The Pharma Innovation Journal 2022; SP-11(6): 1419-1422

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(6): 1419-1422

www.thepharmajournal.com
Received: 16-04-2022
Accepted: 19-05-2022

Ram Prawesh Prasad
Pundit Deen Dayal Upadhyay College of Horticulture and Forestry, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Motihari East Champaran, Bihar, India

Dibyanshu Shekhar
Krishi Vigyan Kendra, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India

MS Kundu
Director Extension Education, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India

Chandan Kumar
Krishi Vigyan Kendra, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India

Corresponding Author
Ram Prawesh Prasad
Pundit Deen Dayal Upadhyay College of Horticulture and Forestry, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Motihari East Champaran, Bihar, India

Effect of cluster frontline demonstrations (CFLDs) on production and profitability of green gram (*Vigna radiata*) for nutritional security in Darbhanga district of Bihar

Ram Prawesh Prasad, Dibyanshu Shekhar, MS Kundu and Chandan Kumar

Abstract
India is the largest producer (26%) of world's production and consumer (30%) of total pulses of the world. The frequency of pulses consumption in the country is much higher than any other source of protein, which indicates the importance of pulses in their daily food habits (Raj *et al*. 2013) Green gram is the third important pulse crop of India grown in nearly 8 per cent of the total pulse area of the country. Its seed contains 24.7% protein due to its supply of cheaper protein source, it is designated as "poor man's meat" (Potter and Hotchkiss, (1997). Every100 g of mungbean seeds contains 132 mg calcium, 6.74 mg iron, 189 mg magnesium, 367 mg phosphorus and 124 mg potassium and vitamins (Haytowitz and Matthews, 1986). Green gram has high digestibility and palatability, its pods are used as green vegetable. The present study was carried out by Krishi Vigyan Kendra, Darbhanga during summer season from 2018-19 to 2020-21 in the farmer's field of twelve villages of Darbhanga District. From the finding, it can also be concluded that use of scientific methods of green gram cultivation can reduced the technology gap to a considerable extent thus leading to increased productivity of the district. Moreover, extension agencies in the district need to provide proper technology support to the farmers through different educational and extension methods to reduce the extension gap for higher pulses production in the Darbhanga district of Bihar.

Keywords: CFLDs, green gram, benefit cost ratio, adoption, Darbhanga Bihar

Introduction
India is the highest producer as well as consumer of pulses in the world. Pulses play a vital role in Indian Agriculture. In India, total production of pulses is 23.95 million tons (Anonymous, 2017-18) [2]. Pulses are the major source of dietary proteins in the vegetarian diet of our country. Besides being the source of proteins, they maintain soil fertility through biological nitrogen fixation and thus play a vital role in furthering sustainable agriculture (Kannaiyan, 1999) [9]. Green gram is the third important pulse crop of India grown in nearly 8 per cent of the total pulse area of the country. Its seed contains 24.7% protein due to its supply of cheaper protein source, it is designated as "poor man's meat" (Potter and Hotchkiss, (1997) [16]. Every100 g of mungbean seeds contains 132 mg calcium, 6.74 mg iron, 189 mg magnesium, 367 mg phosphorus and 124 mg potassium and vitamins (Haytowitz and Matthews, 1986) [8]. Green gram has high digestibility and palatability, its pods are used as green vegetable.

Its whole grains and split grains are used as dal and curry. Being highly digestible, its curry is generally recommended for patients. Its flour is used in various preparations like, halwa, savoury dishes, snacks, pakoras and fried dal, to get very delicious and nutritious products. In addition, the nutritional quality of pulses can also be compromised by the presence of anti-nutritional factors such as oligosaccharides, enzyme inhibitors, saponins, polyphenols, phytates, etc. (Egounlety and Aworh 2003; Gupta *et al*. 2015) [5, 6]. Germinated grains are better in nutritional quality on account of a higher protein and starch digestibility, higher bioavailable minerals, B-complex vitamins, and ascorbic acid and inactivation of many anti-nutritional factors (Luo and Xie 2014. Its green plants, chopped and mixed with other fodders are palatable feed for animals. It is also used as green manuring crop, which adds nitrogen in addition to humus to the soil. It is a soil protecting crop in rainy season. Cooked dal of green gram is a very digestive food for invalid and sick persons. Its regular use during childhood, pregnancy and lactation helps one to get the required nutrition and promote health. It is an aperients i.e. a laxative. When given in large quantities. The soup made from it is best article of diet after recovery from acute illness. The Krishi Vigyan Kendras (KVK) of zone-II have been successfully implementing this programme since Summer 2017-18 by conducting cluster frontline demonstrations in a systematic manner on farmers' field under the close supervision of their scientists to show the worth of new/ proven varieties with technological packages in their respective districts for enhancing production and productivity of pulse crops. With this background, the present investigation was undertaken with the specific objectives to assess the performance of CFLD on green gram in terms of grain yield, extension gap, technological gap and economic gains by the farmers, so that the findings the study will be helpful to the concerned policy makers and other stakeholders to focus on the way forward for improving pulses production.

Materials and Methods

The present study was carried out by Krishi Vigyan Kendra, Darbhanga during summer season from 2019-20 and 2020-21 in the farmer's field of twelve villages Jogiara, Samdhinia, Sauria, Radhi, Manma, Kamtaul, Chandauna,Sahaspur and Brahmpur from Jale block and Madhopatti in Keoti block of Darbhanga District. Total of 183 front line demonstrations on green gram were laid out comprising 77 farmers covering the total area of 30 ha with demonstration plots ranging from 0.40 ha. Under the cluster front line demonstrations improved technologies included improved variety (cv. – HUM-16,IPM 02-03), integrated nutrient management (20: 45: 20: 20 kg N: P: K & S/ha) +Rhizobium + P.S.B. @ 500 g per ha, integrated pest management (Seed treatment with FIR fungicide (Carbendazim 50% WP @ 2 gram/kg seed), Insecticide (chloropyriphos 20% E.C @5 ml/kg seed) and rhizobium culture and need based used of Saaf@1.0gram/ Lt of water for management of fungal infection and Imidachlopride 17.8 SL @ 1 ml /3 Lt of water for aphid) were tested as intervention. Crop was sown between 25 February to 25 March with a spacing of 30 cm X 10 cm and seed rate 20-25 kg/ha. Entire dose of N P K and S was applied as basal dose at the time of sowing. Under the demonstration programme farmer practice was maintain as control. Prior to conducting the front line demonstrations, group meeting and specific skill trainings were conducted. All other steps like farmer selection, site selection, farmer's participation etc was followed as suggested by Kirar *et al*., (2004) [11] (Chaudhary, 1999; Venkatta Kumar *et al*., 2010) [3]. Materials for present study with respect to CFLDs and farmers practices has been given in Table 1. In case of local check plots, existing practices being used by farmers were followed. In general soil of area under study is sandy loam and medium fertility status. Visits of farmers, the district agriculture line department and extension functionaries was organized at demonstration plots to disseminate the massage at large scale. The demonstrated farmers were facilities by KVK scientists in performing field operation like sowing, spraying, weeding, harvesting etc. during the course of training and visits. The necessary steps for selection of site and farmers layout of demonstrations etc., were followed as suggested by Chaudhary (1999) [3]. Traditional practices were mentioned in case of local checks. The data outputs were collected from both CFLD plots as well as control plots (farmers practices) and finally the extension gap, technology gap, technology index along with the benefit cast ratio(B:C:R) worked out (Sanui *et al*., 2000) [20] as given below:

Technology gap = Potential Yield Demonstration

Yield Extension gap = Demonstration Yield – Farmers yield.

$$\text{Technology Index} = \frac{\text{Potential Yield- Demonstration Yield}}{\text{Potential Yield}} \times 100$$

Results and Discussion

The results of 77 Cluster Front Line Demonstrations (CFLDs) conduct during 2018-19 to 2020-21 in 30 ha area. On farmers field 10 village of Darbhanga district indicated that the cultivation practices comprised under-CFLD viz., used of improved variety (HUM-16 & IPM -02-03), line sowing, balance used of fertilizers, sulphur, Zinc, weedicide, and disease and pest manage of through fungicide and insecticides at economic threshold level, production on an average 44.68% more yield of green gram as compared to local practices (8.48 q/ha). The data of table 2 reveal that the yield of green-gram fluctuated successively over the field of demonstrated plots. The maximum yield was recorded 9.80 q/ha over local practices (7.30q/ha) in year 2018-19. The increase in percentage of yield was range between 7.41% to 54.76% during three year study. The similar results of yield enhancement in rape seed crop in front line demonstrations has been documented by Mitra and Samajdar (2010) [12], in tarai zone of west Bengal. The results are also in conformity with the findings of Tiwari and Saxena (2001), Tiwari *et al*., (2003) Tomer et demonstrations has been documented by Mitra and Samajdar (2010) [12], in tarai zone of west Bengal. The results are also in conformity with the findings of Tiwari and Saxena (2001), Tiwari *et al*., (2003) Tomer *et al*., (2003), Singh *et al*., (2007) and Katare *et al*., (2011). The results indicated that the Front line demonstrations has given a good impact on the farming community of this district as they were motivated by the improved agricultural technologies used in the front line demonstrations. The result clearly indicates the positive effect of CFLDs over the existing practices toward in enhancing the yield of lentil in Darbhanga, with its positive effect on yield attribute (Table 3). Benefit Cost ratio was recorded higher under demonstration against control of all the year of study. These results were also supported by The higher yield in demonstration plot may be attributed to the fact that farmers of demonstration plot have followed the same techniques that are used in research plot like line sowing, seed treatment with rhizobium, recommended fertilizer doses, plant protection measures, etc. Higher yield of chickpea and lentil in demonstration plot is due to line sowing with optimum spacing, improved variety with optimum seed rate, rhizobium inoculation, optimum fertilizer application and proper weed control (Rajiv and Singh, 2014) [17]. The demonstration conducted on lentil with improved varieties and technologies showed a yield advantage of about 33 per cent over local check (Kokate *et al*., 2013). Rhizobium inoculation alone can increase the yield of chickpea, pigeon pea, lentil and field pea by 12.5, 14.0, 18.1 and 20.6 per cent (Ali and Kumar, 2007) [1], but in traditional system the sample farmers do not apply seed treatment with rhizobium resulting lower yield. Farmers did not practice seed treatment with rhizobium culture, an important component increasing the yield and yield attributes (Kumar and Elamathi, 2007) [10]. This type of gap arise when farmers deviate from the recommendation to achieve the agronomic yield potential

Duwayri *et al.*, (2000) [4] The extension gap showed an increasing trend. The extension gap ranging between 0.63 to 2.5q/ha during the study period emphasizes the need to educate the farmers through various means for adoption of improved agricultural technologies to reverse the trend. The trend of technology gap (ranging between 5.90 to 9.20q/ha) reflects the farmers cooperation in carrying out such demonstrations with encouraging results in subsequent years. The technology gap observed might be attributing to the dissimilarity in soil fertility status and weather conditions. Mukharjee (2003) [14, 15], have also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. Similar findings were also recorded by Mitra *et al*., (2010) [12]. The technology index, showed the feasibility of the evolved technology at the farmer's field. The lower the value of technology index, the more is the feasibility of technology. The wider gap in technology index (ranging between 37.58% and 58.60%) during the study period in certain region, may be attributed to the difference in soil fertility status, weather condition, non-availability of irrigations water and insect- pests attack in the crop. The benefit cost ratio of front line demonstrations have been presented in Table 3 clearly showed higher BC ratio of recommended practices was than control plots i.e. farmer's practices in all the years of study. The benefit cost ratio of demonstrated and control plots were 2.06, 1.65 and 2.25, 1.84, 1.63 and 1.35 during 2018-19, 2019-20, 2020-21 respectively. Hence, favorable benefit cost ratios proved the economic viability of the interventions and convinced the farmers on the utility of interventions. Similar findings were reported by Sharma (2003) [21] in moth bean and Gurumukhi and Mishra (2003) [7] in sorghum.

The result of Cluster Front Line Demonstrations convincingly brought out that the yield of green -gram could be increased by 7.1% to 54.76% with the intervention of balanced nutrient coupled with the improved seed and disease management in the Darbhanga district of Bihar. The input and output prices of commodities prevailed during each year of demonstration were taken for calculating cost of cultivation, net return and benefit cost ratio (Table 3). The average net return from recommended practices was Rs.21916 while the net return from farmer practices was Rs.13290. It means that net return from demonstration was higher than the farmer practices. The average additional cost of Rs. 430 and gave average additional net return; Rs.9557 per hectare. Thus, and it was clearly showed that the demonstration of Green gram with full package was better than farmer's practices. Similar result has been reported by earlier by Teggelli *et al*., (2015) [22]. From the above finding, it can also be concluded that use of scientific methods of green gram cultivation can reduced the technology gap to a considerable extent thus leading to increased productivity of the district. Moreover, extension agencies in the district need to provide proper technology support to the farmers through different educational and extension methods to reduce the extension gap for higher pulses production in the Darbhanga district of Bihar.

Table 1: Technology demonstrated in CFLD's and Farmer's Practice

Sl. No.	Particulars	Demonstrated practices	Farmers Practices
1.	Seed	20 kg/ha	25-30 kg/ha
2.	Variety	PDM-02-03	Local
3.	Sowing time	25 February to 25 March	Mid March to End of April
4.	Method of sowing and spacing	Line sowing	Broad casting, uneven plant population
5.	Nutrient management	Rhizobium, PSB, N20, P45, K-20 20, S S-20kg/ha	NPK-20:60:40
6.	Weed management	UsePre-emergence weedicide(Pendamethiline)	Partially weeding
7.	Irrigation management	1-2 irrigation	Improper irrigations
8.	Harvesting and threshing	Hand picking, Manually	Hand picking, Manually

Table 2: Yield, extension gap, technology gap, and technology index (%) analysis between Cluster Front Line Demonstrations (CFLDs) plots and farmer's Practice in Green gram crop

Year	No. of CFLDs	Demo. Avg. Yield(q/ha)	Yield of local Check (q/ha)	(%) Increase over local check	Extension gap (q/ha)	Technology Gap (q/ha)	Technology Index %
2018-19	27	9.8	7.30	34.25	2.5	5.90	37.58
2019-20	25	9.13	8.50	7.41	0.63	6.57	41.85
2020-21	25	6.50	4.20	54.76	2.30	9.20	58.60
Average	25.67	8.48	6.67	27.13	1.81	7.22	45.98

Table 3: Economical comparison of Green- gram growers in Cluster Front Line Demonstrations (CFLDs) and farmers Practice

Crop	Season and year	Average Cost of cultivation (Rs./ha		Additional cost in demo. (Rs/ha.)	Average Gross Return (Rs./ha)		Additional return in demo. (Rs./ha.)	Average Net Return (Rs./ha)		Effective Gain (Rs./ha)	Benefit Cost Ratio	
		Demo.	Local Check		Demo.	Local Check		Demo	Local Check		Demo	Local Check
Green gram	2019 Summer	21400	19850	1550	44100	32850	11250	22700	13000	9700	2.06	1.65
	2020 Summer	22300	21600	700	50375	39780	10595	28075	18180	9895	2.25	1.84
	2021 Summer	23740	24700	-960	38714	33389	5325	14974	8689	6285	1.63	1.35
Average		22480	22050	430	44396	35340	9057	21916	13290	8627	1.98	1.61

Acknowledgement

Authors are highly thankful to the Director, ICAR-ATARI Patna (Zone-II), for providing funds to conducting the CFLDs and farmers who always show faith in the Krishi Vigyan Kendra, Jale Darbhnaga.

References

1. Ali M, Kumar S. Pulses: Good option for rainfed area, The Hindu Survey of Indian Agril, 2007, 39-41.
2. Anonymous. 2nd estimates of production of major crops. Economic Survey, Government of India, Ministry of Finance and Company Affairs, Economic Division, New Delhi. 2017-18, 2018.
3. Choudhary BN. Krishi Vigyan KendraA guide for KVK managers. Division of Agricultural Extension, ICAR, 1999, 73-78.
4. Duwayri M, Tran DV, Nguyen VN. Reflections on yield gaps in rice production: How to narrow the gaps, In: M. K., Papadimitriou, F. J. Dent Herath (eds) Bridging the yield gap in the Asia Pacific region, FAO Regional Office for Asia and the Pacific, Bangkok, Thailand, 2000.
5. Egounlety M, Aworh OC. Effect of soaking, dehulling, cooking and fermentation with *Rhizopus oligosporus* on the oligosaccharides, trypsin inhibitor, phytic acid and tannins of soybean (*Glycine max* Merr.), cowpea (*Vigna unguiculata* L. Walp) and groundbean (*Macrotyloma geocarpa* Harms) J Food Eng. 2003;56:249–254.
6. Gupta RK, Gangolia SS, Singh NK. Reduciton of phytic acid and enhancement of bioavailable micronutrients in food grains. J Food Sci Technol. 2015;52(2):676-684
7. Gurumukhi DR, Mishra Sumit. Sorghum front line demonstration-A success story. Agriculture Extension Reviev. 2003;15: 22-23.
8. Haytowitz DB, Matthews RH. Composition of foods. Ag. Handb. 8. USDA, Washington DC, 1986.
9. Kannaiyan S. Bioresource technology for sustainable agriculture. Associated Publishing Company. New Delhi, 1999, 422.
10. Kumar Asheesh, Elamathi S. Effect of nitrogen levels and rhizobium application methods on yield attributes, yield and economics of black gram (*Vigna mungo* L.), International Journal of Agril Sci. 2007;3(1):179-180.
11. Kirar BS, Mahajan SK, Nashine R. Impact of technology practices on the productivity of soybean in FLD. Indian Res. J Ext. Edu. 2004;5(1):15-17
12. Mitra, Samajdar T. Yield gap analysis of rapeseed – mustard through front line demonstration. Agri Extension Review. 2010;22:16-17.
13. Mitra, Biplab, Samajdar T. Yield gap analysis of rapeseed-mustard through Front Line Demonstration. Agric. Exten. Reviev, 2010, April-June, 16-17.
14. Mukherjee N. Participatory learning and action Concept Publishing Company, New Delhi, 2003, 63-65.
15. Mukherjee N. Participatory learning and action Concept Publishing Company, New Delhi, 2003, 63-65.
16. Potter NN, Hotchkiss JS. Food science. CBS Publishers, New Delhi, India, 1997, 403
17. Rajiv, Singh L. Performance of pulses demonstration Bundelkhand Zone of Uttar Pradesh, India, Indian Journal of App Research. 2014;4(3):1.
18. Reddy A. Consumption pattern, trade and production potential of pulses. Economic and Political Weekly. 2004, October, 4854-60
19. Raj AD, Yadav V, Rathod JH. Impact of front line demonstrations (FLD) on the yield of pulses. International Journal of Scientific and Research. 2013;3(9):1-4.
20. Samui SK, Mitra S, Roy DK, Mondal AK, Saha D. Evaluation of front line demonstration on ground nut (*Arachis hypogea* L.), Journal of Indian Society of Coastal Agriculture Research. 2000;18:180-83.
21. Sharma OP. Moth bean yield improvement through Front Line Demonstrations. Agric Ext Rev. 2003;15:11-13.
22. Teggelli, Raju G, Patil DH, Naik Ananda, Zaheer Ahamed B, Patil MC. Impact of front line demonstration on the yield and economics of pigeonpea in Kalaburgi district of Karnataka State. I.J.S.N. 2015;6(2):224-227.