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Farmers Need to Adopt Recommended Package of Practices for Realizing Higher Benefit from Greengram in Alwar District of Rajasthan

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ABSTRACT

The cluster front line demonstrations on Green gram were conducted by Krishi Vigyan Kendra, Navgaon Alwar during *Kharif* 2018 and 2019 covering 20 ha each in two village of Alwar District during both the seasons. The improved technologies consisted of improved high yielding variety IPM 02-14, pre and post emergence herbicides, use of bio fertilizers as a seed treatment and plant protection measures for insect and pest management. The result revealed that the highest grain yield (792.5 kg/ha), average net return (Rs. 31795/ha), B:C ratio (2.84), average increase in yield (26.5 per cent)and net return increase (47.65 per cent) were obtained in demonstrated plot compared to farmer's practice. The average technology gap of 407.5 kg/ha whereas the average extension gap of 166 kg/ha with average technology index 33.95 per cent were recorded. There is a need to further 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 for realizing higher benefit.

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INTRODUCTION

Pulses are very important in nutritional food security of India. Among pulses green gram is most important *Kharif* pulse crop of India. It is third most important pulse crop of the country after chick pea and pigeon pea. Green gram is a protein rich staple food. In addition to being an important source of human food and animal feed, Green gram also plays an important role in sustaining soil fertility by improving soil physical properties and fixing atmospheric nitrogen. The green gram production among pulses was 1304423 t from the area of 2326561 ha with productivity of 5.61 q/ha in Rajasthan in the year 2019-20. Whereas, in Alwar district total production of *kharif* green gram was 90 t from the area of 190 ha with productivity of 5.01 q/ha (Agricultural Statistics at a Glance, 2020). The CFLD is an important tool for transfer of latest package of practices in totality to farmers and the main objective of this programme is to demonstrate newly released crop variety, production and protection technologies and management practices at the farmers' field under real farming situation. Through this practice, the newly improved innovative technology having higher production potential under the specific cropping system can be popularized and simultaneously feedback from the farmers may be generated on the demonstrated technology (Singh *et al*, 2012). Greengram has strong root system and have capacity to fix the atmospheric nitrogen into the soil and improves soil health and contributes significantly to enhancing the yield of subsequent crops (Meena *et al*, 2012). The cluster front line demonstration (CFLD) is an important method of transferring the latest package of practices in totality to farmers. Further, these demonstrations are designed carefully where provisions are made for speedy

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TABLE 1. Practices followed on demonstrated plot and farmers plot.

Sr. No.	Intervention	Demonstration Plot	Famer's Plot	Critical inputs	
				2018	2019
1	Land Situation	Rainfed	Rainfed	-	-
2.	Variety	IPM 02-14	Samrat, Local	Seed	Seed
3.	Sowing time	Onset of Monsoon	Onset of Monsoon	-	-
4.	Method of sowing	Line Sowing	Broadcasting	-	-
5	Seed Treatment	Seed treatment with PSB, Rhizobium and *Trichoderma*	No seed treatment	Rhizobium, PSB and *Trichoderma*	Rhizobium, PSB and *Trichoderma*
6	Seed Rate	12 kg/ha	15 kg/ha	-	-
7	Spacing	30 cm x 10 cm	Broadcasting	-	-
8	Manures & Fertilizers	20:40, N:P_2O_5	20:40, N:P_2O_5	-	-
9	Weed management	Application of herbicides Pendimethalin and Imazethypr	Manual weeding	Weed management by using heribicide Pendimethalin 1.0 kg a.i./ha as pre emergence and Imazethypr 50 g a.i./ha as at 25 DAS	Weed management by using heribicide Pendimethalin 1.0 kg a.i./ha as pre emergence and Imazethypr 50 g a.i./ha as at 25 DAS
10	Plant protection	Application of Imidachloprid and Emamactin Benzoate	No measures	Spray of Imidachloprid 8 ml/l for sucking pest and spray of Emamactin Benzoate 300 gm a.i./ha for pod borer	Spray of Imidachloprid 8 ml/l for sucking pest and spray of Emamactin Benzoate 300 g a.i./ha for pod borer

dissemination of demonstrated technology among farming community through organization of other supportive extension activities, such as field days and farmers convention. During demonstration, the scientists study the factors contributing to higher crop production, field constraints, generate production data and feed-back information (Meena and Dudi, 2018). Keeping in view, the present study was undertaken to increase the green gram productivity by conducting the CFLDs in Alwar district of Rajasthan.

MATERIALS AND METHODS

A total of 40 FLDs were conducted at farmers' field namely Bamboli and Sonagadh village of Alwar District of Rajasthan during kharif seasonof 2019 and 2020, respectively under rainfed conditions. Each demonstration was conducted on an area of 0.5 ha, and 0.4 ha area adjacent to the demonstration plot was kept as farmers' practices. The package of improved technologies like required seed rate, line sowing, nutrient management, seed treatment and whole packages were used in the demonstrations. The variety of green gram IPM-02-14 was used during 2018and 2019, respectively and details used for the present study with respect to CFLDs and farmers' practices are given in Table 1. In farmer's plots, farmer's traditional practices were practiced.

TABLE 2. Grain yield performance of cluster front line demonstration on green gram.

Year	Variety	Yield (Kg/ha)		Percent increase over farmers' practices	Technology gap (Kg/ha)	Extension gap (Kg/ha)	Technology Index (%)
		RP	FP				
2018	IPM 02-14	830	669	24.06	370	161	30.83
2019	IPM 02-14	755	584	29.28	445	171	37.08
Av.		792.5	626.5	26.50	407.5	166	33.95

The soil of the area under study was sandy loam and medium to low in fertility status. The pH of the sol varied from 6.8 to 7.4. The spacing was 30 cm between rows and 10 cm between plants. The thinning was done invariably 25-30 days after sowing to ensure recommended plant spacing with in a row because excess population adversely affects growth and yield of crop. Sowing time was First week of July to Second week of July with a seed rate of 12kg/ha. Just after sowing pre emergence application of Pendimethalin @1.0 kg a.i/ ha was done to manage the weed population in early stage of crop. Farmers of these villages generally used to grow green gram in *kharif* season without adoption of any proper scientific technology with locally available seeds having low productivity. The method demonstrations on seed treatment with bio-fertilizers were conducted at each village to make aware the farmers about its effects and benefits on pulse crop production. All other plant protection measures were taken in consideration for pest and disease management. Yield gap analysis was assessed prior the programme. The yield parameters were observed along with grain yield. The economic parameters were calculated based on the prevailing market prices of inputs and minimum support prices of outputs. The data output were collected from both CFLDs as well as control plots and finally the extension gap, technological gap, technological index along with the benefit-cost ratio were calculated using the following formula as given by Samui *et al* (2000).

Technology Gap= Potential Yield - Demonstration Plot Yield

Extension Gap = Demonstration Plot Yield - Farmer's Plot Yield

Technology Index (%) = (Pi-Di)/Pi*100

Where Pi= Potential Yield of i^{th} crop; Di= Demonstration yield of i^{th} crop

B:C = Gross income (Rs./ha) / Cost of cultivation (Rs./ha)

RESULTS AND DISCUSSION

Comparison of production technologies

The perusal of data (Table 1) indicated that farmers generally did not use recommended and improved technologies. A wide gap in use of improved varieties seed due to its non availability was observed and farmers generally use local varieties seeds. In farmer's practices broadcast method of 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, which is important component in increasing the yield and yield attributes of pulses (Kumar and Elamathi, 2007). Data in table 1 further indicated that farmers did not apply any recommended fertilizer and if applied, only urea was given to the crop at the time of sowing. Weed management and plant protection measure also showed a full gap in adoption under farmer's practices over recommended practices of application of Pendimethalin as pre emergence and Imazethypr as post emergence herbicide @ 25 DAS as well as application of Imidachloprid for sucking pest and Emamectin Benzoate for pod

TABLE 3. Economics of cluster front line demonstration of greengram

Year	Cost of cultivation (Rs/ ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		Additional Return (Rs/ha)	Net return Increase over FP (%)	B:C Ratio	
	RP	FP	RP	FP	RP	FP			RP	FP
2018	17015	16525	52905	39900	35890	23375	12515	53.54	3.11	2.41
2019	17600	15500	45300	35040	27700	19540	8160	41.76	2.57	2.26
Average	17307	16012	49102	37470	31795	21457	10337	47.65	2.84	2.33

borer at the time of pod development. The similar observations for gap in improved technologies and farmers practices were observed by Burman *et al* (2010), Kumar *et al* (2014 and Kumar *et al* (2020) in different crops.

Seed yield

The productivity of green gram under improved production technology ranged between 755 to830 kg/ha with mean yields of 792.5 kg/ha (Table 2). The productivity under improved technology was 830 and 755 during 2018 and 2019, respectively as against a yield range between 584to 669 kg/ha under farmers' practice. In comparison to farmer's practice, there was an increase of 24.06 and 29.28 per cent in productivity of green gram under improved technologies in 2018 and 2019, respectively. The increased grain yield with improved technologies was mainly because of line sowing, use of seed treatment with biofertilizers and Trichoderma, nutrient management, weed management and plant protection measures. The findings were in line with Meena *et al* (2012), Patel *et al* (2013), Raj *et al* (2013) and Kumar *et al* (2020).

The results revealed that the variety IPM-02-14 was found suitable for the villages in both the years. The improved technologies adopted by the farmers reflected the enhancement of the growth. The inoculation of seeds with *Rhizobium*, PSB and *Trichoderma* enhanced the nodule formation along with yield than farmer's practice of non-inoculated seeds. Verma et al (2017) conducted different kind of seed treatments in mungbean and found that seed treatment increased the seed yield of mungbean. The improved packages and practices had been observed better than traditional one as farmers' practice. Similar observations were reported by Singh *et al* (2012).There were less infestation of pest and diseases. During 2018 and 2019 in the plots where insect pest attacks were found had been managed by use of Imidachloprid and Imamectin Benzoate pesticides which made the farmers aware about use of Chemical pesticides too.

Gap analysis

The study (Table 2) revealed that an extension gap of 161 to 171 kg/ha was found between demonstrated technology and farmers' practice and on average basis the extension gap was 166 kg/ ha. The extension gap was highest (171 kg/ ha) during 2019 and lowest (161 kg/ha) during 2018. The adoption of high yielding varieties, improved technologies, seed inoculation, weed management and appropriate plant protection measures in demonstrations might be the reason which resulted in higher grain yield than the traditional farmers'practices.

The data also depicted a wide technology gap of 370 and 445 kg/ha during 2018 and 2019 respectively and this might be attributed to dissimilarity in the soil fertility status and weather conditions. These findings were similar to the findings of Patel *et al* (2013), Gaur and Jadav (2020) and Kumar *et al* (2020). The average technology gap of both the years was 407.5 kg/ha. The difference in technology gap in different years was due to better performance of recommended varieties with different interventions and more feasibility of recommended technologies




during the years. Similarly, the technology index for the demonstrations was in harmony with technology gap. The Technology index shows the feasibility of the technology at the farmer's field. Higher technology index reflected the inadequate transfer of proven technology to growers and insufficient extension services for transfer of technology. On the basis of two years results, average 33.95 per cent technical index was recorded, which was30.83 per cent in 2018 and 37.08 per cent in 2019, respectively. The findings of the present study were in close conformity with the findings Rai *et al* (2016).This indicates that a gap existed between technology evolved and technology adoption at farmer's field. Therefore, the awareness, method demonstrations and adoption of improved varieties with recommended scientific package of practices have increased during both the years of study. These findings were in the conformity of the results of study carried out by Chandra (2010), Meena and Dudi (2018), Meena and Singh (2016), Meena and Singh (2017), Khedkar *et al* (2017). The similar results were also observed by Kumar *et al* (2014), Bairwa *et al* (2013) and Kumar *et al* (2020).

Economics

The results of economic analysis of green gram production revealed that average cost of cultivation increased in demonstration practice (Rs 17307/ha) as compared to Farmers practice plot check (Rs16012 /ha). It was observed that front line demonstrations recorded higher gross returns (Rs 49102/ha) and net returns (Rs 31795/ha). The average benefit cost ratio of demonstration plot (2.84) was also more than the farmers' practice (2.33). Average net return increased over farmers

practice by 47.65 percent and average additional return was Rs 10337 /ha. The higher additional returns obtained under demonstrations could be due to improved technology. The results were in line with the findings of front-line demonstrations on pulses Gauttam *et al* (2011), Lathwal (2010), Chaudhary (2012), Meena and Dudi (2018) and Kumar *et al* (2020).

CONCLUSION

The Cluster frontline demonstrations on green gram conducted at Alwar district of Rajasthan during 2018 and 2019 at the farmers' field indicated that the adoption of improved technologies significantly increased the yield of the crop and also the net returns to the farmers. There was 26.50 per cent increase in yield observed in demonstrated plot over farmers plot. There is a need to further 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 for realizing higher returns. Horizontal spread of improved technologies may be achieved by the successful implementation of front line demonstration and various extensions activities like training programme, field day, exposure visit organized in CFLDS programmes in the farmers' fields.

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