at the farmer's field. The lower value of technology index more is the feasibility of technology. This indicates that a gap existed between

technology evolved and technology adoption at farmer's field. The similar results were also observed by Bairwa *et al.*, (2013), and Dhaka *et al.*, (2010). Hence, it can be concluded from the table 2 that increased yield was due to adoption of improved varieties and conducting demonstration of proven technologies yield potentials of crop can be increased to greater extent. The programme of cluster frontline demonstration could be popularized for other oilseed crops also in order to increase farmer's income and attain self-sufficiency in oilseeds production.

Economics analysis

Economic performance of blackgram under cluster frontline demonstration were depicted in table 3. The economic analysis results revealed that the blackgram (Indira urd pratham) recorded higher total return from recommended practice (CFLD's) were 60426.00 Rsha⁻¹ as compared to 45630.00 Rsha⁻¹ farmer's practice of Tamnar block.

The net returns ranged from 38527.00 - 40217.00 Rsha⁻¹ in recommended practice in comparison to 26593.00 - 27231.00 Rsha⁻¹ in farmer's practice of both blocks. It was economically observed that additional return ranged from 11934.00 - 112986.00 Rsha⁻¹ in recommended practice. The benefit cost ratio also recorded higher in recommended practice with 3.02 and 2.99 as compared to 2.55 and 2.48 in farmer's practice.

The higher net returns and B: C ratio in black gram demonstration might be due to the higher grain yield and better pricing of the produce in the market. These results in accordance with the findings of Gurumukhi and Mishra (2003) and Dhaka *et al.*, (2010). Recommended practice (CFLD's) proved beneficial in respect of yield and economics of blackgram in consecutive blocks of Raigarh District In Chhattisgarh Plains.

The present study revealed that Indira urd pratham variety of blackgram gave higher yield and net returns in recommended practice (CFLD's) than farmer's practice in all block's Raigarh district. The highest grain yield was attributed to higher potential with improved variety, timely sowing, nutrient management, weed management, insect, pest and disease management in accordance of scientific package and practice. Economic analysis of different parameter's revealed that net return and additional return were recorded highest with recommended practice (CFLD's). The study was concluded that Indira urd pratham in recommended practice proved beneficial in respect of yield and economics of blackgram.

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