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Influence of cluster frontline demonstrations (CFLDs) on black gram productivity, profitability and transfer of technologies in Dhamtari District of Chhattisgarh, India

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Abstract
Krishi Vigyan Kendra, Dhamtari has conducted Cluster Front Line Demonstration on Black gram variety PU-1 at farmers fields in the two adopted villages namely Sinoli and Kustla during *Kharif* 2017-2018 and 2018-19 under National Food Security Mission, Govt. of India. Fifty front line demonstrations were conducted in 20 hectare area with active involvement of farmers and scientific staff of KVK. The increase in yields of black gram crop under cluster front line demonstrations was attributed to spreading of improved technologies *viz*. YVM resistant variety, seed treatment with bio-fertilizers, use of recommended seed rate, proper dose of fertilizers and plant protection measures. The study revealed that the yield of black gram in CFLD under rainfed conditions ranged from 9.29 to 10.29 q/ha whereas in FP it ranged between 4.32 to 4.5 q/ha. The per cent increase in yield with Improved Practices (IP) over FP was recorded in the range of 52.85 to 52.79. However, the extension gap and technological index were ranging between 5.06 -5.79 q/ha. The benefit cost ratio was 2.46 to 2.52 under the farming community for higher productivity and returns.

Keywords: Cluster Frontline Demonstrations (CFLDs), National Food Security Mission, Chhattisgarh

Introduction
Black gram is an important *kharif* pulse crop in Dhamtari district of Chhattisgarh but, due to unavailability of improved variety and non adoption of improved cultivation practices in the district, it's productivity (550 kg/ha) is far below the average national productivity (937 kg/ha) and state average of 332 kg/ha. It is therefore, necessary to assess the technological gap in production and also to know the problems and constraints in adopting modern black gram production technologies Islam *et al*., (2011) [10]. In this view, Krishi Vigyan Kendra an innovative science based institution plays an important role in bringing the research scientist face to face with farmers. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generations of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven produce technologies under different micro farming situations in a district (Das, 2007). Considering the above discussed issues a project implementation was undertaken by the KVK, Dhmatari with the main objective of studying the influence of Cluster Frontline Demonstrations (CFLDs) on black gram Productivity, Profitability and Transfer of Technologies in Dhamtari District of Chhattisgarh, to boost the production and productivity of pulses through CFLDs with latest and specific technologies.

Materials and Methods
District Profile
District Dhamtari is the fertile plains of Chhattisgarh from 81 00 23‟ 17” to 82 00 10‟ 35” E longitude and 20 00 02‟ 30” to 21 00 01‟ 32” N latitude has extensive wetlands mostly belongs to paddy fields. The district experiences subtropical climate with an annual rainfall of about 1100 mm over 65 days during June to October. The fertility of land in Dhamtari may be attributed to river *Mahanadi* and its tributaries *Sendur, Pairy, Sondur, Jonk, Kharun, and Sheonath.*

The present study was carried out by Krishi Vigyan Kendra, Dhamtari and 50 farmers from two Adopted villages were selected under Cluster front line demonstration. The soil of FLD's field was Alluvial soil and the Ph of soil is near about 7.0- 7.5. Farmers were trained to follow the package and practices for black gram cultivation as recommended by the Indira Gandhi Krishi Vishwavidyalaya, Raipur and need based inputs were provided to the beneficiaries. The farmers followed the full package of practices like soil testing, seed treatment with bio-fertilizer, fertilizer application, weed management, Integrated Pest Management (IPM) practices etc. Before conducting CFLDs, a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers.

Year	No. of Demonstration	Technology demonstrated
2017-18	59	Improved variety, IPM, Line sowing
2018-19	75	Improved variety, IPM, Line sowing

In demonstration plots, use of quality seeds of improved varieties (PU 31), line sowing and timely weeding, need based pesticide as well as balanced fertilizer were emphasized and comparison has been made with the existing practices. Visit of farmers and the extension functionaries was organized at demonstration plots to disseminate the message at large scale. The beneficiaries under the programme were facilitated by KVK scientists in performing field operations like sowing, spraying, weeding, harvesting etc during the course of training and visits The seed rate of Black gram was 20 kg / ha in demonstration plots. The sowing of Black gram crop seed was done during last week of august to first week of September. The spacing between Row and Plant was kept 30 x 10 cm for the cluster front line demonstration. The fertilizers doses were also given as basal dose. Two hands weeding with in Row were done at 30-35 and 55-60 days after sowing. The data were collected through personal contact with farmers at farmer's field and after that tabulated and analyzed to find out the findings and conclusion. The statistical tool like percentage used in this study for analyzed data. The extension gap, technology gap and the technology index were work out with the help of formulas given by Samui *et al*., (2000) [8] as mentioned below:

Extension gap = Demonstration yield- farmers' yield (control)
Technology gap = Potential yield- demonstration yield

$$\text{Technology index} = \frac{Technology\ gap}{Potential\ yield} \text{x}100$$

Results and Discussion

Results of Cluster Front Line Demonstrations conducted during 2017-18 to 2018-19 in different villages of Dhamtari district indicated that the cultivation practices comprised under CFLD *viz* use of improved variety, line sowing, balanced application of fertilizers and control of pest through insecticide at economic threshold level. The findings of the present research study as well as relevant discussion have been conferred under following points:

Yield performance

The results clearly indicates the positive effects of CFLDs over the existing practices toward enhancing the yield of black gram with its positive effect on yield attributes. The seed yield of CFLD's plots was higher due to good variety, seed treatment and plant protection measures which were followed in CFLD's plots. The table 2 depicted that the average seed yield was 7.83 q/ha which was higher as compared to local plots (5.77 q/ha).

The increased % yield was 52.85 to 56.85 in CFLD's over local check. However, the obtained seed yield in CFLD's was low as compared to Potential yield of the variety PU-1 due to drought like situation at the time of flowering and pod formation stage of the crop. The similar results were also observed by Dubey *et al.*, (2010) [2] and Poonia and Pithia (2010). Yield of the front line demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology and extension gaps (Hiremath and Nagaraju, 2009).

Table 1: Productivity, extension gap, and benefit-cost ratio of black gram grown under FLDs and existing package of practices

Year	Variety	Area (ha)	No. of farmer	Seed yield (q/ha)			Ext. gap q/ha	yield Increase (%)	B:C ratio	
				Potential	CFLD	FP			CFLD	FP
2017-18	PU-31	5	10	12-14	10.29	4.5	5.79	56.26	2.52	1.74
2018-19	PU-31	5	10	12-14	9.29	4.32	5.06	52.85	2.46	1.68

Extension gap

An average extension gap between demonstrated practices and farmers practices was recorded 5.06 to 5.79 q/ha (Table 1). The trend of technology gap reflects the farmer's cooperation in carrying out such demonstrations with encouraging results in subsequent years. Similar finding was recorded by Katare *et al*. (2011) [4] and Sharma and Sharma (2004) [7]. This Extension gap should be assigned to adoption of improved transfer technology in demonstrations practices resulted in higher grain yield than traditional farmer practices. The similarly observations were also obtained in Black gram crop by Mahalingam *et al*., (2018) [5] Bairwa *et al.*, (2013) [1] and also Hiremath and Nagaraju (2010) [3].

Table 2: Technology demonstrated in CFLD's and farmers' practices

Sr. No.	Particulars	Demonstrated practice	Farmer's practice
1	Farming situation	Demonstrations rainfed medium land	Farmer practices rainfed medium land
2	Variety	PU-31	Local
3	Time of sowing	Mid august to first week of September	September till first week of October
4	Methods of sowing	Line sowing	Broadcasting
5	Seed rate	20. Kg /ha	24 kg /ha
6	Fertilizer/ Vermicompost	15:30:0/ Vermicompost @30kg /ha	30 kg Urea
7	Seed treatment	With Rhizobium	No seed treatment
8	Plant protection management	*Pod borer: Quinalphos 25 EC @1500 ml/ha. Injudicious use of insecticides	Injudicious use of insecticides

Conclusion

Front Line Demonstration programme was effective in changing attitude, skill and knowledge of the farmers about improved practices of HYV of black gram including adoption of improved agro-technology. This developed the confidence and reliability of the farmers on the improved technology of black gram. The demonstration farmers acted also as source of information and pure seeds producer for wider dissemination and adoption of HYV (PU-31) of black gram by other farmers. The productivity gain under FLD over traditional practices of black gram cultivation created greater awareness and motivated the other farmers to adopt appropriate production technology of black gram in the district. The selection of critical input and participatory approach in planning and conducting the demonstration definitely helped in the speedy and wider dissemination of technology to other members of the farming community in *Nagri* Block in particular and in Dhamtari district as a whole.

Fig 1: Diagnostic visit of farmer field by KVK, Scientists

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