Indian Journal of Extension Education
Vol. 54, No. 1, 2018 (130-133)

Impact of Front Line Demonstrations on Productivity Enhancement of Cluster bean in Arid Zone

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ABSTRACT

The study was conducted in Bheenjwdia village of Jodhpur district of Rajasthan by ICAR-Central Arid Zone Research Institute, Jodhpur during 2010 to 2014 to study the Impact of Front Line Demonstrations on Productivity Enhancement of Cluster bean. The data were collected from 96 farmers and analysed. The results of the study showed that the yield under demonstration was 32.71 per cent higher as compared to farmers' practices. The net returns and B: C ratios on demonstration plot were higher, *i.e.*, ` 24234 and 2.41 respectively as compared to farmer's practices (` 17160 and 1.96). The study suggests that for strengthening linkages with line department and converging the demonstration with Government schemes for large scale adoption of farmers' fields this can be a good option for enhancing farmers' income.

Keywords: Extension gap, frontline demonstration, technology gap, technology index

INTRODUCTION

Cluster bean is an important kharif crop of Rajasthan; it occupies about 46.30 lakh hectare areas with total production of 27.47 lakh tonnes in Rajasthan state. Mostly it is grown under rainfed condition in the state. The average productivity of cluster bean is 593 kg/ha (2014-15) in the state, which is very low as compared to its potentiality. The yield levels of cluster bean crop are highly fluctuating due to monsoon and infestation of insect pests. The Government of India and ICAR is operating various schemes for quick and effective transfer of technology to farmers' field. Among these schemes, Front line demonstrations (FLDs) is one, which emphasizes on increasing production by supplying critical inputs along with improved packages of practices tested by scientists of ICAR Institutes and State Agricultural Universities (SAUs). Use of improved seed, seed rate, seed treatment, sowing time, recommended dose of fertilizer, weed control and plant protection measure gives a higher yield of cluster bean as compared to farmer's practices. Extending cultivation of improved varieties, getting feedback from farmers about constraints in adoption of recommended improved technologies for further research and to maximize the technology dissemination process among the farmers are some of the other important features of this programme (Nagarajan *et al.,* (2001). Keeping this in mind, the present study was conducted to assess the impact of front line demonstration on yield and economics of cluster bean production.

METHODOLOGY

The study was carried out by ICAR-Central Arid Zone Research Institute, Jodhpur during 2010 to 2014 (five consecutive years) at farmers' fields of Bheejwadia village of Jodhpur district. A total of 96 FLDs in 38.50 ha in different locations were conducted. Primary data were collected from the frontline demonstration on cluster bean conducted at farmers' fields by Central Arid Zone Research Institute, Jodhpur, and Rajasthan. Total 96 farmers were associated with this programme. Intensive trainings were imparted to the selected farmers regarding different aspects of moth cultivation in each year. The differences between the demonstration package and existing farmers' practices are mentioned in Table-1. All demonstrations were conducted under the supervision of CAZRI scientists. In demonstration plots, use of quality seed of improved varieties (RMG-112, RGC-936, RGC-1003, HGS-365), line sowing, seed treatment and timely weed control, as well as recommended dose of fertilizer (20 kg nitrogen+ 40 kg phosphorus) were emphasized. In

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case of farmers' practices, existing practices used by farmers were followed. Before conducting the demonstration, training to the framers of respective villages was imparted with respect to envisaged technology interventions, site selection, farmers selection, layout of demonstration, and farmers' participation *etc.* were followed as suggested by Choudhary (1999) and Singh (2007). Visits of farmers and the extension functionaries were organized at demonstration plots to disseminate the message at large. The farmers were selected on the criteria that they were involved in cumin cultivation since last 5 years. The data on output were collected from FLD plots as well as control plots and finally, the yield attributes, grain yield, cost of cultivation, net returns with the benefit-cost ratio was worked out.

To estimate the extension gap, technology gap and technology Index, following formulae were considered as suggested by Samui et al. (2000).

Technology gap = Pi (Potential yield) – Di (Demonstration yield)

Extension gap = Di (Demonstration yield) – Fi (Farmers yield)

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

Clint Satisfaction Index (CSI) was calculated by using formula as developed by Kumaran and Vijayragavan (2005).

$$\text{Clint Satisfaction Index (CSI)} = \frac{\text{Individual obtained score}}{\text{Maximum score possible}}$$

Table 1: Description of technological intervention under FLD on cluster bean

Particulars	Technological Interventions(T)	Farmers' practices (T)	Gap
Variety	RMG-112, RGC-936, RGC-1003, HGS-365	Local and old	Full gap
Seed rate	12-15 kg/ha	15-20 kg/ha	Partial gap
Seed treatment	Seed treatment with Trichoderma 6 gm/kg seed	Nil	Full gap
Time of sowing	1-15 July	25-30 July	Partial gap
Method of sowing	Line sowing proper crop geometry	Line sowing improper crop geometry	Partial gap
Fertilizer dose	20kgN and 40kgP	No use of fertilizer	Full gap
Plant protection measures	Need based application of neem oil to protect the crop against insect	Nil	Full gap
Weed management	Two hand weeding	One hand weeding	Partial gap

RESULTS AND DISCUSSION

Performance of FLD

The yield performance of demonstrations conducted in Bheenjwadia village during 2010-2014 is given Table 2. The data indicated that under the demonstration plots the crop productivity was recorded higher than that of under the farmer's practices. Highest grain yield was recorded (724kg/ha) during 2014 and lowest (345 kg/ha) during 2011 (Table 2). Average grain yield of cluster bean under demonstration plot was 507.56 kg /ha which is 32.71 per cent more than control (382.46 kg/ha). The increased grain yield in terms of per cent was ranging from 18.80 to 63.95 higher over the control during five year study. The results clearly show the positive effects of FLD over the existing practices towards enhancing the yield of cluster bean (Table 2). Similar yield enhancement in different crops in front line demonstration has amply been documented by Jeengar *et al.,* (2006), Hiremath *et al.,* (2007), Dhaka *et al.,* (2010) and Patel *et al.,* (2013). From these results, it is evident that the performance of improved variety is better than the local check under same environmental conditions.

Technology gap

The technology gap shows the gap in the demonstrated yield over the potential yield and it was maximum in the year 2011 (655 kg/ha) and lowest in the year 2014 (235 kg/ha). However, overall average technology gap in the study was 463.33 kg/ha (Table2). The front line demonstrations were laid down under the supervision of CAZRI scientists at the farmers' field. This may be due to the soil fertility and weather conditions. Hence, location specific recommendations are necessary to bridge the gap. These findings are similar to the findings of Sharma and Sharma (2004) and Patel et al. (2013).

Extension gap

The highest extension gap of 138 kg/ha was recorded in variety RGM 112, followed by 125 kg/ha in RGC-936, 121 kg/ha by HGS -365 and lowest 98 kg/ha for RGC-1003. This emphasizes the need to educate the farmers through various means for adoption of improved agricultural practices.

Technology index

Technology index shows the feasibility of improved technology at the farmer's field. The lower the value of the technology index more is the feasibility of technology Jeengar *et al.* (2006). On the basis of five years study, overall 47.93 per cent technology index was recorded, which was reduced from 65.50 per cent during 2011 to 29.89 per cent during 2014. Hence, it can be inferred that

awareness and adoption of improved varieties with the recommended scientific package of practices have increased during the advancement of the study period. Results of the present study are in consonance with the findings of Singh *et al.* (2007), Hiremath and Nagaraju (2009), Dayanand *et al* (2012), Raj *et al* (2013), Meena and Singh (2014) and Bhargav *et al.* (2015).

Table 2: Grain yield, Extension gap, Technology gap and Technology Index of different cluster bean variety

Year	Name of variety	No. of demo.	Area (ha)	Grain yield (kg/ha)			% increase in yield over FP	Extension gap (Kg/ha)	Technology gap (Kg/ha)	Technology Index (%)
				Potential	IP	FP				
2010	RMG-112	8	3.20	1000	560	414	35.26	146	440	44.00
	RGC-1003	4	1.60	900	470	414	13.53	56	430	47.77
2011	RMG-112	10	4.00	1000	345	215	60.46	130	655	65.50
	RGC-936	4	1.60	1000	360	215	67.44	145	640	64.00
2012	RGC-1003	12	5.00	900	454	314	44.59	140	446	49.55
	RGC-936	4	1.60	1000	405	314	28.98	91	595	59.50
2013	HGS-365	27	11.00	950	546	385	41.82	161	404	42.53
2014	RGC-936	10	4.00	1000	724	585	23.76	139	276	27.60
	HGS-365	17	8.00	950	666	585	13.85	81	284	29.89
	Total/ Mean	96	40.00		503.33	382.33	31.64	121	463.33	47.93

Economics of front line demonstrations

The economics of cluster bean production under front line demonstrations were estimated and the results of the study have been presented in Table 3. The results of economic analysis of cluster bean production revealed that front line demonstrations recorded higher gross returns (` 34166/ha) and net return (` 23960 /ha) with higher benefit ratio (2.26) as compared to local checks. The results are in accordance with the findings of Hiremath *et al.,* (2007), Hiremath and Nagaraju (2009), and Patel *et al.,* (2013). Further, additional cost of ` 2059 per hectare in demonstration has increased additional net returns ` 6710 per hectare with incremental benefit-cost ratio 2.16 suggesting its higher profitability and economic viability of the demonstration. More and less, similar results were also reported by Hiremath and Nagaraju (2009), Dhaka *et al.,* (2010), Patel *et al.,* (2013), Rajni *et al.,* (2014) and Bhargav *et al.,* (2015).

Table 3: Economics analysis of demonstration and farmers practices

Year	Name of variety	Cost of cultivation (`/ha)		Gross return (`/ha)		Net return (`/ha)		B:C ratio	
		IP	FP	IP	FP	IP	FP	IP	FP
2010	RMO-112	7205	6600	14627	11435	7422	4835	1.03	0.73
	RGC-1003	7205	6600	12746	11225	5541	4627	0.83	0.70
2011	RMO-112	8535	6460	35290	21992	26755	15532	3.13	2.40
	RGC-936	8535	6460	36824	21992	28289	15532	3.31	2.40
2012	RGC-1003	11650	9850	48516	33629	36866	24779	3.74	2.51
	RGC-936	12150	9850	43376	33629	31726	24779	2.72	2.51
2013	HGS-365	12075	9800	36658	27181	24583	17381	2.04	1.77
2014	RGC-936	11500	10150	41630	33637	30130	23487	2.62	2.34
	HGS-365	11500	10150	38295	33637	26795	23487	2.33	2.31
	Mean	10039	8436	34218	25373	24234	17160	2.41	1.96

IP- Improved practices, FP- Farmers practices

Farmers' Satisfaction

The extent of satisfaction level of farmers over extension services and performance of improved practices of cluster bean was measured by Clint Satisfaction Index (CSI). The results are presented in Table 4. It was observed from table 4 that majority of the respondent's expressed high (51%) to medium (37.50%) level satisfaction for extension services and performance of improved practices under demonstrations, whereas, only 11.46 per cent of respondents expressed low level of satisfaction. The results are conformity with the results of Kumaran and Vijayraghavan (2005), Tomar (2010), Khajuria *et al.,* (2016) and Kushwah *et al.,* (2016). The medium to high level of satisfaction with respect to services rendered, linkage with farmers and technologies demonstrated etc. indicate stronger conviction, physical and mental involvement in front line demonstration which in turn would lead to, higher adoption.

Table 4: Extent of farmer's satisfaction of extension services rendered

Satisfaction	Frequency	Percentage
Low	11	11.46
Medium	36	37.50
High	49	51.04

CONCLUSION

From the above findings, it can be concluded that the yield of cluster bean was increased by 19 to 64 per cent by different technological interventions. The results clearly established the facts that the adoption of improved technology improves the cluster bean productivity and profitability. In the vicinity of the CAZRI, farmers in large number adopt and followed the recommended practices under demonstrations and got benefitted with higher production. The study suggests that extension agencies in the arid zone need to provide more intensive technical support to the farmers through different educational and extension methods to reduce the extension gap for higher productivity of cluster bean. This can be one approach to enhance farmers' income with existing resources.

Paper received on : December 20, 2017
Accepted on : December 28, 2017

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