https://doi.org/10.56572/gjoee.2022.si.0012

EFFECTIVENESS OF CLUSTER FRONTLINE DEMONSTRATION TOWARDS TRANSFER OF SCIENTIFIC CULTIVATION PRACTICES OF MAJOR PULSES IN NAVSARI DISTRICT OF GUJARAT

K. A. Shah[1], Prabhu Nayaka[2] and Sumit Salunkhe[3]

1 Scientist (Agronomy), Krishi Vigyan Kendra, NAU, Navsari -396450
2 Scientist (Plant protection), Krishi Vigyan Kendra, NAU, Navsari -396450
3 Scientist (Extension Education), Krishi Vigyan Kendra, NAU, Navsari -396450
Email : shahkinjal@nau.in

ABSTRACT

The cluster frontline demonstrations (CFLDs) on pigeon pea, chick pea and summer green gram were conducted by Krishi Vigyan Kendra, Navsari – Gujarat during the year 2018-19 in three talukas of Navsari district, i.e., Chikhli, Khergam and Vansda. Total 577 demonstrations on pigeon pea, chickpea and summer green gram pulse crops were carried out in an area of 82 ha by the active participation of farmers with the objective to demonstrate the scientific cultivation practices of major pulses. The scientific cultivation practices consisting use of improved varieties, seed treatment with Thiram, rhizobium and PSB culture and management of weeds, insects and diseases. Average yield of demonstrated plots of BSMR-853, chickpea varieties of GG-3and GJG-5, and summer green gram varieties of Meha and G. mungbean-6 were recorded 10.89, 12.81, 15.32, 8.34 and 9.12 q/ha, respectively, which was 27.21, 25.96, 50.64, 42.34 and 55.63 per cent higher over check plots. Similarly, net return of 54.32, 45.29, 93.31, 97.57 and 130.35 per cent increases and B: C ratio of 2.12, 2.45, 2.93, 2.29 and 2.51 were found under pigeon pea variety of BSMR-853, chickpea varieties of GG-3 and GJG-5, and summer green gram varieties of Meha and G. M.-6, respectively.

Keywords : *cluster front line demonstration, yield, yield gap, pulses.*

INTRODUCTION

India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world. Pulses contribute 11% of the total intake of proteins in India (Reddy, 2010). In India, frequency of pulses consumption is much higher than any other source of protein, which indicates the importance of pulses in their daily food habits. Pulses are a good source of protein, carbohydrates, water, fat, fiber and ash etc. Besides being a rich source of protein, it maintains soil fertility through biological nitrogen fixation in soil and thus plays a vital role in furthering sustainable agriculture (Kannaiyan, 1999). In addition, it also provides nutritious fodder and feed for livestock.

Pulses are drought resistant and prevent soil erosion due to their deep root and good ground covers, because of these good characters, pulses are called as “Marvel of Nature”. Pulses can also be referred to as “mini fertilizer factory”, as they fix atmospheric nitrogen through symbiosis. Pulses are the most important component of the balanced diet in vegetarian country like India. The steady increase in Indian population together with stagnant production of pulses over the past four decades compared to cereals has naturally resulted in decreased per cent availability of pulses.

Due to low and unstable production and increasing the population pressure, per capita availability of pulses decreasing from 25.2 g in 1961 to about 16.0 g in 2015, against the minimum requirement of 80 g per capita per day. (Anonymous, 2016). To make up minimum 50 g pulses per capita per day and further demand from burgeoning population at least 24 m tones of pulses are required in 2020-21 (Anonymous, 2016). Therefore, much attention has been given to boost pulse production in India. To satisfy the demand of pulses requirement of ever increasing population, the production of pulses has to be increased only by increasing the yield/unit area/day.

The domestic production of pulses was around 23.15 million tonnes over the last three years. Pulses production in India has not kept up with growth in demand calling for import to the tune of 2.0 to 4.0 million tonnes (Raj *et al*., 2013). The productivity of pulses in India (817 kg/ha) is lower than most of the major pulse producing countries. Pulses account for around 14.28 per cent of the area under food grains and contribute around 7.80 per cent of the total food grains production in the country (Annonymus, 2020). In Gujarat, pulse crop were cultivated in an area of 0.65 million

ha with production 0.66 million tones and yield of 1023 kg/ha during the year 2018-19 (Anonymous, 2019). Even though pulses production increased significantly during the last decade but continuing the rapid growth is a challenge for researchers, extension agencies and policy makers to fulfill the domestic demand.

Therefore, considering above facts, Government of India has decide to increase the productivity of major pulses crops by implementing the cluster front line demonstration of pulses crop through the Krishi Vigyan Kendra in a entire country under the National Food Security Mission project. With above mention problem, Krishi Vigyan Kendra, Navsari was planning to implement the cluster front line demonstrate of pulses on farmers field of Navsari districts with a objective of increase the productivity and profitability of pulses growing farmers.

OBJECTIVES

(1) To know the effect of improved variety along with package of practices demonstration on major pulses crop

(2) To know the technology gap and technology index of demonstration of major pulses crop

(3) To know the economics improved variety along with package of practices demonstration on major pulses crop

METHODOLOGY

Three talukas of Navsari district namely Chikhli, Khergam and Vansda were selected for implementing of cluster front line demonstration. Total 163, 159 and 255 CFLDs on pigeon pea, chick pea and greengram in area of 31, 20 and 31 hectare were organized on farmer's field (Table-1), respectivaly. Farmers were trained by organizing various training and field day programmes to follow the package and practices for pigeon pea, chick pea and summer green gram cultivation as recommended by the Navsari Agricultural University, Navsari and need based input materials provided to the farmers. The demonstration conducted in irrigated condition and having good drainage facility. The necessary step for selection of site and farmers, layout of demonstration were followed as suggested by Choudhary (1999). The farmers of the Chikhli, Khergam and Vansda talukas followed the package of practices like seed treatment with Thiram @ 3 g per kg seed and each liquid biofertilizers @ 10 ml per kg seed *viz., Rhizobium* and PSB culture, rate and method of fertilizer application, weed management by application of herbicide (Pendimethaline @ 1 kg a.i/ha) and insect pest management by application of insecticide (Indaxocarb 14.5 % SC and Triazophos 35 % EC).

Before conducting the CFLDs, a list of farmer of different village were prepared through survey and farmer's meeting and specific skill trainings were imparted in the form of practicing the farmer's at farmer's field or at KVK campus regarding the different aspect of scientific cultivation practices and plant protection measures. Certified seeds of major pulse along with fungicide and liquid bio-fertilizers *viz.*, rhizobiaum, and phosphate solublizing bacteria bacteria for the seed treatment were given to each farmer. The traditional practices followed by farmers were maintained in case of local checks. The yield data were collected from both CFLD plots as well as check plots and finally the benefit cost ratio were work out. The yield gap-I and yield gap-II was calculated by using bellowed mention formula.

$$\text{Yield gap-I (\%) (Technology Index)} = \frac{\text{Potential Yield} - \text{Demonstration Yield}}{\text{Potential Yield}} \times 100$$

$$\text{Yield gap-II} = \frac{\text{Demonstration Yield} - \text{Check Yield}}{\text{Demonstration Yield}} \times 100$$

Tab1e 1 : Area cover and number of participant benefited under CFLDs organized on scientific cultivation practices of major pulses under NFSM project during year 2018-19

Sr. No.	FLD organized			Area (ha)	Beneficiaries		
	Crop	Variety	Season		SC/ST	Others	Total
1	**Pigeon pea**	BSMR-853	Kharif 2018	31	37	126	**163**
2	**Chick pea**	GG-3	Rabi-2018	10	79	0	**79**
3	**Chick pea**	GJG-5	Rabi-2018	10	65	15	**80**
4	**Green gram**	Meha	Summer 2019	21	74	93	**167**
5	**Green gram**	GM-6	Summer 2019	10	73	15	**88**

RESULTS AND DISCUUSION

Yield

The perusal data (Table-2) clearly indicated that yield of different major pulses crop were found higher in CFLDs plots as compared to farmer practices (control plot). The maximum yield of 12.18, 13.94, 16.43, 8.94 and 10.23 q/ha were recorded in cluster front line demonstration of

Table 2 : Yield performances of CFLDs organized on scientific cultivation practices of major pulses under NFSM project during year 2018-19 (n=577)

Sr. No.	Name of crop and variety demonstrated	Yield obtained (q/ha)						Yield increase (%)
		Check			Demo			
		Max.	Min.	Av.	Max.	Min.	Av.	
Kharif pulses								
1	**Pigeon pea (Vaishali)**	9.78	5.48	8.56	12.18	6.75	10.89	**27.21**
Rabi pulses								
2	**Chick pea (GG-3)**	11.84	8.53	10.17	13.94	9.84	12.81	**25.96**
3	**Chick pea (GJG-5)**	11.84	8.53	10.17	16.43	12.62	15.32	**50.64**
Summer pulses								
4	**Green gram (Meha)**	7.62	4.94	5.86	8.94	7.11	8.34	**42.34**
5	**Green gram (GM-6)**	7.62	4.94	5.86	10.23	7.84	9.12	**55.63**

pigeon pea variety BSMR-853, chickpea variety GG-3 and GJG-5 and summer green gram variety Meha and GM-6, respectively. The average yield of CFLDs plots of pigeon pea variety BSMR-853, chickpea variety GG-3 and GJG-5 and summer green gram variety Meha and GM-6 were 10.89, 12.81, 15.32, 8.34 and 9.12 q/ha, whereas, control plots recorded 8.56, 10.17, 10.17, 5.86 and 5.86 q/ha, respectively. The increase in the yield under CFLDs of pigeon pea variety BSMR-853, chickpea variety GG-3 and GJG-5 and summer green gram variety Meha and GM-6 were obtained 27.21, 25.96, 50.64, 42.34 and 55.63 per cent higher over farmer's practices, respectively. The reason for higher yield in CFLDs plots of major pulses is due to use of recommended practices in demonstration plots and seed treatments with fungicide and bio-fertilizer at appropriate time and methods, in addition to these utilized the natural resources efficiently by these method. Similar type of results in increase the yield was reported in *Rabi* onion FLDs by Arora *et al*. (2014), in paddy FLDs by Dhenge *et al*. (2014), in cumin FLDs by Sondarva *et al.* (2014) and in brinjal FLDs by Tandel *et al.* (2014).

Yield gaps

Tab1e 3 : Yield gaps of CFLDs organized on scientific cultivation practices of major pulses under NFSM project during year 2018-19 (n=577)

Name of the crop	Demos (No.)	Variety		Potential yield of the demo variety (q/ha)	Technology gap (kg/ha)	Extension gap (kg/ha)	Technology index (%)
		Check	Demo				
Kharif Pulses							
Pigeon pea	163	Local (Deshi)	BSMR-853 (Vaishali)	15.0	411	233	27.4
Rabi pulses							
Gram (GG-3)	80	Local (Dahod Yellow)	GG-3	15.0	219	264	14.6
Gram (GG-5)	79	Local (Dahod Yellow)	GG-5	18.0	268	515	14.9
Summer pulses							
Green gram	167	G. green gram 1/2	Meha	10.0	166	248	16.6
Green gram	88	G. green gram 1/2	GM-6	12.0	288	326	24.0

The technological and extension yield gap were calculated under present study. The data (Table-3) revealed that technological yield gap was maximum in pigeon pea crop variety BSMR-853 (411 kg/ha) during kharif 2018 followed by green gram crop variety GM-6 (288 kg/ha) during summer 2018-19, while the lowest technological yield gap was observed in green gram crop variety Meha (166 kg/ha) during summer 2018-19. The technological yield gaps appear when any demonstration is laid out at farmer's field even if the demonstration is conducted under the supervision of scientist. This technological yield gaps may be attributed due to variation in soil fertility and local specific management problems to attaining the potential and demonstration yield of crops. These results were in close conformity with the Choudhary *et al.* (2009) and Yadav *et al.* (2020). The maximum extension yield gap of 515 kg/ha was observed in gram crop variety GG-5 during *rabi* 2018 followed by 326 kg/ha was observed in green gram variety GM-6 during summer -2019. The lowest extension yield gap of 233 kg/ha was observed in pigeon pea crop variety

BSMR-853 during kharif- 2018. The higher extension yield gap indicates that there is a strong need to motivate the farmers for adoption of improved technology over their local practices (farmer's practice). The extension gaps in cluster front line demonstrations on different crops have been reported by many extension workers (Kumar (2013), Rai *et al*. (2016) and Bhoraniya *et al.* (2017)) which observed that extension gap was maximum due to lack of awareness in adoption of improved and recommended package of practice in pulses crop production.

Technology Index

The data (Table-3) revealed that technology index varied from 14.6 to 27.4 in the pulses crops during year 2018-19. The lowest technology index 14.6 per cent was recorded in gram variety GG-3 during rabi 2018-19 followed by 14.9 per cent in gram variety GG-5 during rabi 2018-19. Further, highest technology index value (27.4%) was observed with pigeon pea variety BSMR- 853 during kharif, 2018 followed by green gram variety GM-6 during summer 2019. The technology index indicates the feasibility of evolved technology in the farmer's field. If the value of technology index is lower, there is higher the feasibility of improved technology. Thus, this indicates that gram crop is more popular among the farmers of Navsari district in comparison to other crops demonstrated at farmer's field. The similar results with regards to technology index of different crops were observed by Choudhary *et al.* (2009) and Yadav *et al.* (2020).

Economics

Table 4 : Economic parameters of CFLDs organized on scientific cultivation practices of major pulses under NFSM project during year 2018-19 (n=577)

Sr. No.	Name of crop and variety demonstrated	Expenditure and returns (₹/ha)								Increase in net returns (%)
		Check				Demo				
		Gross cost (₹/ ha)	Gross return (₹/ha)	Net return (₹/ha)	B:C ratio	Gross cost (₹/ ha)	Gross return (₹/ ha)	Net return (₹/ha)	B:C ratio	
Kharif pulses										
1	**Pigeon pea**	27050	47946	20896	1.77	28750	60997	32247	2.12	54.32
Rabi pulses										
2	**Gram (GG-3)**	26990	55528	28538	2.05	28480	69942	41462	2.45	45.29
3	**Gram (GJG-5)**	26990	55528	28538	2.05	28480	83647	55167	2.93	93.31
Summer pulses										
4	**Green gram (Meha)**	26450	44536	18086	1.68	27650	63384	35734	2.29	97.57
5	**Green gram (GM-6)**	26450	44536	18086	1.68	27650	69312	41662	2.51	130.35

The data show in Table-4 clearly indicated that cost of cultivation, gross and net return as well as benefit cost ratio were observed higher in the cluster front line demonstration plots. The cost of cultivation was observed higher in all pulses demonstration plot because of whole recommended package of practices were adopted including the integrate nutrient and weed management practices, which was generally farmers were not followed pulse crop. The maximum gross return and net return of 60997 and 32247, 69942 and 41462, 83647and 55167 63384 and 35734 and 69312 and 41662 Rs/ha were found under the CFLDs of pigeon pea variety BSMR-853, chickpea variety GG-3 and GJG-5 and summer green gram variety Meha and GM-6, respectively. The benefit cost ratio of 2.12, 2.45, 2.93, 2.29 and 2.51 were incurred under the CFLDs of pigeon pea variety BSMR-853, chickpea variety GG-3 and GJG-5 and summer green gram variety Meha and GM-6, respectively. There was 54.32, 45.29, 93.31, 97.57 and 130.35 per cent increasing in the net return under the CFLDs of pigeon pea variety BSMR-853, chickpea variety GG-3 and GJG-5 and summer green gram variety Meha and GM-6, respectively. The gross and net return as well as B: C ratio were found higher under demonstration plots might be due to increase in the yield under the demonstration plots because of adoption of recommendation scientific cultivation practices helps in increase the growth and yield attributing characters. Similar types of results were also found by Tandel *et al.* (2014), Bhoraniya *et al.* (2017) and Yadav *et al.* (2020).

CONCLUSION

Form this study it is concluded that the cluster front line demonstration on major pulse *viz*., pigeon pea, chickpea and summer green gram on farmer's field produced higher yield and incurred maximum net income as well as B: C ratio against the farmers' practices in the Navsari district of Gujarat. Further, it was also observed from the present study that there is a wide technology yield gap and

extension yield gap in pulses crops which reflect in potential and demonstration yield of different pulses crops in study at Navsari district of Gujarat. By adoption of scientific cultivation technologies in major pulses not only enhanced the profitability and productivity to a greater extent but also increase the livelihood security of farming community of the Navsari district.

POLICY IMPLICATION

Based on the findings of the study it can be recommended that there is vast scope to improve knowledge of pulses growing farmers about scientific cultivation practices of pulses. Government should focused on training programmes, demonstrations, field days, exhibitions, camps, radio/TV talks, message through ICT tools at grass root level. There is need to strengthen para extension worker at village level specially trained for scientific cultivation practices of pulses.

ACKNOWLEDGEMENT

Authors are hartley thankful to the Vice Chancellor, NAU, Navsari, Director, ICAR-ATARI, Zone-VIII, Pune and National Food Security Mission, ICAR, New Delhi for providing funds for conducting the CFLDs and farmers who always show faith in the Krishi Vigyan Kendra, Navsari.

CONFLICT OF INTEREST

There is no conflict between author.

REFERENCES

Annonymus (2019). Agricultural Statistics at a Glance, Ministry of Agriculture and Farmers welfare, Government of India.

Annonymus (2020). Agricultural Statistics at a Glance, Ministry of Agriculture and Farmers welfare, Government of India.

Anonymous (2016). Agricultural Statistics at a Glance, Ministry of Agriculture and Farmers welfare, Government of India.

Arora, R. K., Singh, U. and Kumar, R. (2014). Impact of front line demonstrations of *Rabi* onion in Ambala district of Haryana. *Agric. update*, 9(3): 333-336.

Bhoraniya, M. F., Chandawat, M. S. and Bochalya B. C. (2017). Assessment of front line demonstration on yield enhancement end economic of cumin in Surendranagar district of Saurashtra region of Gujarat. *Guj. J. Ext. Edu,* 28(1): 14-17.

Choudhary, B. N. (1999). *Krishi Vigyan Kendra - A guide or KVK managers*. Division of Agricultural Extension, ICAR, pp: 73-78.

Damor, C. B., Rathod, D. M. and Chauhan, C. D. (2021). Knowledge and adoption of recommended scientific practices of castor growers about castor cultivation. *Guj. J. Ext. Edu.* 32(1):16-19.

Desai, H. K., Thakkar, K. A. and Desai, J. D. (2022). Adoption of potato cultivation technology by the potato growers under contract farming. *Guj. J. Ext. Edu.* 33(1):30-33.

Dhenge, S. A., mankar, D. M. and Wakle, P. K. (2014). Knowledge level of farmers about integrated pest management practices of paddy. *The Ecoscan,* special issue 6: 27-33.

Kannaiyan, S. (1999). Bio-resource technology for sustainable agriculture. *Associated Publishing Company.* New Delhi, pp: 422.

Rai, A. K., Khajuria, S. and Kanak Lata. (2016). Popularizing of improved cultivar of maize through frontline demonstration. *Guj. J. Ext. Edu.***,** 27(2): 195-198.

Raj, A. D., Yadav, V. and Rathod, J. H. (2013). Impact of front line demonstrations (FLD) on the yield of pulses. *Int. J. Sci. Res. Publ.*, 3(9): 1-4.

Reddy, A. A. (2010). Regional disparities in food habits and nutritional intake in Andhra Pradesh, India. *Reg. Sect. Econ. Stud.*, 10(2): 125-134.

Sondarva, K. N., Parmar, R. M. and Jaiswal P. J. (2014). Impact of front line demonstration on the yield of cumin. *Guj. J. Ext. Edu.,* 25(2): 205-208.

Tandel, B. M., Shah, K. A., Prabhu, Nayaka and Tandel, Y. N. (2014). Yield and impact analysis of training and FLDs regarding scientific cultivation of brinjal. *Agric. update*, 9 (3): 288-291.

Received : May 2022 : Accepted : August 2022