

International Journal of Agriculture Extension and Social Development

Volume 8; SP-Issue 1; January 2025; Page No. 108-112

Received: 11-11-2024
Accepted: 16-12-2024

Indexed Journal
Peer Reviewed Journal

Economic impact of cluster front line demonstration (CFLD) on the pulse and oilseed crops in Gurugram district of Haryana, India

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DOI: <https://doi.org/10.33545/26180723.2025.v8.i1Sb.1583>

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Abstract

The main objective of study to assess the economic impact of cluster front line demonstrations in terms of grain yield, extension gap, technological gap and economic gains in pulse (green gram, chickpea, pigeon pea) and oilseed (mustard) crops in Gurugram district of Haryana during 2018-19 to 2022-23. The data was collected on important phonological stage of crop from demonstration plots as well as control plots through experimental design of social research. The result showed that the average grain yield in demonstration plots were higher as compared to farmer practices. It was observed that green gram crop showed lower extension gap (1.36 q/ha.) followed by pigeon pea (2.11 q/ha.), mustard (2.65 q/ha) and chickpea (2.80 q/ha.) during over the period of study. The technology gap and technology index was observed lower in pigeon pea (0.57 q/ha) & (3.40%) followed by mustard (2.33 q/ha.) & (9.80%), chickpea (3.95 q/ha.) & (16.46%) and green gram (6.62 q/ha.) & (44.67%) respectively. The highest additional gain/income was recorded in pigeon pea (Rs. 14154.33) followed by mustard (Rs. 12671.22), chickpea (Rs. 11801.00) and green gram (Rs. 7834.67) over local check. The B:C ratio was recorded higher in recommended practice with 3.32, 4.32, 4.36, and 4.51 in green gram, chickpea, pigeon pea and mustard as compared to 2.63, 4.21, 3.69 and 3.88 in farmer's practice. The results indicated that the use of improved varieties and package of practices with scientific intervention under cluster frontline demonstration programme contributed to enhance the productivity and profitability of pulse and oilseed crops in the region by reducing the technology gaps.

Keywords: CFLD, economics, extension gap, technological index, technology gap

Introduction

Pulses are one of the important food crops globally due to higher protein content. Cluster front line demonstration (CFLD) is an appropriate tool to demonstrate recommended technologies among the farmers in a cluster approach. This new concept of field demonstration was evolved by the Indian Council of Agricultural Research. Pulses are grown in India on 28.78 million hectares of land with an annual production of 25.46 million tons in the year 2021-22 (DES, 2022). In Haryana, average gross area under pulses and oilseeds during the year 2020-21 was 76.1 & 643.2 thousand hectares respectively with the production of 67.0 & 1258.0 thousand tons respectively, (Haryana Statistical Abstract, 2021-22). Singh *et al.*, (2020) ^[9] recorded in cluster frontline demonstrations average yield of chickpea increased 26.66% over farmer practices, while the year wise variation in yield increased from 17.00 - 40.00%. CFLD Programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of chickpea adoption under drought condition. The yield of black gram was recorded higher in CFLDs plot over the farmer practices. The trend of technology gap reflected the farmer's cooperation in carrying out demonstration with encouraging results in subsequent years (Saikia *et al.*, 2018) ^[5]. Sarma *et al.*, (2023) ^[7] revealed that beneficiary farmer's

productivity was higher than non-beneficiary farmers. Dhakad *et al.*, (2021) ^[2] revealed that impact of CFLD to motivate the farmers by the improved agricultural technologies applied in the demonstration plots and recorded an increased production of 25.8% higher than farmer's practices. Vishal *et al.*, (2022) ^[12] showed that the highest grain yield was obtained in demonstrated plots with an average of 7.54 q/ha as compared to local check with an average of 4.70 q/ha and used of improved technology in Linseed cultivation recorded average higher B:C ratio (2.1) as compared to Farmers Practice (1.54).

This project was implemented by Krishi Vigyan Kendra, Shikohpur in Gurugram district with main objective to boost the production and productivity of pulse and oilseed crops through CFLDs with latest and specific technologies. The present study was conducted with main objectives to analysis the economic impact of cluster front line Demonstration (CFLD) on the pulse and oilseed crops.

Material and Methods

The study was conducted in Gurugram district of Haryana. Krishi Vigyan Kendra, Gurugram had implemented CFLD programmes on selected varieties of *Rabi* and *Kharif* pulses and oilseeds crops namely; Green gram, Chickpea, Pigeon pea and Mustard during last six years (2018-19 to 2022-23)

were selected for analysis of economic impact of CFLDs for the study. Varieties of each crop namely; Green gram (M.H.-421), Chickpea (C.S.J. – 515, Pusa 3043), Pigeon pea (Pusa Arhar- 992, Pusa Arhar- 16, Pant Arhar- 291, Pant Arhar- 421), Mustard (RH 749, RH 725, P.M. 30, P.M. 31), which was having paramount significance in terms of production potential and wide acceptance by the farmers in their local farming systems were considered for the study.

Experimental Details

Krishi Vigyan Kendra used all the technological interventions in accordance with the recommended package of practices for the region for suitable field crops as shown in Table 1. KVKs scientist organized the training and awareness programmes for farmers as part of technological interventions with improved package or practices in demonstration plots at farmers' field. For check of technological intervention, demonstration plot compares with control or Farmers practice, which was maintained by farmers according to own traditional knowledge with repeated or old varieties and technology. As per project guidelines or mandates, KVK scientist provided inputs such as seeds, fertilizers, IPM package, and bio-fertilizers to the farmers for demonstration plots with technical support. KVK scientist visited to the cluster frontline demonstration field and farmer's field (control plot) on regular basis or important phenophase of crop for close supervision and data collection.

Data Collection and Analysis

The data was collected from demonstration plots as well as control plots on regular basis and continued till harvesting of crops to assess the overall performance of CFLDs on selected pulses and oilseed crops. A predetermined questionnaires interviewing of farmers to elicit the information from beneficiary and non-beneficiary farmers about technology, varieties, constraint to application of technology and increase area of pulse and oilseeds crop etc. The basic information from the farmer's field as well as feedback information were systematically recorded and analyzed to see the comparative performance of cluster frontline demonstrations (CFLDs) and farmer's practice (control). The data outputs were also collected from CFLD plots and control plots and finally the extension gap, technology gap, technology index, additional return along with benefit cost ratio were calculated (Table 3 & 4) as per the formula adopted by (Samui *et al.*, 2000) ^[6] as given below:

Extension Gap = Demonstrated yield - Farmers' practice yield

Technology Gap = Potential yield - Demonstration yield

Additional Return = Demonstration return – Farmers practice return

$$\text{Technological Index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

$$\text{Benefit-Cost ratio} = \frac{\text{Gross return}}{\text{Gross cost}}$$

Results and Discussion

Krishi Vigyan Kendra maintained the details of conducted technological demonstration year to year as shown in Table 1. In each cluster frontline demonstration (CFLD), one or two suitable varieties were considered on the basis of performance or climatic suitability for region along with their recommended package of practices. While in control or local check plots, locally available old variety of selected pulse and oilseed crops with traditional cultivation practices was followed by the farmers in their local farming situations. A total of 1232 demonstrations on improved varieties of green gram (230), chickpea (174), pigeon pea (292) and mustard (563) covering 580 ha were conducted by the KVKs at farmers' field during 2018-19 to 2022-23 (Table 2 and Fig. 1).

Grain yield and Gap analysis of pulse and oilseed crops

Grain yield and gap analysis of pulses and oilseeds crops of demonstrated field's and farmer's practices is presented in Table 3. Average grain yield was presented in the table of all three pulses and one oilseed crops viz; green gram, chickpea, pigeon pea and mustard in demonstration fields was higher than of farmer's practices. The result showed that average yield of green gram under CFL demonstration was 8.20 q/ha compared to 6.84 q/ha. in farmers' practice with 19.88% average increase over local check. In case of chickpea and pigeon pea, average yield of 20.05 q/ha & 16.18 q/ha. in demonstration plot was recorded against 17.25 q/ha & 14.07 q/ha. in farmers' practice with 16.23% & 15.0% average increase over local check respectively. While, in oilseed crop mustard showed that average yield of 21.45 q/ha. in demonstration field as compared to 18.80 q/ha. in farmer's practices with 14.10% average increase over local check because of created greater awareness, training and motivated the farmers to adopt the improved package of practices of pulses and oilseed crops. The data represented that green gram crop showed lower extension gap (1.36 q/ha.) followed by pigeonpea (2.11 q/ha/), mustard (2.65 q/ha) and chickpea (2.80 q/ha.). The technology gap and technology index was observed lower in pigeon pea (0.57 q/ha) & (3.40%) followed by mustard (2.33 q/ha.) & (9.80%), chickpea (3.95 q/ha.) & (16.46%) and green gram (6.62 q/ha.) & (44.67%) respectively as shown in Table 3. Tripathi *et al.*, (2021) ^[10] showed that latest technologies of mustard cultivation reduce the technology gap to a considerable extent over the farmer practices. Singh *et al.*, (2017) ^[8] revealed that the improved cultivation practices comprised under FLDs viz recommended varieties, seed rate, timely sowing and plant protection technology resulted in average increase in yield of green gram crop over the check plots. Mitnala *et al.*, (2018) ^[3] result indicated 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 pulse crops.

Economics analysis of pulse and oilseed crops

Economics analysis of pulse and oilseed crops showed that net return was higher in demonstration field as compared to farmer practices as shown in Table 4. It is seen that the total average gross return of crop green gram and chickpea from demonstration fields was Rs. 43196 /ha. & 111571.75 /ha

respectively as compared to Rs. 36028.53 /ha. & 94320.75 /ha respectively in farmers practice during the period of study. In case of pigeon pea and mustard average gross return from demonstration fields was Rs. 100345.73/ha. & Rs.112086.88 /ha. as compared to Rs. 86701.40 /ha. & Rs. 100415.66 /ha. from farmers' field during the period of study. The additional gain in green gram and chickpea from demonstration fields was Rs. 7834.67/ha. & Rs. 11801.00 /ha over farmers practice. In case of pigeon pea and mustard, the additional gain was Rs. 14154.33 /ha. & Rs. 12671.22 /ha. over the farmers practice during the period of study as shown in Fig 2.

The result showed that higher the benefit cost ratio (B:C ratio) of recommended practices in demonstration plots than control plot of farmers traditional practices as shown in

Table 4. The B: C ratio recorded higher in recommended practice with 3.32, 4.32, 4.36, and 4.51 in green gram, chickpea, pigeon pea and mustard as compared to 2.63, 4.21, 3.69 and 3.88 in farmer's practice of the same crops. Tripathi *et al.*, (2021) ^[10] showed that the benefit: cost ratio was recorded to be higher under demonstrations against control treatments during the years of experimentation. Undhad *et al.*, (2019) ^[11] result showed that demonstration practices of pulses crop gave higher average gross return, net return with Higer B:C ratio as compared to farmer's practices. Prasad *et al.*, (2022) ^[4] showed that improved technology in CFLDs recorded higher yield, gross return, net return and benefit-cost ratio and also increase in technological gap, extension gap and technological index over farmer's practices.

Table 1: Details of recommended package of practices for selected pulses and oilseed crops

Technological intervention	Recommended package and practices followed in CFLDs demonstration	
Crops	Green gram	Pigeonpea
Seed treatment.	Seed treatment with Fungicides and inoculated with bio-fertilizers.	Seed treatment with Fungicides and inoculated with bio-fertilizers.
Sowing method/Spacing	Line to Line	Line to line
Nutrient management	Applied 50% of R.F.D.as basal dose. Because the previous crop was cauliflower. Use of recommended fertilizer dose (20:40:20) as per soil test based. Seed inoculation with bio fertilizer (Rhizobium & PSB).	Use of recommended fertilizer dose (20:40:20) as per soil test based. Seed inoculation with bio fertilizer (Rhizobium & PSB).
Weed management	Wheel hand hoe and use of Pendimethalin (Stomp-30EC) as PE@1kg. a. i. lit/ha.	Spray of pendimethelin-30EC@1kg. a. i./ha. as pre emergence
Plant Protection	Spray of pendimethelin-30EC@1kg. a. i./ha. as pre emergence. Installed the pheromone traps-8-10/ha	Installed the pheromone traps@ 10/ha and Two spray of Emamectin Benzoate 5SG.@ 0.2g./lit water at 10-15 days interval.
Crops	Chickpea	Mustard
Seed treatment.	Seed treatment with Fungicides and bio-fertilizers	Seed treatment with Fungicides and inoculated with bio-fertilizers (PSB).
Sowing method/Spacing	Line to line	Line to line
Nutrient management	Use of recommended fertilizer dose (20:40:20) as per soil test based. Seed inoculation with bio fertilizer (Rhizobium & PSB).	Use of recommended fertilizer dose (80:40:40:N:P:K:S kg/ha) as per soil test based. Applied 50% N and100% dose of P, K & S of R.F.D.as basal dose and 50% Of N as top dressing.
Weed management	Use of Pendimitheline (Stomp-30EC) as PE@1kg. a. i.in 500 lit of water/ha. and one hand weeding by wheel hand hoe after 30DAS	Spray of pendimethelin-30EC @1kg. a. i./ha. as pre emergence
Plant Protection	Install the pheromone traps-04-05/acre. Two spray of Ha N.P.V. @250 L.E. per 500litres of water/ha. Foliar spray of insecticide Emamectin benzoate 5SG.@ 0.2g./liter of water at 10-15 days interval to control pod borer	One spray of fungicide with Redomil (Metalaxyl M4 + Mancozeb 64%) @ 2gm per litre of water at 50 DAS to control of Sclerotinia stem rot. One spray of Quinalphos 25EC @2 ml./lit water at 65 DAS. To protect the crop from aphid.

Table 2: Details of pulses and oilseed crops growing under Cluster frontline demonstrations (CFLDs) and farmer's practices

Crops	2018-19		2019-20		2020-21		2021-22		2022-23		Total	
	Area (ha.)	No. of Demo.	Area (ha.)	No. of Demo.	Area (ha.)	No. of Demo.	Area (ha.)	No. of Demo.	Area (ha.)	No. of Demo.	Area (ha.)	No. of Demo.
Green gram	40	95	30	55	20	30	10	25	10	25	110	230
Chickpea	35	85	5	14	10	25	10	25	10	25	70	174
Pigeon pea	35	68	40	82	20	30	20	44	30	68	145	292
Mustard	30	65	50	87	75	175	50	130	50	106	255	563
Total	140	313	125	238	125	260	90	224	100	224	1398	1259

FPS=Farmer practice

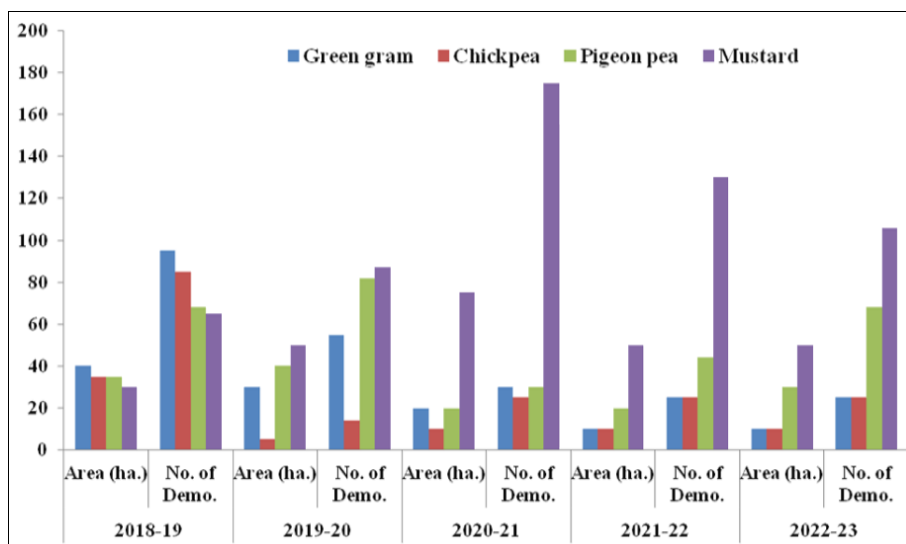
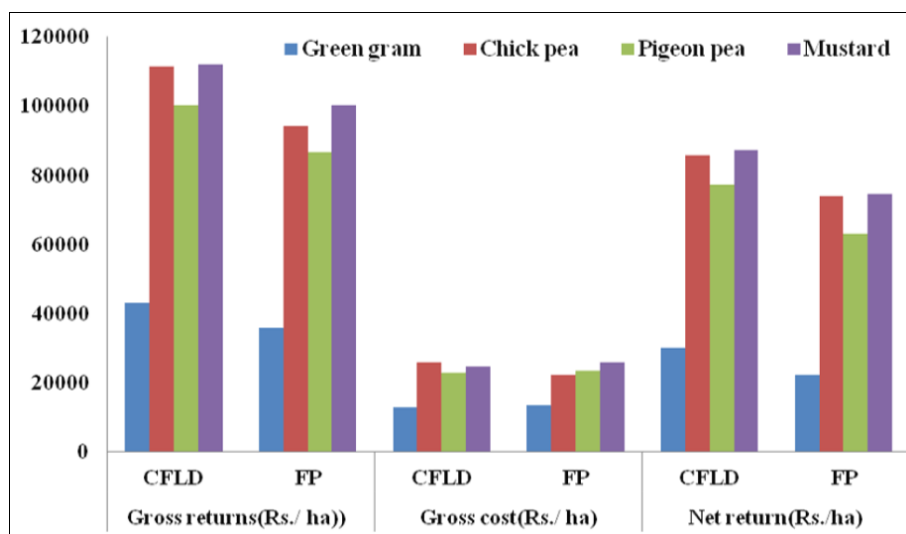
Table 3: Productivity, extension gap, technology gap and technology index of pulses and oilseed crop under CFLDs (average over years)

Crops	No. of Demonstration	Area (ha.)	Average productivity (q/ha.)			% increase over FP	Extension Gap (q/ha.)	Technology gap (q/ha.)	Technology Index (%)
			Potential	CFLD	FP				
Green gram	46	22	14.82	8.20	6.84	19.88	1.36	6.62	44.67
Chick pea	34.8	14	24.00	20.05	17.25	16.23	2.80	3.95	16.46
Pigeon pea	58.4	29	16.75	16.18	14.07	15.00	2.11	0.57	3.40
Mustard	99.6	45	23.78	21.45	18.80	14.10	2.65	2.33	9.80

FP=Farmer practice

Table 4: Economics of cluster frontline demonstrations on pulses and oilseed crops under CFLDs (average over years)

Crops	Gross returns (Rs./ ha)		Gross cost (Rs./ ha)		Net return (Rs./ha)		Additional gain (Rs./ha) in FLD's	B:C ratio	
	CFLD	FP	CFLD	FP	CFLD	FP		CFLD	FP
Green gram	43196.46	36028.53	13023.26	13690.00	30173.20	22338.53	7834.67	3.32	2.63
Chick pea	111571.75	94320.75	25825.00	22375.00	85746.75	73945.75	11801.00	4.32	4.21
Pigeon pea	100345.73	86701.40	22990.00	23500.00	77355.73	63201.40	14154.33	4.36	3.69
Mustard	112086.88	100415.66	24875.00	25875.00	87211.88	74540.66	12671.22	4.51	3.88

**Fig 1:** Represent the area and no. of demo. of green gram, chickpea, pigeon pea and mustard in CFLD fields**Fig 2:** Represent the gross returns, gross cost and net return of green gram, chickpea, pigeon pea and mustard in CFLD and FP field

Conclusion

The result showed that all the selected varieties of pulse and oilseed crops namely; green gram (MH 421), chickpea (C.S.J.-515), pigeon pea (Pusa 3043, Pusa Arhar-992, Pusa Arhar-16, Pant Arhar-291, Pant Arhar-421) and mustard

(RH 749, RH 725, P.M. 30, P.M. 31) gave higher yield in demonstration field as compared to farmer practice over the period of study. Farmers' practices have lower yields as a result of the significant yield gap between demonstration technology and farmers' technology. The demonstration

technology motivates the farmers for adopting of new technology and varieties to abridge the wide yield gap. Economics analysis revealed that the net returns and additional gains were recorded higher in recommended practice (CFLDs) which is effective tool for increasing the production and productivity of pulses and oilseed crops by improving knowledge, skill and attitude of farmers. KVKs plays a significant role to transfer of improved pulse and oilseeds cultivation practices to farmers by provided training and other extension programmes with proper technical support.

References

1. DES, Ministry of Agri. & FW (DA&FW), Govt. of India. Annual Report 2021-22. Available from: [https://dpd.gov.in/Annual%20Report%20\(2021-22\).pdf](https://dpd.gov.in/Annual%20Report%20(2021-22).pdf)
2. Dhakad SS, Khedkar NS, Kirad KS, Chauhan SS, Shrivastava A, Verma S. Impact of Front Line Demonstration on the yield and economics of green gram crop in Shajapur District of Madhya Pradesh. *Pharma Innov J*; c2021. p. 574-576.
3. Mitnala J, Prasad Babu G, Ragavendra Chowdary K, Vijayabhinandana B, Subba Rao M, *et al.* Impact of cluster frontline demonstrations (CFLDs) on pulse production productivity, profitability and transfer of technologies in Kurnool District of Andhra Pradesh, India. *Int J Curr Microbiol Appl Sci*. 2018;7(12):937-947.
4. Prasad A, Verma LC, Kumar V, Singh LPK, Singh VK, Anand RK, *et al.* Impact of front line demonstrations (FLD) on the yield of pulses; c2022.
5. Saikia N, Nath KD, Chowdhury P. Impact of cluster frontline demonstrations on popularization of blackgram var. PU 31 in Cachar district of Barak Valley region of Assam. *J Pharmacol Phytochem*. 2018;7(4):940-942.
6. Samui SK, Maitra S, Roy DK, Mandal AK, Saha D. Evaluation of front line demonstration on groundnut. *J Indian Soc Coastal Agric Res*. 2000;18(2):180-183.
7. Sarma GK, Ahmed FUA, Saud RK, Neog M, Pathak PK. Impact assessment of cluster frontline demonstration (CFLD) programme on oilseed crops: A study in Dhubri district of Assam. *Pharma Innov J*. 2023;12(6):720-727.
8. Singh D, Singh KB, Gill NS, Grewal IS. Impact analysis of frontline demonstrations on pulses in Punjab. *Int J Farm Sci*. 2017;7(1):190-194.
9. Singh NK, Kumar S, Singh BK, Hasan W. Impact of Cluster Frontline Demonstration on Yield of Chickpea in Nalanda, Bihar: Impact of CFLD on Yield of Chickpea production. *J AgriSearch*. 2020;7(1):44-46.
10. Tripathi CK, Singh AK, Singh JB. Impact assessment of cluster front line demonstration on mustard crop in Sultanpur District of UP. *Pharma Innov J*. 2021;10(10):921-923.
11. Undhad SV, Prajapati VS, Sharma PS, Jadav NB. Impact of frontline demonstration on the yield and economics of chickpea (*Cicer arietinum* L.) production in Rajkot district of Gujarat. *Int J Curr Microbiol Appl Sci*. 2019;8(8):95-100.
12. Vishal M, Pranay B, Ahirwar RP, Pandre NK, Suryawanshi VS, Sahare KV, *et al.* Impact assessment of cluster frontline demonstrations (CFLD) oil seeds on increasing yield of linseed (*Linum usitatissimum* L.) under rainfed conditions in tribal district of Mandla, Madhya Pradesh. *Pharma Innov J*. 2022;11(1):1216-1219.