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ENHANCING YIELD AND PROFITABILITY THROUGH FRONT LINE DEMONSTRATIONS OF CLUSTER BEAN VARIETY RGC-1066 IN SIKAR DISTRICT OF RAJASTHAN

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SUMMARY

Cluster bean (*Cyamopsis tetragonoloba*) is a legume crop grown in kharif season. However, the average productivity of guar in the district (751 kg/ha) is very low as compared to potential yield of new varieties (20 q/ha). The productivity of this crop is low in the district due to poor adoption of improved technologies of guar by the farmers. The KVK, Fatehpur has carried out 140 FLDs on guar (RGC-1066) in 24 selected operational villages covering an area of 58 ha during 2013 to 2018 to exhibit latest proven technologies & to know the productivity & economics of demonstrations compared with farmer's practices. The average yield of six years data was recorded 14.40 q/ha in FLDs and 12.00 q/ha in farmers practice with an additional yield of 2.40 q/ha and productivity increased by 20.19 per cent. The average technology gap and extension gap were found 5.59 and 2.40 q/ha respectively. The result shows positive effect of FLDs of improved variety (RGC-1066) & new proven technologies of guar over the existing practices towards enhancing the productivity of guar in the district. The improved variety RGC-1066 gave higher six years average gross return (Rs 64387/ha), net return (Rs. 41103/ha) with higher cost benefit ratio of 2.79 as compare to farmer's practice average gross return (Rs. 54050/ha), net return (Rs. 33067/ha) with cost benefit ratio of 2.56 in the six years from 2013 to 2018. The horizontal spread of improved new variety RGC-1066 among 350 farmers of nearby 30 villages over more than 450 hectare area show positive impact of FLDs.

Key words : Cluster bean, front line demonstration, productivity, technology gap, extension gap

Krishi Vigyan Kendra, an innovative science based institution plays an important role in bringing the research scientist face to face with farmers. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generations of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven production technologies under different farming situations in the district. Front line demonstration is a long term educational activity conducted in a systematic manner at farmer's fields to prove the worth of a new practice/ technology. Indian farmers are still producing crops based on the knowledge transmitted to them by their forefathers leading to a grossly unscientific agronomic, nutrient management and pest management practices. As a result of these, they often fail to achieve the desired potential yield of various crops and new varieties. Similarly, the productivity level of cluster bean (guar) is not achieving significant level due to several constraints like unavailability of quality seeds of improved varieties in time, poor soil status with low organic carbon, lack of knowledge about of proper seed treatment & plant protection measures and erratic rainfall in the districts. Keeping above points in view front line demonstration was conducted on guar by Krishi Vigyan Kendra. The main objectives of the study were to exhibit the performance of recommended high yielding guar varieties with recommended practices for harvesting higher crop yields.

MATERIALS AND METHODS

To assess the feedback performance of FLD Guar variety RGC-1066 from four Panchayat Samities, 24 villages (6 from each P.S.) were purposively selected because in these villages maximum guar

demonstration were conducted during 2013 to 2018 in the District by Krishi Vigyan Kendra, Fatehpur-Sikar 332301, Rajasthan. Each demonstration of RGC-1066 variety laid out in 0.4 ha area and the critical inputs were supplied by KVK as per the package of practices and regular visits to the demonstration fields from sowing to harvesting by KVK scientists ensured proper guidance to the farmers. The data were collected from reports of FLDs conducted by KVK on the production technology of guar crop were used. These were compared with prevailing production technologies of guar crop (which were taken in check plot). The existing difference between the recommended package of practices under FLDs and farmers practices were measured and reported in Table No. 1. The performance of new improved variety of guar (RGC-1066) with improved technologies were evaluated every years closely by the KVK scientist by organizing field days, kisan goshthies, off campus trainings and method demonstrations to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The data output were collected from both FLD plots as well as control plots and cost of cultivation, net income and benefit cost ratio were also work out. To calculate the technology gap, extension gap and technology index :

Extension gap = Demonstration yield – local yield
Technology gap = Potential yield – Demonstration yield
Technology index = Potential yield – Demonstration yield x 100/Potential yield

RESULT AND DISCUSSION

Production & profitability performance of guar variety RGC-1066 under FLD as compare to existing practices: The yield performance results of guar crop obtained under demonstrations and farmers practice during six years are presented in Table 2.

Grain yield

On an average the demonstration fields showed 20.19 per cent increase in grain yield (Table 2). The highest increase in grain yield (26.30%) was observed in year 2013 which might be due to seed of improved variety and other technologies about which the farmers were ignorant. Similar findings were also reported by Asiwal *et.al.,* (2015); Jain (2016) & Malve *et.al*., (2018) in moong and Sharma *et.al*., (2016) in wheat and Aswal *et.al*., (2020) in cluster bean.

Extension gap

An extension gap between demonstrated technology and farmers practices ranged from 1.96 to 3.14 q/ha during different six years and on average basis the extension gap was 2.40 q/ha (Table 2). This gap might be attributed to adoption of improved technologies in demonstrations which resulted in higher grain yield than the traditional farmer's practices.

Technology gap

Wide technology gap were observed during different years and this was lowest (4.66 q/ha) during 2016 and was highest during (7.39 q/ha) during 2017. The average technology gap was found 5.59 q/ha. Technology gap were recorded higher in last two years due to low erratic rainfall. Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap (Sharma and

TABLE 1
Comparison of existing gap between demonstration package and farmers practice of cluster bean

S. No.	Particular practice	Demonstration package	Farmers practice	Gap (%)
1.	Improved variety	RGC-1066, RGC-1033, RGC-1055	RGC-1003, RGC-197, RGC-936	60-65
2.	Seed rate	20 kg	15-20 kg	45-55
3.	Seed treatment	Thiram 1 gm + Carbendazim 1.5 gm, Chlorpyriphos (20 EC) 4.0 ml/kg seed & trichoderma + PSB culture	Use only Chlorpyriphos 20 EC with improper method	100
4.	Sowing method	Line sowing (seed drill), 30x10 cm	Broadcasting and line sowing	50-60
5.	Basal application of fertilizer	10 kg N + 40 kg P_2O_5	Less quantity applied without knowledge of right method	100
6.	Weed management	Hoeing 25 DAS and imazethapyr 10 SL	Manual Hoeing & Weeding 25 DAS	30-35
7.	Plant Protection measures	Need based spray of pesticides: Dimethoate 30 EC	Partial use of pesticides during sever infestation	Up to 80

TABLE 2
Yield performance of cluster bean crop grown under FLD and existing practices

Year	Varieties	No. of demo.	Area (ha)	Average yield (q/ha)		% increase over local	Av. Yield of district (q/ha)	Potential yield (q/ha)	Extension on gap (q/ha)	Technology gap (q/ha)	Technology index %
				Demo	Local practice						
2013	RGC-1066	25	10.0	15.08	11.94	26.30	6.90	20.0	3.14	4.92	24.60
2014	RGC-1066	25	10.0	15.12	13.16	14.89	7.68	20.0	1.96	4.88	24.40
2015	RGC-1066	20	8.0	15.05	13.02	15.55	8.16	20.0	2.03	4.95	24.75
2016	RGC-1066	25	10.0	15.34	12.84	19.47	6.90	20.0	2.50	4.66	23.30
2017*	RGC-1066	20	10.0	12.61	10.40	21.15	7.24	20.0	2.21	7.39	36.95
2018*	RGC-1066	25	10.0	13.23	10.69	23.80	7.51	20.0	2.54	6.77	33.85
	Overall	140	58	14.40	12.00	20.19	7.40	-	2.40	5.59	27.97

* Low yield in these years.

The findings of the present study as well as relevant discussion have been presented under following heads:

Choudhary, 2014). More or less similar findings were also reported by Pagaria (2015) in mung bean and Verma *et.al*., (2014) in wheat.

Economic analysis of FLD cluster bean & farmer's practice :

The economic analysis presented in table 3 indicate that yield performance of FLDs was observed higher in all six years with average gross return (Rs 64387/ha), net return (Rs. 41103/ha) and higher cost benefit ratio of 2.79 as compare to farmer's practice *i.e*. average gross return (Rs 54050/ha), net return (Rs. 33067/ha) with cost benefit ratio of 2.56 was recorded during 2013 to 2018.

Similarly, in other study years the net profit from improved practices was observed more than farmer's practice as a result of FLDs showed positive impact of demonstrations, trainings & other supportive activities of KVKs. Similar findings were also reported by Asiwal *et.al.,* (2014) in groundnut, Joshi *et.al*., (2014) in wheat and Jain *et. al*., (2019) in cluster bean.

Horizontal spread of technologies

Table 4 revealed that horizontal spread and adoption of technology was observed maximum in improved new variety RGC-1066 and seed treatment among 350 farmers of adopted & nearby 30 villages spread over more than 450 hectare area. It might be due to the popularization of advance technologies and approaching the KVK personnel to farmers of nearby villages to beneficiaries with personal contact, field days, kishan gosthies and other social occasions. Similar findings were also reported by Asiwal, *et al.* (2015) in Mung bean FLDs.

CONCLUSION

Front line demonstration programme was effective in changing knowledge, attitude and skill of farmers towards improved guar cultivation. The average yield of six years data was recorded 14.40 q/ha in FLDs and 12.00 q/ha in farmers practice with an additional yield of 2.40 q/ha and productivity

TABLE 3
Economics of Front Line Demonstrations of cluster bean variety RGC-1066

Year	Av. Cost of cultivation (Rs./ha)		Av. gross return (Rs./ha)		Av. Net return (Rs./ha)		B : C ratio	
	Demon.	Local	Demon.	Local	Demon.	Local	Demon.	Local
2013	21800	21500	70506	55822	48706	34322	3.36	2.60
2014	23400	21300	79069	68252	55664	46952	3.38	3.20
2015	23400	21300	71210	61105	47810	39805	3.04	2.87
2016	24100	21400	60288	51888	36188	30488	2.50	2.42
2017	23000	19700	46320	38880	23320	19180	2.01	1.93
2018	24000	20700	58928	48352	34928	27652	2.46	2.34
Total/Av.	23283	20983	64387	54050	41103	33067	2.79	2.56

TABLE 4
Role of KVK in Horizontal spread of technologies in the nearby villages

S. No.	Technology demonstrated	Within village				Horizontal spread of technology			popularization methods
		Before FLD		After FLD					
		No. of farmers	Area in ha	No. of farmers	Area in ha	Nearby village	No. of farmers	Area in ha	
1.	Improved variety RGC-1066	00	00	75	300	30	350	450	-FLDs Results &
2.	Seed rate & plant spacing	20	20	60	300	18	200	380	- Method Demon-
3.	Seed treatment	18	15	54	200	18	200	380	- Literature
4.	Weed mgt	14	50	45	200	14	140	250	- Kisan mela
5.	Plant Protection measures	15	50	60	300	20	180	250	- Telephone helpline
6.	Balance use of fertilizer	35	40	65	320	20	220	300	- Field days, - kisan Goshti

increased by 20.19 per cent. The average technology gap and extension gap were found 5.59 and 2.40 q/ha respectively. The results of FLD also helped in replacement of local varieties with improved recommended varieties such as RGC-1066. This also improved the relationship between farmers and scientists and build confidence between them. The farmers where improved technology was demonstrated also acted as primary source of information for other neighbouring farmers on the improved practices of guar cultivation and also acted as source of good quality pure seed in their locality for the next crop season. The concept of FLD may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community.

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