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Response of Green Gram Demonstrated Technology under Cluster Front Line Demonstration in Samastipur, Bihar, India

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ABSTRACT

Cluster Front Line Demonstration on green gram was conducted during 2016-17 to 2017-18 in Samastipur district of Bihar to evaluate the performance of improved management techniques in green gram during each year. Performance of demonstrated technology revealed the highest number of nodules/plant at 20 DAS (12.78 & 11.92) & 40 DAS (26.83 & 25.14) and dry weight of nodules/plant at 20 DAS (29.14 & 78.57) & at 40 DAS (26.87 & 73.26) was observed in CFLD. Highest grain yield of (14.20 & 11.20 q/ha) were recorded in demonstrated plot over farmers' practice during both the years. Lowest technology index was observed in demonstrated technology, 29.0 per cent and 43.8 per cent, respectively. The extension gap varied from 3.62 to 4.855 q/ha. Maximum net returns (Rs. 44,630/ha during 2016-17 and Rs. 40,740/ha in 2017-18) was obtained with higher benefit-cost ratio 2.69 and 2.53, respectively compared to 1.99 in case of local check. The results clearly indicate that use of improved package of practice with scientific intervention under cluster frontline demonstration programme led to increase the productivity and profitability of green gram.

INTRODUCTION

Pulses are a good and cheap source of protein for a majority of our population. India lonely accounts for 33 per cent of world area and 22 per cent of the world production of pulses (Sandhu & Dhaliwal, 2016). Pulses consumption is much higher than any other source of protein, which indicates the great importance of pulses in their daily food habits. Greengram is one of the most important and hardiest crops among all the pulses. It contains 25-26 per cent protein, 3 per cent vitamins and 51 per cent carbohydrates (Mondal et al., 2012). The pulses cultivation has been drastically reduced in back year resulting in shortage of pulses in the market although the demand was high. Pulses has ability to fix the atmospheric nitrogen and addition of organic matter to soil, which are important factors to maintaining soil fertility (Kumar et al., 2017). In order to address this short coming, the Government of India has devised a programme to promote the pulse cultivation in cluster mode under National Food Security Mission through KVKs. Green gram is primarily a *summer* season pulse crop of Samastipur, Bihar. Nutrient management plays a pivotal role that greatly affects the growth and yield of green gram. To maintain reasonable health of the Indian soils, each and every field to be manured with at least 7 to 10 tons of organic fertilizer. With this assumption, there is a need for about 850 to 1200 million tons of organic fertilizer (Singh & Singh, 2014.). The main objective of CFLD was to explore new production technology and its management practices on farmer's field under different farming situations. These demonstrations were carried out under the supervision of agricultural scientists and feedback from the different farmers was generated on the demonstrated technology.

METHODOLOGY

The study was carried out during summer season from 2016-17 to 2017-18 by KVK Birauli, Samastipur. Area were selected for cluster formation (0.2 to 0.4 ha, each) in ten villages of the district. Farmers were trained to follow the package and practices for

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greengram cultivation and critical inputs like seeds, fungicides, insecticide, were supplied to the farmers. In case of local check, the traditional practices were followed. In demonstration plots, use of quality seeds of improved varieties SML-668 and Pusa Vishal with line sowing at 30 x 10 cm row spacing, and need based pesticide as well as balanced fertilizer were emphasized. The crop was harvested at its optimum maturity stage. Five plants were randomly selected from demonstrated plot and check plot from each cluster area at 20 and 40 DAS and uprooted carefully. After washing the roots, total number of nodules from the roots were detached and counted and then averaged. The nodules so detached were freshly weighed after that sun-dried for 2 days and then oven dried at 70°C. After complete drying, dry weight of nodules was taken at 20 and 40 DAS. Length of pods in sampled plants were recorded and averaged. Number of pods per plant in sampled plants were also counted expressed as average number of pods per plant. The yield data were collected both from the demonstration and farmers' practice by crop cutting method and analyzed with using simple statistical techniques. Gross return was calculated by multiplying yield into prevailing local market price of the grains obtained by the farmers. Further, net return and benefit cost ratio were calculated. The technology gap and technological index (Yadav et al., 2004) along with the benefit cost ratio (Samui et al., 2000) were calculated by using following formula as given below.

Technology gap = Potential yield - Demonstration yield
Extension gap = Demonstration yield – Farmers' yield
Technology index = Technology gap/Potential yield x 100

RESULTS AND DISCUSSION

Results revealed that the technological interventions of CFLDs had positive influence on grain yield over farmers' practice during two years of demonstrations (Table 1). Results indicated that due to use of high yielding varieties, balanced use of fertilizers and micronutrients and control of insect and disease during both the years, maximum number of farmers were motivated to take up greengram as a summer crop under strict supervision of scientists from KVK, Samastipur. The data revealed that number of nodules/ plant at 20 days after sowing (12.78 & 11.92) and at 40 days after sowing (26.83 & 25.14) were produced higher in demonstrated plots during both the years over farmers' practice. Similarly, dry weight of nodules/plant at 20 days after sowing (29.14 & 26.87) and at 40 days after sowing (78.57 & 73.26) were higher in demonstrated plots during both the years than check plots. Increase in nodules number might be due to increased rhizobial colonization in the rhizosphere because of increased availability of micronutrients in the root zone (Meena et al., 2012). During 2016-17, SML-668 in demonstrated plots recorded 7.12 grains/pod, 8.02 cm pod length, 18.28 number of pods/plant and 36.75 g test weight. Similarly, during 2017-18, Pusa Vishal in demo plots recorded 6.45 grains/ pod, 6.98 cm pod length, 16.67 number of pods/plant and 35.47 g test weight. Results obtained by Saravanakumar et al., (2021) showed that number of pods per plant was increased by 7.66 per cent over farmer's practice. The beneficial effects of foliar nutrition of micronutrients on green gram were also reported by previous researchers like Kumawat et al., (2005). The micronutrients might have enhancing role in seed setting that resulted in improvement in number of seeds per pod. Greater mobilization of photosynthates to the developing grains by application of micronutrients might be the reason for increase in grain weight. Application of the micronutrients along with the inoculations might have a synergistic effect, which enhanced the activity of nitrogenase, in turn supplied more nitrogen by fixation for better growth and yield attributes. Similar results were also corroborated by the findings of Singh et al., (2010) & Choudhary et al., (2011).

The grain yield of green gram during both the years under demonstration recorded as 14.20 and 11.24 q/ha as compared to grain obtained from farmers' field as 9.35 and 7.62 q/ha (Table 1). Demonstration plot resulted in 51.87 per cent and 47.50 per cent higher grain yield from local check during both the years. Similar findings were recorded by Nain et al., (2014); Sandhu & Dhaliwal (2016); Jain (2016) & Kumar et al., (2018). The major differences observed between demonstration practices and farmers' practices might be due to introduction of seed treatment, method and time of sowing, fertilizer doses and method of its application and plant protection measures. It is evident from the results that the yield of demonstration was found better than the local check (farmer's practice) under the similar environmental conditions. Jakhar & Kumar (2022) also reported significant increase in the average yield of demonstrated plot (23.1%) over the farmer's plot in green gram cultivation.

The technology gap observed as 5.80 and 8.76 q/ha in 2016-17 and 2017-18, respectively. The observed technology gap resulted may be due to various constraints such as soil fertility, availability of low moisture content, sowing time and climatic hazards etc. Hence, to reduce the yield gap location specific recommendations for varieties, soil testing and timely sowing appears to be necessary. The 4.85 q/ha extension gap found in 2016-17 whereas 3.62 q/ha was in 2017-18. There is a need to decrease this wider extension gap through latest technologies. The findings are similar to the findings of Raj et al., (2013); Jain (2016) & Kushwah et al., (2016). The technology index showed the suitability of varieties at farmers' field. The technology index was 29.0 per cent and 43.8 per cent, respectively in 2016-17 and 2017-18. This finding is in corroboration with the findings of Kumbhare et al., (2014); Bar & Das (2015); Sandhu et al., (2016) & Anuratha et al., (2019).

Table 1. Yield, technology gap, extension gap and technology index of green gram cultivation

Year	No. of farmers	Variety	No. of demo	Potential yield (q/ha)	Yield (q/ha) Demonstration Max			Check Max			Yield increase (%)	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
					Max	Min	Av.	Max	Min	Av.				
2016-17	35	SML-668	35	20	16.27	12.13	14.20	10.89	7.81	9.35	34.15	5.80	4.85	29.0
2017-18	26	Pusa Vishal	26	20	13.67	8.81	11.24	8.92	6.32	7.62	32.20	8.76	3.62	43.8

Table 2: Gross return, cost of cultivation, net return and B:C ratio of green gram cultivation

Year	Expenditure and return (Rs/ha)								Net return increase (%)
	Check				Demonstration				
	Gross cost (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio	Gross (Rs/ha)	Gross (Rs/ha)	Net (Rs/ha)	B:C ratio	
2016-17	23470	46750	23280	1.99	26370	71000	44630	2.69	91.71
2017-18	23970	45720	21750	1.90	26700	67440	40740	2.53	87.31

* Rs. 50 per kg rate in 2016-17 & Rs 60 per kg rate in 2017-18

The economics of green gram production under CFLD have been presented in Table 2. Economics analysis of the yield performance revealed that CFLD recorded higher gross return (Rs. 71,000/ha during 2016-17 and Rs. 67,440/ha in 2017-18) and net return (Rs. 44,630/ha during 2016-17 and Rs. 40,740/ha in 2017-18) with higher benefit-cost ratio 2.69 and 2.53 compared to 1.99 in case of local check. The net return increase was 91.71 per cent and 87.31 per cent during 2016-17 and 2017-18, respectively. Nain et al., (2015); Patil et al., (2015); Kumar et al., (2018) & Gireesh et al., (2019) also find the similar results in which demonstration plot gave higher net return over the check farmers' practice.

CONCLUSION

The cluster frontline line demonstrations conducted by KVK, Birauli, Samastipur had enhanced the yield of green gram and ensured rapid spread of recommended technologies of green gram production by implementation of various extension activities like training programmes, field days, exposure visits etc. organized in farmer's field. The farmers included under CFLD programme also played an important role for wider dissemination of the improved technologies for the nearby farmers. Therefore, it is suggested that policy maker may provide adequate financial support to frontline extension system for organizing CFLD under the close supervision of agricultural scientists and extension functionaries.

REFERENCES

Anuratha, A., Ravi, R., & Selvi, J. (2019). Cluster frontline demonstration in green gram variety CO-8 at Nagapattinam district of Tamil Nadu. *Journal of Pharmacognosy and Phytochemistry, 2*, 726-729.

Bar, N., & Das, S. (2015). Enhancement of production and productivity of Arhar crop through front line demonstration. *International Journal of Innovative Research & Development. 4*(5), Online. http://www.internationaljournalcorner.com/index.php/ijird_ojs/article/view/135552/94676

Chaudhary, H. R., Sharma, O. P., Yadav, L. R., & Choudhary, G. L. (2011). Effect of organic sources and chemicals fertilizers on productivity of mungbean. *Journal of Food Leg*umes, *24*, 324-326.

Gireesh, S., Kumbhare, N. V., Nain, M. S., Kumar, P. & Gurung, B. (2019). Yield gap and constraints in production of major pulses in Madhya Pradesh and Maharashtra. *Indian Journal of Agricultural Research, 53*(1), 104-107.

Jain, L. K. (2016). Impact assessment of front line demonstrations on green gram in Barmer district of Western Rajasthan. *Journal of Food Legumes, 29*(3&4), 249-252.

Jakhar, D. S., & Kumar, S. (2022). Impact of cluster front line demonstrations on green Gram (MH-421) in Sirsa District of Haryana State. *Indian Journal of Extension Education, 58*(1), 166-168.

Kumar, S., Singh, R. N., & Choudhary, V. P. (2017). Effect of integrated nutrient management on growth, yield and fertility level in lentil. *The Bioscan, 12*(1), 341-344.

Kumar, S., Tiwari, R. K., Asthana, R. K., & Kumar, S. (2018). Evaluation of different cultivars of green gram under cluster frontline demonstration programme in Samastipur district Bihar. *Journal* of *Community Mobilization and Sustainable Development, 13*(2), 271-274.

Kumawat R. N., Rathore, P. S., & Talwar, H. S. (2005). Effect of sulphur and iron on crop growth attributes in summer green gram. *Indian Journal of Plant Physiology, 10*(1), 86-89.

Kumbhare, N. V., Dubey, S. K., Nain, M. S., & Bahal, R. (2014). Micro analysis of yield gap and profitability in pulses and cereals. *Legume Research- An International Journal, 37*(5), 532-536.

Kushwah, S., Kumar, S., & Singh, S. R. K. (2016). Adoption of improved late sown mustard cultivation practices– A case study in Bihar. *Journal* of *Community Mobilization and Sustainable Development, 11*(1), 19-23.

Meena, K. K., Meena, R. S., & Kumawat, S. M. (2012). Effect of sulphur and iron fertilization on yield attributes, yield and nutrient uptake of mungbean (*Vigna radiata*). *Indian Journal of Agricultural Sciences, 83*(4), 472-476.

Mondal, M. M. A., Puteh, A. B., Malek, M. A., Ismail, M. R., Rafii, M. Y., & Latif, M. A. (2012). Seed yield of mungbean [*Vigna radiata* (L.) Wilczek] in relation to growth and developmental aspects. *Scientific World Journal*, pp 425168. https://doi.org/10.1100/2012/425168 .

Nain, M. S., Bahal, R., Dubey, S. K., & Kumbhare, N. V. (2014). Adoption gap as the determinant of instability in Indian legume production: Perspective and implications. *Journal of Food Legumes, 27*(2): 146-150

Nain, M. S., Kumbhare, N. V., Sharma, J. P., Chahal, V. P., & Bahal, R. (2015). Status, adoption gap and way forward of pulse production in India. *Indian Journal of Agricultural Science, 85*(8), 1017-1025.

Patil, L. M., Modi, D. J., Vasava, H. M., & Gomkale, S. R. (2015). Evaluation of front line demonstration programme on green gram variety Meha (IPM-99-125) in Bharuch district of Gujarat. *Journal of Agriculture and Veterinary Science, 8*(9), 1-3.

Raj, A. D., Yadav, V., & Rathod, J. H. (2013). Impact of front line demonstrations on the yield of pulses. *International Journal of Scientific and Research, 3*(9), 1-3.

Samui, S. K., Maitra, S., Roy, D. K., Mondal, A. K. & Saha, D. (2000). Evaluation of front line demonstration programme on groundnut (*Arachis hypogea* L.). *Indian Society* of *Coastal Agricultural Research*, 18 (2),180-183.

Sandhu, B. S., & Dhaliwal, N. S. (2016). Evaluation of front line demonstration programme on summer moong in south Western Punjab. *Journal of Food Legumes. 29*(3&4): 245-248.

Saravanakumar, S., Alagesan, P., Premalatha, A., Srinivasan, R. D., & Thirumoorthi, M. (2021). Productivity enhancement in blackgram (*Vigna mungo* L.) through improved crop management practices on farmers' field. *Indian Journal of Extension Education, 57*(4): 32-35.

Singh, A., & Singh, H. (2014). Integrated nutrient management for sustaining crop productivity. *Indian Farming, 63*, 41-47.

Singh, G., Aggarwal, N., & Khanna, V. (2010). Integrated nutrient management in lentil with organic manures, chemicals fertilizers and bio-fertilizers. *Journal of Food Legumes*, *23,* 149-151.

Yadav, D. B., Kamboj, B. K., & Garg, R. B. (2004). Increasing the productivity and profitability of sunflower through frontline demonstrations in irrigated agro-ecosystem of eastern Haryana. *Haryana Journal of Agronomy*, *20*(1&2), 33-35.