Role of Cluster Front Line Demonstrations (CFLDs) in summer green gram production in Faridabad district of Haryana

Abstract:

Rice–wheat cropping sequence (RWCS) is the world's largest agricultural production system occupying around 12.3 M ha in India. Summer moong could be a great option for the farmers in rice- wheat cropping system just after harvest of wheat.

The production of green gram in district Faridabad is very less as compared to state and national average. Front line demonstration is an appropriate means for demonstration of improved technology and innovations in agriculture for large scale popularization among the farming community. A three years' study was carried out by conducting cluster front line demonstrations (CFLDs) at farmers' fields during summer seasons in various villages of Faridabad district of Haryana from 2020 to 2022. A total of 175 demonstrations were laid out in three years in an area of 70 ha by the active participation of farmers with the objective to demonstrate the improved technologies of pulses production potential. The improved technologies consisted of use of latest variety; seed treatment with fungicide followed by bio fertilizers namely *rhizobium* and PSB culture, chemical weed management, balanced fertilizers application and integrated pest management. Three years study results showed that there was found a positive impact of CFLDs was on the yield of summer green gram and other aspects. Yield was recorded higher under demonstrated trials as compared to farmer's local practices. The average yield of 627 kg/ha under improved technology was recorded in summer green gram for the years 2020 to 2022 than 463 kg/ha under farmers practice. In spite of increase in yield of pulses, technological gap, extension gap and technology index was also existed. The improved technology gave higher gross return, net return with higher benefit cost ratio over farmer's practices. The result indicated that the cluster front line demonstrations have given a good impact over the farming community.

Key words: Yield, Economics, Gap %, Technology gap, Extension gap, Technology index

Introduction:

Pulses are important food crops for human consumption and animal feed. Being leguminous in nature, they are considered to be important components of cropping systems because of their viability to fix atmospheric nitrogen, add substantial amounts of organic matter to the soil and produce reasonable yields.

India is the major pulse producing country in the world which shares 30-35% and 27-28% of the total area and production of pulse, respectively. In 2018 (FAO,2018) the production of pulses in India is 23.02 MT and productivity is 745 kg/ha which is lower than most of the major pulse producing countries. Pulses production in India has not kept up with growth in demand calling for import to the tune of 3.0 to 5.0 million tones (Suresh & Reddy 2016).In Haryana area, production and productivity of moong was found 28.5 thousand hectare, 19.6 thousand tones and 688 Kg/ha respectively in the year 2020-21.

Even though pulse production increased significantly during last decade growth but maintaining that trend is a challenge for researcher, extension agencies and policy makers to fulfill the domestic demand.

Green gram (Vigna radiate L. Wilczek.) is the third important pulse crop in India. It can be grown both as kharif green gram and summer green gram. With the advent of short duration, mungbean yellow mosaic virus tolerant and synchronous maturing varieties of green gram, there is a big opportunity for successful cultivation of paddy-wheat-green gram based cropping system. In India, pulses, therefore, have always received due attentions both in terms of requirement by consumers and adequate programmatic support from the government at the production front.

The newly and innovative technology having higher production potential under the specific cropping system can be popularized through FLD programme. The present study has been undertaken to evaluate the difference between demonstrated technologies vis-a-vis practices followed by the local farmers in summer green gram crop.

Low productivity is common problem in pulses in India as well as in Haryana. The major reasons for the lower productivity of green gram are erratic rainfall, cultivation of crops under poor and marginal lands, broadcasting of seeds, local varieties, non-availability of season based quality seeds resulting in increased pest and disease incidence particularly yellow mosaic virus, no seed treatment with bio-fertilizers (Rhizobium and PSB), no application of nutrients particularly DAP by farmers at sowing time, Poor management of pests and diseases (Sengupta and Biswas, 2017).

Keeping these points in mind this investigation was carried out in this area for popularizing the current technologies of pulse production by incorporating summer green gram in between rice-wheat system and also with objective of increase productivity of summer green gram.

Materials and Methods:

A three years study was carried out from 2020 - 2022 by the Krishi Vigyan Kendra, Faridabad ,Chaudhary Charan Singh Haryana Agricultural University, Hisar during summer seasons on the farmers' fields of Faridabad district. There were 175 cluster front line demonstrations(CFLDs) conducted in 70 ha of area in different villages by making clusters and soil was analyzed before start experiment (Details of farmers practice and technological intervention and gap percentage among these intervention are given in Table 1 and details of year wise demonstrations conducted given in table 2). Materials for the present study with respect to CFLDs was on following

(i) Improved variety (Green gram-MH421)
(ii) Seed treatment with rhizobium and PSB culture
(iii) Chemical weed management with Pendimethalin (3.3litre/ha pre emergence)
(iv) Fertilizers (N: P) 20:40 kg/ha
(v) Adoption of Integrated Pest Management
(vi) The improved technology included modern varieties, seed treatment and maintenance of optimum plant population etc. The sowing was done during April 5-15 in green gram during both the years. The spacing was 45 x 10 cm and seed rates was 25 kg/ha in green gram. The fertilizers were given as per improved practices as basal dose. Weed management was done with chemical Pendimethalin 30 % EC (3.3 litre/ha pre emergence. Fertilizer was recommended on the basis of soil test basis and Different pests were minutely observed at different stages of crop growth and controlled by adopting integrated pest management techniques.

The crops were harvested in the presence of Scientists of Krishi Vigyan Kendra at perfect maturity stage by manual and some were harvested by mechanical method. In general, soils of the area under study were light to medium in texture particularly sandy loam, sandy with low fertility status in Nitrogen and Phosphorus and medium to high in Potash. The average rainfall of this area was 515 mm. In demonstration plots, critical inputs in the form of quality seed, bio fertilizers, agro-chemicals for weed management and insects' pests control were provided by KVK. For the study, technology gap, extension gap and technology index was calculated as suggested by Samui, *et al*.(2000).

Technology gap = Potential yield- Demonstration yield

Extension gap = Demonstration yield-Farmers yield

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

Table.1 Details and percent gap of Summer greengram grown under farmers practice and technological intervention under CFLDs.

Particulars	Farmers Practice	Technology intervention	Gap %
Variety	SML 668	MH421	40
Seed rate	15 kg/ha	25-30 kg/ha	55
Sowing	Broadcasting/Line	L-L (20-25cm)	30
Seed Treatment	No seed treatment	Seed treatment with Thiram@4 gram/Kg seed fb by bio fertilizers like Rhizobium and PSB.	90
Nutrient Management	No fertilizers.	Application (20 kg N + 40 kg P2O5 / ha.	90
Weed Management	Hand weeding or No chemical weed management	Weeds control by using herbicide Pendimethalin 3.3L/ha as pre-emergence after sowing. + two manual weed management @ 20-25 DAS & 35-40 DAS	60
Plant protection	No application of Plant protection chemicals	Need based plant protection Chemicals were used.	70

Table 2. Year wise details of Cluster Front Line Demonstrations (CFLDs).

Sr. No.	Year	Name of crop	Variety	Variety	Area (ha)	Number of Demonstrations
1	2020	Summer Green Gram	MH 421	SML 668	30	75
2	2021	Summer Green Gram	MH 421	SML 668	20	50
3	2022	Summer Green Gram	MH 421	SML 668	20	50

Results and discussion:

Productivity

After analyzing data under farmers practices and under technological intervention a gap analysis was done to find out major factors were identified for the trial and a gap from 30-90 percent (Table 1) was found under different practices and on that bases different technological interventions were applied in these demonstrations and on the three years pooled data the average yield of green gram was found 627 kg/ha which was higher than as compared to average yield of farmers practice (463 kg/ha) (Table 3).This clearly shows that it is due to higher number of yield attributing characters i.e pods per plant, grains per pod and branches per plant under scientific production technologies than farmers practices. The average percentage increased in the yield over farmer's practices was 36.30 percent over district average during three years. This clearly shows that farmers' productivity of summer moong was increased by adopting scientific production technologies. The results indicated that the Cluster front line demonstrations have given a good impact on yield and also on economics over the farming community of Faridabad district as they were motivated by adopting the new agricultural technologies applied in the CFLDs plots (Table 3). This finding is in validation with the findings of Poonia and Pithia (2011).

Table 3: Effect of CFLDs on the Yield and yield attributes of summer green gram.

Year	Pods /plant	Grains/pod	Branches/plant	Demonstration yield (q/ha)	Farmers practices (q/ha)	Increase yield (%)
2020	24.3	11.8	4.4	5.80	3.90	48.7
2021	25.1	11.9	4.5	5.82	4.50	29.3
2022	26.9	12.7	5.1	7.20	5.50	30.91
Average	25.43	12.1	4.7	6.27	4.63	36.30

Gap analysis

Extension gap

Evaluation of findings of the study (Table 4) stated that an extension gap of 1.20 to 1.90 q/ha was found between demonstrated technology and farmers' practice and on an average extension gap 1.60 q/ha has been found during this period while the average highest extension gap 1.90 q/ha was recorded during the year 2020. This emphasized the need to educate the farmers through different means for the enhancement of adoption of improved technologies to reverse this trend of wide extension gap use of innovation production technologies with high yielding varieties will subsequently change this alarming trend to extension gap.

The results of technologies will ultimate lead to the discussion of farmers to discontinue the old technology to adopt the new technology.

Technology gap

The average technology gap was 4.72 q/ha during three years, while it was highest 5.20 q/ha during the year 2020. The minimum technology gap has been recorded 3.80 q/ha during the year 2022 (Table 3).

The observed technology gap may be attributed dissimilarly in soil fertility status, disease and pest attack as well as the change in the location of demonstration plots every year. The differences in technology gap during different years could be due to more feasibility of recommended technologies during different years.

Technology index

The technology index for all the demonstrations during different year were in accordance with technology gap. The highest technology index per cent of 47.27 was recorded in the year 2020 and the lowest was observed in the year 2022 which was34.54 per cent. Hence, it can be inferred that the awareness and adoption of improved varieties with recommended scientific package of practices have increased the yield and net returns of the farmers during the advancement of study period. The present findings confirm the Meena et al., (2012), Raj et al. (2013) and Meena and Singh (2017).

Table 4: Technological Gap analysis of summer green gram under CFLDs.

Year	Extension gap(q)	Technologygap (q)	Technologyindex (%)
2020	1.90	5.20	47.27
2021	1.20	5.18	47.09
2022	1.70	3.80	34.54
Average	1.60	4.72	42.96

Profitability

The inputs and outputs prices of commodities prevailed during the study of demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit: cost ratio (Table 5). The cultivation of summer green gram under improved technologies gave higher net return of Rs. 23810/ha as compared to farmers practices (Rs.15700/ha). The benefit cost ratio of 2.23 as compared to 1.88 under farmers' practices. This may be due to higher yields obtained under improved technologies compared to local check (farmers practice). This finding is in corroboration with the findings of Mokidue et al, (2011).

Table 5: Economic analysis of summer green gram under CFLDs.

Year	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		Net return (Rs/ha)		B:C ratio	
	IT	FP	IT	FP	IT	FP	IT	FP
2020	17725	16400	39440	30600	21715	14200	2.22	1.86
2021	17725	16400	39440	30600	21715	14200	2.22	1.86
2022	22450	19800	50400	38500	28000	18700	2.25	1.94
Mean	19300	17533	43093	33233	23810	15700	2.23	1.88

Conclusion:

The cluster frontline demonstrations conducted on summer green gram crop at farmer's field revealed that the adoption of improved technologies significantly increased the yield as well as yield attributing traits of crop and also the net returns higher than the farmer's practices. The impact was also observed on the area expansion of summer green gram in the district Faridabad from 250 ha to 350 ha. The awareness and adoption of improved varieties with recommended scientific package of practices have increased the yield and net returns of the farmers during the study period. So, there is a need to disseminate the improved technologies among the farmers with effective extension methods like training and demonstrations. The farmers should be encouraged to adopt the recommended package of practices realizing for higher returns.

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