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Impact analysis of cluster frontline demonstrations in enhancing the black gram productivity in Bilaspur District of Himachal Pradesh

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Abstract

The Cluster Frontline Demonstration are important tool in transfer of latest technologies with the objective of convincing farmers and extension functionaries together about the production potentialities of production technologies for further wide scale diffusion. Under these demonstrations, extension scientists arrange ideal farming conditions at farmers' fields demonstrating package and practices at their field by adopting improved varieties, balanced fertilization on the basis of soil test and scientific management of pests and diseases. Under this, necessary and critical inputs are also provided. Krishi Vigyan Kendra, Bilaspur conducted 71 number of Cluster Front line Demonstrations (CFLDs) on black gram crop during *kharif* 2015 and 2016 on an area of 24 hectares at farmers fields. There was a wide yield gap between the potential and demonstration grain yields in black gram crop mainly due to technology and extension gaps. The study on black gram crop indicated that increase in grain yield over farmers practice was 48.4 and 78.4 percent, respectively, during these two years. It was further observed that in terms of economics, black gram crop recorded higher net returns per hectare compared to farmer's practice during all the years. The benefit cost ratio was 1.8 and 2.7, respectively, during *kharif 2015*and 2016 in demonstration plots of black gram. The percent technology index varied from 31.8 to 60.0 percent indicating urgent need to motivate the farmers to adopt economical viable technologies for increasing production, productivity and profitability of pulse crops.

Keywords: Black gram, cluster frontline demonstration, technology gap, productivity, economics

Introduction

Pulses being a major source of dietary protein in a vegetarian diet in our country are a rich source of protein as well they maintain soil fertility through biological nitrogen fixation in soil and thus play a vital role in furnishing sustainable agriculture (Kannaiyan, 1999) [6]. In order to meet the projected demand of 32 million tonnes of pulses by 2030, as per the Vision 2030 paper prepared by the Indian Institute of Pulses Research, Kanpur, a growth rate of 4.2% has to be ensured. Black gram popularly known as "urd bean" is one of the important grain legumes and is an excellent source of easily digestible good quality protein (24-26%). The productivity of pulse crops in hilly state Himachal Pradesh is far below the average national productivity mainly because of *rainfed* conditions, lack of improved varities, improper nutrient management, lack of knowledge of improved agronomical and plant protection practices. It's a big challenge for agricultural scientists, extension workers, planners and farming community to enhance and sustain the pulse production and diversify their cropping systems to meet out the national pulse requirements. Krishi Vigyan Kendras (KVKs) by conducting CFLDs on pulses are playing the role of game changer not only in demonstrating the new and improved technologies and capacity building of farmers but also contributing in checking the country's exchequer drain because of pulses import. The main objective of CFLD's in pulses is to demonstrate and popularize the improved agro-technology on farmers' fields under varied existing farming situations. By providing training to the farmers' and participatory front line demonstrations the knowledge gap of farmers is reduced and helps in increasing the productivity of crop.

Materials and Methods

Krishi Vigyan Kendra, Bilaspur at Berthin conducted 71 numbers of Cluster Front Line Demonstrations on Blackgram crop during *kharif* 2015 and 2016 on farmers' fields covering an area of 24 hectares in all the four development blocks of the district (Table 2). Full package of practices were adopted in CFLDs plots whereas in the adjoining farmer's field, which served as a control/local check, the crop was grown as per farmer's practice. Yield data for the improved practice as well as from farmers' practice were recorded at the time of threshing and analyzed to draw the inferences. The season-wise detail of sowing and harvesting has been given in Table 1. The regular monitoring of the demonstrations on farmers' fields was done by the Scientists of Krishi Vigyan Kendra, right from sowing to harvesting. The yield increase in demonstrations over farmers' practice was calculated by using the following formula as suggested by Yadav *et al*, 2004 [17]:

$$\% \text{ increase in yield over farmers' practice } (\% \text{ YIOFP}) = \frac{\text{Demonstration yield} - \text{farmers' plot yield}}{\text{Farmers' plot yield}} \times 100$$

Estimation of technology gap, extension gap and technology index: The estimation of technology gap, extension gap and technology index was done using following formula (Samui *et al*, 2000) [15]:

Technology gap = Potential yield – Demonstration plot yield

Extension gap = Demonstration plot yield – Farmer's plot yield

$$\text{Technology Index} = \frac{\text{Pi} - \text{Di}}{\text{Pi}} \times 100$$

Where

Pi = Potential yield of ith crop

Di = Demonstration yield of ith crop.

Economic analysis of FLD's on blackgram

Cost of cultivation of Black gram include cost of inputs like seed, fertilizers, pesticides etc. purchased by the farmers (in farmers practice)/provided by the KVK (in demonstration plots) as well as hired labour (if any), ploughing charges by bullocks/tractor (if any) and post harvest operation charges (if any) paid by the farmers. The farmers' family labour was not taken into consideration in the present study. The gross and net returns were worked out accordingly by taking cost of cultivation and price of grain into consideration. Similarly, the benefit-cost ratio was worked out as a ratio of gross returns and corresponding cost of cultivation (Mishra *et al*, 2009). Additional costs in CFLD's include expenditure on improved technological inputs in CFLD's over farmers' practice plots.

Results and Discussion

Comparison of production technologies

The Table 1 depicts the gap between the recommended practices in cluster frontline demonstrations and farmers' practice of black gram in Bilaspur district of Himachal Pradesh. The data clearly revealed that farmers generally did not use recommended and improved technologies. Due to non availability of improved varieties seed a wide gap in its use was observed and farmers generally grow seed of local varieties. Moreover, in farmers' practice broadcast method of seed sowing with higher seed rate against the recommended line sowing and optimum seed rate was used. Farmers also did not practice seed treatment with *rhizobium* culture, an important component in increasing the yield and yield attributes of pulse crops (Kumar and Elamathi, 2007) [8]. A partial gap in time of sowing, a critical factor in enhancing the productivity of black gram, was also observed. The sowing of black gram by the farmers was conducted in between June15th to June 30th, compared to recommended time of sowing i.e. June end to July beginning. Data in Table 1 further revealed that farmers are generally using urea at the time of sowing and did not apply any recommended fertilizer. Weed management and plant protection practices also showed a partial or full gap in adoption under farmers' practice over recommended practice in cluster frontline demonstrations. Similar observations for gap in improved technologies and farmers practices were also observed by Burman *et al,* (2010) and Kumar *et al,* (2014) [3, 9] in different crops.

Table 1: Details of production technologies followed in black gram crop under Cluster Front Line Demonstration and farmers' practice in Bilaspur district of Himachal Pradesh

Crop Operation	Recommended Practices demonstrated	Farmers' practice	Gap
Variety	Him Mash-1	Local	Full
Land preparation	Two ploughings	One or two ploughings	Nil
Seed rate	20 kg/ha	22-25 Kg/ha	Higher seed rate
Seed treatment	*Rhizobium* culture	Nil	Full
Method of sowing	Line sowing at 30cm row spacing	Broadcasting	Full
Time of sowing	June end to July beginning	June15th to June 30th.	Partial
Fertilizer dose	20:40:20 Kg NPK per ha (On soil test basis)	No fertilizer or urea only.	Full
Method of fertilizer application	Kera/line	Broadcast at the time of sowing	Full
Weed management	Pre emergence application of Pendimethalin @ 1.5 l ai/ha + one hand weeding	No or one hand weeding	Full
Plant protection	Need based pesticide and fungicide application	No pesticide and fungicide application	Full
Irrigation	Rain fed	Rain fed	Nil

Grain Yield

Table 2 depicts that during both the years of study, grain yields of black gram in demonstrations plots were higher (6.4 to 10.9 q/ha) compared to farmers plots (4.3 to 6.1 q/ha). The percent increase in yield of demonstration plots over farmers plots ranged from 48.8% to 127%. This increase in grain yield of demonstration plots was mainly due to the recommended package and practices followed under the supervision of KVK scientists. Use of Him Mash-1 improved and recommended variety of black gram, optimum sowing time, proper seed treatment, line sowing, judicious use of fertilizers, integrated weed and plant protection measures followed under CFLDs really jumped the yield of black gram compared to farmers practices. In farmer's practices, use of local varieties, broadcasting method of seed sowing, only urea application and no pesticide and fungicide application resulted in poor grain yields (Table 2). The findings are in agreement with the findings of Dwivedi *et al*, 2019, Kothyari *et al*, 2018, Pakira *et al*, 2018 and Meena *et al*, 2018 [5, 7, 13, 11].

Table 2: Technology gap, extension gap and technology index in pulse crop in Bilaspur district of Himachal Pradesh

Crop/Variety	Season/Year	Area(ha)	Yield(q/ha)		%YIOFP	Technology gap(q/ha)	Extension gap(q/ha)	Technology index (%)
			DP*	FP*				
Blackgram								
Him Mash-1	*Kharif* 2015	4	6.4	4.3	48.8	9.6	2.1	60.0
Him Mash-1	*Kharif* 2016	20	10.9	6.1	78.7	5.1	4.8	31.8

DP* Front line demonstration plots FP* Farmers practice plots

Technology gap
The difference between potential yield and yield of demonstration plot is called technology gap. The technology gap in the demonstration yield over potential yield were 9.6 and 5.1 q/ha respectively during *kharif* 2015 and 2016 (Table 2). This technological gap may be attributed to the dissimilarity in the soil fertility status, insect pest attack and erratic weather conditions that prevailed during crop season at different locations. Similar findings were observed by Chandrakar *et al*, 2018 and Birbal *et al*. 2020 [4, 2]. As the technology gap reflects the cooperation of farmers in conducting the CFLDs, the results were encouraging.

Extension gap
It means the difference between demonstration plot yield and farmer's plot yield. Extension gap of 2.1 and 4.8q/ha respectively, were observed during *kharif* 2015 and 2016 (Table 2). The present study is in confirmation with the earlier findings of Rachhoya *et al*, 2018 [14]. Maximum use of the latest production technologies with high yielding recommended varieties of pulse crops will subsequently help in reducing this alarming trend of galloping extension gap. This emphasized the need to educate the farmers through various extensions means. The cluster front line demonstration can help in adoption of improved production and protection technology.

Technology index
The technology index shows the feasibility of the evolved technology at the farmers' fields. The lower is value of technology index more is the feasibility of the technology (Mishra *et al.* 2007) [10]. The data in Table 2 showed that maximum technology index value 60% was noticed during *kharif* 2015 followed by 31.8% in *kharif* 2016. This variation in technology index might be due to uneven weather conditions in the area during the years of study.

Economic Returns
The economic analysis of the data for the study period for black gram clearly revealed that during the both years of study, the gross return, net returns and benefit: cost ratio were higher in cluster frontline demonstrations where recommended practices were followed compared to farmers' practice indicating higher profitability. This indicates that, by adopting proven technologies of black gram, yield potential and economic returns from black gram cultivation can be raised for the farming community. These results were in line with the earlier findings by Kumar *et al*, 2014, Saravanakumar 2018 and Anuratha *et al*, 2018 [9, 16, 1].

Table 3: Economic analysis of FLD's on pulse crops in Bilaspur district of Himachal Pradesh

Crop/Variety	Season/Year	Cost of cultivation (Rs/ha)		Gross returns (Rs/ha)		Net returns (Rs/ha)		Additional cost of cultivation over local (Rs/ha)	Additional net returns over local (Rs/ha)	Benefit: cost Ratio	
		DP*	FP*	DP*	FP*	DP*	FP*			DP*	FP*
Blackgram											
Him Mash-1	*Kharif* 2015	27359.37	18395.47	51200	30100	23841	11704	21100	12136	1.8	1.6
Him Mash-1	*Kharif* 2016	31588.00	19045.00	87200	42700	55612	23655	44500	31957	2.7	2.2

DP* Front line demonstration plots FP* Farmers practice plots

Conclusion
The grain yield of black gram crop can be increased to a greater extent even under *rainfed* situations in Bilaspur district of Himachal Pradesh by adopting the recommended practices and improved technology. This increase in grain yield of black gram was attributed to use of high yielding improved and recommended varieties, timely sowing, balanced nutrient management, proper weed management and plant protection measures taken in accordance of recommended package and practices. The economic viability of the cluster frontline demonstrations was clearly reflected from the favourable benefit: cost ratio, and encouraged the farmers for adoption of interventions imparted. By reducing the technology gaps through scientific intervention to the farmers will lead to enhance the production and productivity of black gram in the district. Moreover, higher extension gap emphasized that there is further need to educate the farmers for adoption of improved technologies through CFLDs on black gram crop so that poor farmer with limited resources could improve their livelihood and diversify their farming situation.

References

1. Anuratha A, Ravi R, Selvi J. Productivity enhancement in black gram by cluster front line demonstrations. J Krishi Vigyan. 2018; 7(1):242-244
2. Birbal Sahu, Chandu Lal Thakur, Suresh Kumar Markam, Upendra Kumar Nag. Performance of Frontline Demonstrations on Productivity and Profitability of Black Gram (*Vigna mungo*) in Rainfed Condition of Uttar-Bastar Kanker. Int. J Current Microbiology and Applied Sciences. 2020; 9(4):1898-1903.
3. Burman RR, Singh SK, Singh AK. Gap in adoption of improved pulse production technologies in Uttar Pradesh. Indian Res J Ext Edu. 2010; 10(1):99-104.
4. Chandrakar K, Verma SK, Dubey S, Kesari R. Yield gap analysis of black gram (*Vigna mungo* L.) through front line demonstration under rainfed condition in Mahasamund district of Chhattisgarh. Int. J Chemical Studies. 2018; 6(4):3173-3176
5. Dwivedi RK, Tiwar BK, Tiwari DK, Baghel KS, Patel AK. Role of cluster frontline demonstrations in

enhancement of chickpea (*Cicer arientinum*) production. Plant Archives. 2019; 19(1):1360-1362

6. Kannaiyan S. Bioresources Technology for Sustainable Agriculture, Associated Publishing Company, New Delhi, 2019, 422p.
7. Kothyari HS, Meena KC, Meena BL, Ram Aseray. Evaluation of Cluster Front Line Demonstration on Black gram in Sawai Madhopur District of Rajasthan, India. Int. J Current Microbiology and Applied Sciences. 2018; 7(1):1569-1573.
8. Kumar Asheesh, Elamathi S. Effect of nitrogen levels and rhizobium application methods on yield attributes, yield and economics of blackgram. Int. J Agril Sci. 2007; 3(1):179-180.
9. Kumar Sanjay, Singh R, Singh A. Assessment of gaps in pulse production in Hamirpur district of Himachal Pradesh. Indian Res J Ext Edu. 2014; 14(2):20-24.
10. Mishra DK, Tailor RS, Pathak G, Deshwal A. Yield gap analysis of blight disease mamagement in potato through frontline demonstration. Indian Res J Ext Edu. 2007; 7(2&3):82-84
11. Meena KC, Meena BL, Meena GS, Kothyari HS. An impact analysis of frontline demonstrations on blackgram in Haauti region of Rajasthan, India. Int. J Current Microbiology and Applied Sciences. 2018; 7(1):1720-1727.
12. Mukherjee N. Participatory, learning and action. Concept, Publishing Company, New Delhi, 2003, 63-65p.
13. Pakira KK, Singh SP, Choudhary M, Patel CR. Frontline demonstration: An effective technology dissemination approach for increasing productivity and profitability of blackgram (*Vigna mungo*) in Chattisgarh plains. Int. J Agriculture Sciences. 2018; 10(13):6622-6624.
14. Rachhoya HK, Sharma Mukesh, Saini VK. Impact of Cluster Front Line Demonstrations on Productivity and Profitability of Chickpea in Desert of Rajasthan, India. International Journal of Current Microbiology and Applied Sciences. 2018; 7(6):1860-1864
15. Samui SK, Maitra S, Roy DK, Mandal AK, Saha D. Evaluation on front line demonstration on groundnut. J Indian Society of Costal Agriculture Research. 2000; 18(2):180-183
16. Saravanakumar S. Impact of cluster frontline demonstration on black gram in western zone of Tamil Nadu. J Krishi Vigyan. 2018; 7(1):136-139.
17. Yadav DB, Kamboj BK, Garg RB. Increasing the productivity and profitability of sunflower through Crop demonstrations in irrigated agro ecosystem of eastern Haryana. Haryana J Agronomy. 2004; 20(1&2):33-35.