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Yield performance of green gram production through cluster frontline demonstrations in Rajsamand district of Rajasthan, India

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Abstract
Front line demonstration is an appropriate means for demonstration of improved technology and innovations in agriculture for large scale popularization among the farming community. National Food Security Mission, a centrally sponsored scheme on Pulses, enabled KVK Rajsamand, to conduct Cluster Front line demonstration on green gram during Kharif 2018-19 to 2020-21 in 150 demonstration plots in 60 ha, at farmer's fields in villages i.e., Nabri, Taraka ka khera and Mallakheri of Khamnor, Railmagra and Bhim block of Rajsamand district of Rajasthan. The present study was conducted to demonstrate production potential and economic benefit of improved technologies comprising improved varieties, sowing method, nutrient management and integrated pest management and adoption of whole package of practices. The findings of the study revealed that the demonstrated technology resulted in a mean yield of 6.31 q/ha as compared to farmers practices 4.82 q/ha. The average yield increased 30.91 per cent over farmer's practices during the three years. The result indicated that the CFLDs has given a good impact over the farming community of the district was obtained with improved technologies in comparison to farmers practices. The frontline demonstrations conducted on 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 than the farmer's practices. 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 yield.

Keywords: Adoption, cluster frontline demonstrations, green gram, productivity

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 with low inputs under harsh climatic and soil conditions (Rakhode *et al*., 2011) [5], 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) [4]. 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 (60-70 days), there is a big opportunity for successful cultivation of Maize-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. Addressing this concern of significance, the Ministry of Agriculture and Farmers Welfare, Govt. of India had initiated a nation-wide cluster frontline demonstration (CFLD) programme on pulses under National Food Security Mission-Pulses (NFSM-Pulses) since 2015-16. The basic strategy of the Mission is to promote and extend improved technologies, i.e., seed, micro-nutrients, soil amendments, integrated pest management, farm machinery and implements, irrigation devices along with capacity building of farmers. The ICAR through its Krishi Vigyan Kendras (KVKs) across the country has been implementing this CFLD programme on different pulse crops to boost the production and productivity of pulses with improved varieties and location specific technologies.

The major pulses grown in the region are green gram (*Vigna radiata*), black gram (*V. mungo*), and chickpea (*Cicer arietinum*).

The Krishi Vigyan Kendras (KVK) in this region have been successfully implementing this programme since Kharif 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 pulses in terms of grain yield, extension gap, technological gap 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 in the region, vertically and horizontally as well.

Materials and Methods

Present study was conducted on CFLD green gram in khaif season in Rajsamand district of Rajasthan. During three years of study, an area of 60 hac was as covered under cluster frontline demonstration with active participation of total 150 farmers (Table 2). Total 150 cluster frontline demonstration were conducted at farmers' field in 3 villages namely Nabri, Taraka ka khera and Mallakheri of Khamnor, Railmagra and Bhim block of Rajsamand district of Rajasthan, during kharif season 2018, 2019 and 2020. Each demonstration was conducted on an area of 0.4 ha, and 1.0 ha area adjacent to the demonstration plot was kept as farmers' practices. Before conducting CFLD's a list of farmers was prepared from group meeting and specific skill training was imparted to the selected farmers regarding different aspects of cultivation. The package of improved technologies like improved varieties, seed treatment, line sowing, nutrient management, integrated pest management and whole package were used in the demonstrations. The varieties of greengram IPM 02-03 and IPM 410-03 was included in demonstrations methods used for the present study with respect to CFLDs and farmers' practices are given in Table 1. In case of local check plots, existing practices being used by farmers were followed. The spacing was 30 cm between rows and 10-15 cm between plants in the rows. Sowing was done in the first week of July with a seed rate of 20 kg/ha. The data were collected from both CFLD plots as well as plots of farmers using their traditional practices. Finally the extension gap, technology gap were worked out. Different parameters as suggested by Yadav *et al.* (2004) [6] was used for gap analysis, the details of different parameters and formula adopted for analysis are as under:

Extension gap = Demonstration yield - Farmers' practice yield.

Technology gap = Potential yield of variety – Demonstration yield

Technology index (%) = Potential yield – Demonstration yield/Potential yield x 100

Results and Discussion

Seed yield (q/ha)

The average yield of CFLD was 6.31 q/ha as compared to farmers practices 4.82 q/ha. The average yield increased 30.91 per cent over farmers practices during the three years. The result indicated that the cluster frontline demonstration has given a good impact over the farming community of the district about 7.02 q/ha. The average highest yield has been recorded during 2018-19 year, while the average yield was 5.27 q/ha in farmers practices during the year 2018-19. The farmers of the district have been motivated by the improved agriculture technologies applied in the CFLD these findings are in corroboration with the finding of many others (Table 3).

Gap analysis

Extension gap

Evaluation of findings of the study (Table 3) stated that an extension gap of 1.27 to 1.75 q/ha was found between demonstrated technology and farmers' practice and on the average extension gap 1.49 q/ha has been found during this period while the average highest extension gap 1.75 q/ha was recorded during the year 2018-19. 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 5.60 q/ha during the three years, while it was highest 5.77 q/ha during the year 2019-20. The minimum technology gap has been recorded 3.98 q/ha during the year 2018-19. 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 52.45 was recorded in the year 2019-20 and the lowest was observed in the year 2018-19 which is 36.18 per cent. Hence, it can be inferred that the awareness and adoption of improved varieties with recommended scientific package of practices have increased during the advancement of study period. The present findings confirm the Meena *et al.*, (2012) [1], Raj *et al.* (2013) [4] and Meena and Singh (2017) [3]. They found more gain yield of CFLD plots than the existing practices.

Table 1: Particulars showing the details of green gram growing under CFLDs and existing practices

Particulars	Demonstration practices	Farmer practices
Variety	IPM 02-03 and IPN 410-3	Local
Seeed rate	20 kg /ka	30 kg /ha
Sowing method	Line sowing (30 cm)	Line sowing (22.5 cm)
Fertilizer dose	20:40:20 kg /ha(NPK)	Nil
Seed treatment	PSB,Rhizobium and Tricoderma	No seed treatment
Weedicide	Imizathaper a.i.100 gm/ha	Hand weeding
Plant protection	Need based insecticide and pesticide	One spray of insecticide

Table 2: Details of cluster frontline demonstration during 2019-190to 202021

S. No	Year	No. of farmers	No. of CFLDs	Area (ha.)
1	2018-19	75	75	30
2	2019-20	50	50	20
3	2020-21	25	25	10
Total		150	150	60

Table 3: Exploitable productivity, extension gap, technology gap and technology index of green gram as grown under CFLDs and existing package of practices

Year	Area (ha.)	No. of demo	Yield q/ ha			FP	% increase in yield over FP	Extension gap q/ha.	Technology gap q/ha.	Technology index
			Highest	Lowest	Average					
2018-19	30	75	9.12	5.16	7.02	5.27	33.20	1.75	3.98	36.18
2019-20	20	50	7.12	3.89	5.23	3.96	32.07	1.27	5.77	52.45
2020-21	10	25	8.24	4.52	6.68	5.24	27.48	1.44	4.32	39.27
Mean	60	150	8.16	4.62	6.31	4.82	30.91	1.49	5.60	42.63

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