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Impact of Cluster Frontline Demonstration on Productivity and Profitability of Greengram in Morigaon District of Assam

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ABSTRACT

The cluster frontline demonstration on greengram were conducted by Krishi Vigyan Kendra, Morigaon during 2016-17 and 2017-18 on summer season covering 60ha land with 150 demonstrations across total 8 villages with 8 clusters of Morigaon district of Assam. The improved technologies consisted of improved high yielding variety, pre-emergence weedicides, use of biofertilizers as a seed treatment, vermicompost, neem based pesticides and yellow sticky card as insect-pest management. The result revealed that the highest grain yield was obtained in demonstrated plot with an average of 1243kg/ha compared to 725kg/ha in farmer's practice. Higher average net return (Rs.41,530/ha)was obtained in the demonstration plots compared to farmers' practice plot(Rs.14,705/ha).The average B:C ratio was 1.45 in demonstrated plot compared to 0.47 in farmer's plot. The average increase in the demonstration yield over farmers' practice was 71.67per cent and net return increase over farmers' practice was 182 per cent. The average technology gap of 157 kg/ha whereas the average extension gap of 518 kg/ha and average technology index 11.21 percent were recorded.

Key Words: Vermicompost, Biofertilizer, Extension gap, Technology gap and Technology index.

INTRODUCTION

Pulses are important commodity group of food crops that can play a vital role to address national food and nutritional security and tackle environmental challenges. Pulses share to total foodgrain basket is around 9-10 per cent and critical and inexpensive source of plant based proteins, vitamins and minerals. Pulses are mostly cultivated under rain fed conditions and do not require intensive irrigation facility and this is the reason why pulses are grown in areas left after satisfying the demand for cereals/ cash crops. Further, pulses are rich in protein, improve soil fertility and physical structure of soil. The productivity of pulses has increased about 13% at 841 kg/ha during 2017-18 from the level of 743 kg/ha during 2014-15 and 90 per cent from the level of 441 kg/ha during 1950-51. The productivity of food grains has also sharply increased to 2233 kg/ ha during 2017-18 from the level of only 522 kg/ha during 1950-51.Green gram (*Vigna radiata* L. Wilczek.) is the third important pulse crop in India. Green gram has strong root system and 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 front line demonstration (FLD) 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 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 et al, 2018). Keeping in view, the present study was undertaken to increase the green gram productivity by conducting the FLDs in Morigaon district of Assam.

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MATERIALS AND METHODS

A total of 60 FLDs were conducted at farmers' field namely Dandua, Kothalguri, Silsaku, Gaolia, Gosarguri, Pub Barangabari, Kunwargaon, Oujari of Morigaon district of Assam during summer season 2016 and 2017, respectively under irrigated conditions. Each demonstration was conducted on an area of 0.4 ha, and 0.13 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, Pratap and IPM-02-03 were used during 2016 and 2017, respectively and details used for the present study with respect to FLDs and farmers' practices are given in Table 1. In farmer's plots, farmer's traditional practices were practiced. The soil of the area under study was sandy loam and medium to low in fertility status. The pH of the sol varied from 5.5 to 6.5. The spacing was 30 cm between rows and 10 cm between plants in the rows. The thinning and weeding was done invariably 30-35d after sowing to ensure recommended plant spacing within a row because excess population adversely affects growth and yield of crop. Sowing time was Last week of March to first week of April with a seed rate of 18kg/ha. Farmers of these villages generally used to grow green gram in summer season without adoption of any proper scientific technology with locally available seeds having low productivity. The method demonstrations on seed treatment with biofertilizers were conducted at each village to make aware the farmers about its effects and benefits on pulse crop production. Yield gap analysis was assessed prior the programme. The

Table1. Practices followed on demonstrated plot and farmer's plot.

Sr. No	Intervention	Demonstration plot	Farmer's plot	Critical inputs	
				2016	2017
1	Land situation	Irrigated	Irrigated		
2	Variety	HYV	Local	Pratap	IPM-02-3
3	Sowing time			21.02.2017	04.03.2018
4	Method of sowing	Line sowing	Broad casting		
5	Seed treatment	Seed treatment with Rhizobium/PSB	No seed treatment	Rizobium @50g/kg of seed & PSB @ 50 g/kg of seed	Rizobium @50g/kg of seed & PSB @ 50 g/kg of seed
6	Seed rate	18kg/ha	25 kg/ha	18kg/ha	18 kg/ha
7	Spacing	30cm x 10 cm	-		
8	Manure & fertilizers	Application of vermicompost	No use of fertilizers	Vermicompost @ 3.33 q/ha	Vermicompost @3.33 q/ ha
9	Weed management	Pre-emergence of weedicide and hand weeding	No weeding	Weeds control by using herbicide Pendimethaline 1kg/ ha in 500 liter of water as pre-emergence treatment for effective control of weeds within two days after sowing	Weeds control by using herbicide Pendimethaline 1kg/ ha in 500 liter of water as pre-emergence treatment for effective control of weeds within two days after sowing
10	Plant protection	Neem based pesticides & placing yellow cards	No measures	Neem based pesticide	Neem based pesticide & Yellow stick card

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 FLDs 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).

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

RESULTS AND DISCUSSION

Seed yield

The productivity of green gram under improved production technology ranged between 1236 to 1250 kg/ha with mean yields of 1243 kg/ha (Table 2). The productivity under improved technology was 1250 and 1236 during 2016 and 2017, respectively as against a yield range between 700 to 750 kg/ha under farmers' practice. In comparison to farmer's practice, there was an increase of 66.67 and 76.57 per cent in productivity of green gram under improved technologies in 2016 and 2017, respectively. The increased grain yield with improved technologies was mainly because of line sowing use of seed treatment with biofertilizers, nutrient management and weed management. The findings were in line with Meena *et al* (2012), Patel *et al* (2013) and Raj *et al* (2013).

The results revealed that the varieties Pratap and IPM-02-03 were 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* and PSB enhanced the nodule formation along with yield than farmer's practice of non-inoculated seeds. Verma (2017) conducted different kind of seed treatments in mung bean and found that seed treatment increased the seed yield of mungbean (1235kg/ha). The improved packages and practices had been observed better than traditional one as farmers' practice. Similar observations were reported by Singh *et al* (2011).There were less infestation of pest and diseases. During 2016 the plots where insect pest attacks were found had been managed by use of neem based pesticides which made the farmers aware about use of organic pesticides too. During 2017, the use of yellow sticky cards on the plots reduced the attack of the insects and it showed a good result of less infestation of pest. In some plots wherever the infestation occurred were controlled by spraying neem based pesticides.

Gap analysis

The study (Table 2) revealed that an extension gap of 500 to 536 kg/ha was found between demonstrated technology and farmers' practice and on average basis the extension gap was 518 kg/ha. The extension gap was highest (536 kg/ ha) during 2017 and lowest (500 kg/ha) during 2016. 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.

Table 2. Grain yield performance of cluster front line demonstration on Green gram.

Year	Area	No of FLDs	Variety	Yield(kg/ha)			Percent increase over farmers practices	Technology gap (kg/ ha)	Extension gap (kg/ ha)	Technology index (%)
				Potential (kg/ha)	Recomm-ended practices (kg/ha)	Farmers practices (kg/ha)				
2016	30	75	Pratap	1400	1250	750	66.67	150	500	10.71
2017	30	75	IPM-02-03	1400	1236	700	76.57	164	536	11.71
Average					1243	725	71.67	157	518	11.21

The data also depicted a wide technology gap of 150 and 164 kg/ha during 2016 and 2017 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) and Gaur *et al* (2020).

The average technology gap of both the years was 157 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.

Correspondingly, 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, average11.21 per cent technical index was recorded, which was10.71 per cent in 2016 and 11.71 per cent in 2017, respectively. The findings of the present study were in line 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 (2012), Meena and Singh (2016), Meena and Singh (2017), Khedkar *et al* (2017). The similar results were also observed by Kumar *et al* (2014), Thakral and Bhatnagar (2002), Bairwa *et al* (2013).

Economics

The results of economic analysis of green gram production revealed that average cost of cultivation increased in demonstration practice (Rs 28600/ha) as compared to Farmers practice plot check (Rs21570 /ha). It was observed that front line demonstrations recorded higher gross returns (Rs 70130/ha) and net returns (Rs 41530/ha). The average benefit cost ratio of demonstration plot (1.45) was also more than the farmers' practice (0.47). Average net return increased over farmers practice by 182 percent and average additional return was Rs 26,825 /ha. The higher additional returns obtained under demonstrations could be due to improved technology. The results were in confirmity with the findings of front line demonstrations on pulses by Yadav *et al* (2004), Gauttam *et al* (2011), Lathwal (2010), Chaudhary (2012), Meena and Dudi (2012).

CONCLUSION

The frontline demonstrations on green gram conducted at Morigaon district of Assam during 2016 and 2017 at the farmers' field portrayed that the adoption of improved technologies significantly increased the yield of the crop and also the net returns to the farmers. There was 71.67 per cent increase in yield observed in demonstrated plot over farmers plot. Anuradha *et al* (2018) also reported 11.43 per cent increase in yield observed in demonstration plot over farmer's practice. There

Table 3. Economics of 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
2016	28200	25140	62500	37500	34300	12360	21940	178	1.22	0.49
2017	29000	18000	77760	35050	48760	17050	31710	186	1.68	0.95
Average	28600	21570	70,130	36275	41,530	14,705	26,825	182	1.45	0.47

was an enthusiasm developed among the farmers as certification of the seeds have been done under Assam State Seed Certifying agency for which they were able to sale their product at good market price. 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. The farmers have shown keen interest to grow these varieties in large area in the ensuing seasons.

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