RESEARCH ARTICLE Indian Journal of Agricultural Research, Volume 58 Issue 5: 806-810 (October 2024)

Enhancing Productivity and Profitability of Black Gram (*Vigna mungo*) Through Cluster Front Line Demonstrations

R. Jayaramasoundari[1]

10.18805/IJARe.A-6205

ABSTRACT

Background: Blackgram (*Vigna mungo* L.) is an important pulse widely consumed in India. The productivity of this crop is declining in Vellore district of Tamil Nadu due to non -adoption of improved varieties and recommended improved practices.

Methods: The present cluster front line demonstration was conducted by Krishi Vigyan Kendra, Vellore in *rabi* season during 2021-22 using black gram variety VBN 11 in the farmers' fields by the active participation of farmers.

Result: The results of the demonstrations revealed that 23.14 per cent yield increase was observed in the demonstrations plots as compared to existing farmers' practices of black gram due to adoption of improved variety and recommended improved practices.

Key words: Black gram, Cluster front line demonstration, Pulses, Yield.

INTRODUCTION

Pulses are rich in proteins and second important constituent of Indian diet after cereals. Pulses are a chief source of protein for a massive section of Indian particularly for the poor and most of the conventionally vegetarian population (Reddy, 2004). They can be grown on all types of soil and climatic conditions. Pulses being legumes fix atmospheric nitrogen into the soil. Pulses maintain soil fertility through biological nitrogen fixation and thus play a vital role in furthering sustainable agriculture (Kannaiyan, 1999). They play important role in crop rotation, mixed and intercropping, as they help maintaining the soil fertility. They add organic matter into the soil in the form of leaf mould. They are helpful for checking the soil erosion as they have more leafy growth and close spacing. They supply additional fodder for cattle. Some pulses namely moong, urad and cowpea are also used as green manure which improve soil health and adds nutrient into the soil. They provide raw material to various industries. Ex. Dal industry, Roasted grain industry, Papad industry *etc*.

Black gram is scientifically known as *Phaseolus mungo* and commonly called as Urad in India. Black gram is one of the important pulse crops grown throughout India. Generally, it is consumed in the form of 'Dal'. It is the chief constituent of 'papad, idly and dosa'. For milch cattle, it is used as nutritive fodder. It is also used as green manuring crop. It controls soil erosion and compete with weeds effectively due to its deep root system and foliage cover. It contains protein (25%), carbohydrates (60%), fat (1.3%) and rich in phosphoric acid. It accounts 13% total pulses area and 10% total pulses production in India. It fixes atmospheric nitrogen into soil and improve the soil fertility. The productivity is declining in Vellore district of Tamil Nadu. Black gram is grown over 19 districts of Tamil Nadu state covering 2,88,721 hectares of land and yielding 1,12,700 tonnes with a productivity of 388 kg ha^{-1} during the 11th five-year plan. Most districts experienced positive growth in both size and production except for six districts including Vellore, where growth rate was negative (Uma Gowri and Prabhu, 2016). The area of black gram in Vellore district was 2241 ha during *kharif*, 2316 ha during *rabi* season of 2019-20 where as it was 379 ha during *kharif* and 893 ha during *rabi* season of 2020-21 respectively. (Anonymous, 2021). The productivity of pulses reduced from 735 kg ha^{-1} during 2019-20 to 589 kg ha^{-1} in 2020-21 (Anonymous, 2022). The major reasons attributed due to non-adoption of improved varieties and recommended improved practices (Sumathi, 2012). Hence, there is a great challenge for policy makers, agricultural scientists, extension functionaries and farming community to enhance the pulse production diversify their cropping systems to meet out the national and local requirements. Indian Council of Agricultural Research and Ministry of Agriculture, Govt. of India had initiated a nationwide programme of cluster frontline demonstration (CFLD) programme on pulses under National Food Security Mission-Pulses (NFSM - Pulses). The main objective of front line demonstrations is to demonstrate newly released varieties, crop production technologies in the farmers' fields. With this back ground, the present study was conducted to evaluate the performance of cluster front line demonstration in blackgram crop.

[1]Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu, India.

Corresponding Author: R. Jayaramasoundari, Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu, India. Email: jayaramasoundari.r@tnau.ac.in

How to cite this article: Jayaramasoundari, R. (2024). Enhancing Productivity and Profitability of Black Gram (*Vigna mungo*) Through Cluster Front Line Demonstrations. Indian Journal of Agricultural Research. 58(5): 806-810. doi: 10.18805/IJARe.A-6205.

Submitted: 03-01-2024 **Accepted:** 02-07-2024 **Online:** 01-08-2024

MATERIALS AND METHODS

The present investigation of CFLD was conducted at farmers' fields in Vellore district during *rabi* season 2021-22. The district Vellore, Tamil Nadu is falls under North eastern Agro climatic zone and it is lies between 12.91 N latitude and 79.13 E longitude.

The demonstrations were conducted in 10 ha area with twenty five farmers' fields. The demonstrations were carried out on improved variety of black gram VBN 11. Each frontline demonstration was laid out on 0.4 ha. The soil of the demonstration plot is red loamy soil and pH value was ranges from 6.71 to 7.29. Line sowing was carried out with recommended seed rate of 20 kg per hectare with recommended spacing of 30 × 10 cm. Field visits were made regularly to record the observations and to address the field problems. The yield data were collected from all the demonstration units.

Per cent increase over farmers practice =

$$\frac{\text{Improved practices - Farmers' practices}}{\text{Farmers' practices}} \times 100$$

Extension gap =

Demonstration yield - Farmers' practice yield

Technology gap = Potential yield - Demonstration yield

Additional return =

Demonstration return - Farmers practice return

$$\text{Technology index} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

$$\text{Benefit cost ratio} = \frac{\text{Gross returns}}{\text{Cost of cultivation}}$$

Cost of cultivation, net income and benefit cost ratio of the demonstrations were worked out based on the prevalent prices.

RESULTS AND DISCUSSION

The improved package and practices is more important with technological intervention for productivity and profitability of pulses. Detailed package and practices with technological intervention for recommended practice is enclosed (Table 1). Improved variety recorded 1.13 q ha^{-1} increase in yield compared to existing farmers' traditional variety.

The result indicates that the frontline demonstration has given a good impact over the farming community as they were motivated for adoption of new agricultural technology applied in the FLD plots.

The results of the demonstrations revealed that 23.14 per cent yield increase was observed in the demonstrations plots as compared to existing farmers' practices of black gram due to adoption of improved variety and recommended improved practices. The above findings are similar to the findings of Patel *et al.* (2013).

With technology intervention, the enhanced package and practices are increasingly crucial for the profitability and productivity of pulses. Comprehensive package with recommended techniques for technical intervention is enclosed (Table 1). The yield of the improved variety was 1.13 q ha^{-1} higher than that of the traditional variety used by the farmers.

The outcome shows that the farming community was positively impacted by the frontline demonstration, as they were inspired to embrace innovative agricultural technologies used in the FLD plots.

The demonstrations outcomes showed that the adoption of an improved variety and suggested improved techniques resulted in a 23.14 per cent yield increase in the demonstration plots when compared to the farming practices of black gram of the farmers at the time. The results mentioned above align with those of Kantwa *et al.* (2022).

Gaps between farmer's practice and demonstration package

The differences were observed between demonstrated practices and farmer's practices are recommended varieties, seed treatment, sowing method, weed management, fertilizer dose, method of fertilizer application and plant protection measures. The difference between demonstrated practice and farmers practices is given in Table 1. Use of improved variety, seed treatment, line sowing, use of recommended dose of fertilizers were used as technological interventions.

The traditional variety used by the farmers was found susceptible to yellow vein mosaic disease. Under farmer's practice, they generally sow seed of blackgram at higher seed rate without treating the seeds.

The farmers under CFLD programme were provided with the seed of VBN11 black gram variety. The variety VBN 11 resistant to Mungbean Yellow Mosaic Virus (MYMV) disease and moderate resistance to powdery mildew disease.

Performance of yield

The average yield of demonstration plots was higher as compared to farmers practice due to high yielding variety and following of recommended package of practices. Improved variety recorded 1.13 q ha^{-1} increase in yield.

The data showed that the seed yield of black gram variety VBN 11 was higher than the traditional variety (Table 2). It was observed that the seed yield was higher as compared to farmers' practice. The increase in the yield over traditional variety was 23.14 per cent. The yield enhancement under the demonstration was due to the use of improved and disease resistant variety, balanced use of nutrients, efficient weed management and pest management practices. These findings are in line with those of Singh *et al.* (2018), Neelam kumara *et al*. (2019) and Sanjay Kumar *et al*. (2022). Yield of front line demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized in to technology and extension gaps. To estimate the technology index,

extension gap, technology gap, the formulae were considered as suggested by Kadian *et al*. (1997).

Extension gap

Extension gap means the difference between the demonstration yield and farmer's yield. The extension gap between demonstration practices and farmers practices recorded was 1.3 q ha^{-1}. The extension gap should be assigned to adoption of improved transfer of technology in demonstration practices resulted in higher seed yield than traditional farm practices. This emphasized the need to educate the farmers through various means for more adoption of improved high yielding varieties and newly improved production technologies to bridge the wider extension gap. More use of new high yielding recommended varieties by the farmers will subsequently change this alarming trend of galloping extension gap.

Technology gap

The technology gap means the difference between the potential yield and yield of demonstration plot. The technology gap was 4.4 q ha^{-1}. The observed technology gap due to dissimilarity in the soil fertility status and weather conditions. These findings corroborate with the findings of and Dayanand *et al*. (2014) and Bhargav *et al.* (2017).

Technology index

The technology index shows the feasibility of the evolved technology at the farmer's fields and the lower the value of technology index more is the feasibility of the technology (Jeengar *et al*., 2006; Ojha and Bisht, 2020; Singha *et al*., 2020 and Singh *et al*., 2020). The technology index was found 49.49. The technology index showed the viability of agricultural technology in micro-farming circumstances (Kumari *et al*., 2007). The technology index range records from 0.As the technology index decreases, the feasibility of generated farm technology under farmers' fields increases and *vice versa*. The technology index of 5.0%, 0.0%, 2.5% and 4.5%, respectively were observed in *kharif* 2016, 2017, 2018 and 2019 in rice by Shankar *et al*. (2022). The technology index from 55 to 77 per cent indicated that the demonstrated technologies were feasible in improve the yield of the vegetables (Sanjeev Ahuja *et al*., 2020). Kumar *et al.* (2019) discovered the technology index may reach 70.85 per cent. The existence of strong gap in technology generated by the research institutes and technology dissemination to the farmers can only be overcome by CFLD programme which can accelerate the level of adoption of improved technologies and help in attaining the self sufficiency in pulse production and getting more income of farmers. Sanjay, *et al*. (2020).

Economics

The economics of black gram production under front line demonstrations is presented in Table 3. The input and output prices of commodities prevailed during the study were taken for calculating cost of cultivation, gross return, net return and benefit cost ratio. The gross return from the black gram cultivation was Rs. 27384 ha^{-1}. Under the farmer's practice, the gross return obtained was Rs. 20484 ha^{-1}. The net return from the black gram cultivation in the demonstration was Rs.17,234 ha^{-1}. However, under the

Table 1: Comparison of recommended demonstrated practices.

Intervention	Farmer's practices	Demonstration practices
Variety	Local variety of 43 years old	VBN 11
Seed rate	22 - 25 kg ha^{-1}	20 kg ha^{-1}
Sowing method	Broad casting	Line sowing
Seed treatment	Seed treatment not done	Seed treatment with bio control agent *Bacillus subtilis*
Fertilizer dose	Use of imbalance fertilizers. doses of 20 Kg urea as basal and 50 Kg DAP as top dressing	Balanced dose of fertilizers 25:50:25 NPK kg ha^{-1}
Crop booster application	No crop booster applied	Application of Pulse wonder 2 kg $acre^{-1}$ at peak flowering stage
Weed management	Hand weeding	Hand weeding

Table 2: Seed yield of black gram.

Variables	Yield (q ha^{-1})	% increase over farmer's practices	Extension gap (q ha^{-1})	Technology gap (q ha^{-1})	Technology index
Farmers practice	3.41				
Demonstration	4.54	23.14	1.13	4.45	49.49

Table 3: Economics of black gram cultivation.

Variables	Gross cost (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B:C ratio
Farmers practice	9356	20484	11128	2.12
Demonstration	10150	27384	17234	2.69

farmer's practice, the net return obtained was Rs. 11,128 ha^{-1}. The benefit cost ratio of demonstration plot was 2.69 found to be more than the farmers practice of 2.12. It may be due to the higher yield obtained under demonstration practices compared to farmer's practices. The results were in agreement with the findings of Patel and Patel, 2020; Kumar *et al.* (2021); Balai *et al*. (2012) and Kabita Mishra *et al*. (2018).

CONCLUSION

Study was undertaken at farmers' fields in Vellore district of Tamil Nadu. The results revealed that the seed yield was higher as compared to farmers' practice. There was 23.14 per cent increase in yield observed in demonstration plot over farmers' practice. It was due to the use of improved and disease resistant variety, balanced use of nutrients, efficient weed management and pest management practices. These demonstrations built the relationship and confidence between farmers and KVK scientists. It is concluded that the CFLD programme is an effective tool for increasing the production and productivity of black gram and improving the knowledge, attitude and skill of the farmers.

Conflict of interest

The author declares no conflict of interest.

REFERENCES

Anonymous, (2021). District Wise Area, Production and Yield Report of Directorate of Economics and Statistics, 2019-20 to 2020-21.

Anonymous, (2022). District Wise Area, Production and Productivity of Important Food and Non Food Crops in Tamil Nadu. Statistical Hand Book of Tamil Nadu for 2020-21. pp -129.

Balai, C.M., Meena, R.P., Meena, B.L. and Bairwa, R.K. (2012). Impact of frontline demonstration on rapeseed and mustard yield improvement. Indian Research Journal of Extension Education. 12: 113-116.

Bhargav, K.S., Gupta, Nishith, Pandey, Ankita, Patel, Neerja and Dixit, A.K. (2017). Impact of front line demonstration on production and productivity of summer moong. Agriculture Update. 12 (TECHSEAR - 6): 1656-1659.

Dayanand, Verma, R.K. and Mehta, S.M. (2014). Assessment of technology gap and productivity gain through front line demonstration in chickpea. Legume Research. 37(4): 430-433. doi: 10.5958/0976-0571.2014.00655.9.

Jeengar, KL., Panwar, P. and Pareek, OP. (2006). Front line demonstration on maize in bhilwara District of Rajsthan. Current Agriculture. 30(1/2): 115-116.

Kabita, M.S., Panigrahi and Sarangi, D. (2018). Evaluation of cluster front line demonstration in greengram crop. International Journal of Current Microbiology and Applied Sciences. 7(10): 3344-3350.

Kadian, K.S., Sharma, R. and Sharma, A.K. (1997). Evaluation of front line demonstration trials on oilseeds in Kangra Valley of Himachal Pradesh. Annals of Agricultural Research. 18(1): 40-43.

Kannaiyan, S. (1999). Bioresource Technology for Sustainable Agriculture. Associated Publishing Company. New Delhi, pp: 422.

Kantwa, C.R., Tripathy, S., Bhadauria, R.S., Sharma, B., Jakhar, S.R., Kumar, S. and Singh, S.R.K. (2022). Front line demonstration on performance of chickpea in malwa region of Madhya Pradesh. Legume Research. 1(4): 74-77. doi: 10.18805/LR- 4890.

Kumar, S., Mahajan, V., Sharma, P.K. and Parkash, S. (2019). Impact of front line demonstrations on the production and productivity of moong (*Vigna radiata* L.) mash (*Vigna mungo* L.), rajmash (*Phaseolus vulgaris* L.), Lentil (*Lens culinaris* L.) and chickpea (*Cicer arietinum* L.) under rainfed ecology in mid hills of J and K, India. Legume Research. 42(1): 127-133. doi: 10.18805/LR-3816.

Kumar, U., Patel, G.A., Chudhari, R.P., Darji, S.S. and Raghav, R.S. (2021). Cluster frontline demonstration: An effective technology dissemination approach for enhancing productivity and profitability of black gram (*Vigna mungo*). Legume Research. 46(10): 1356-1360. doi: 10.18805/LR-4450.

Kumari, V., Kumar, A., Kumar, A. and Bhateria, S. (2007). Demonstration an effective tool for increasing productivity of rapeseed mustard in Kangra district of Himachal Pradesh. Himachal Journal of Agricultural Research. 33(2): 257-261.

Neelam, K., Thakur, A.K. and Kaith, N.S. (2019). Analysis of yield gaps in black gram (*Vigna mungo*) in Shimla District of Himachal Pradesh. International Journal of Economic Plants. 6(4): 196-199.

Ojha, R.K. and Bisht, H. (2020). Yield potential of Chickpea through cluster frontline demonstrations in Deoghar district of Jharkhand. International Journal of Science, Environment and Technology. 9(6): 947-954.

Patel, B.K. and Patel, R.A. (2020). Impact of cluster frontline demonstration programme on the yield of chickpea (*Cicer arietinum* L.) in Mehsana district of Gujarat, India. International Journal of Environment, Agriculture and Biotechnology. 5(4): 901-906.

Patel, M.M., Jhajharia, A.K., Khadda, B.S. and Patil, L.M. (2013). Front-line demonstration: An effective communication approach for dissemination of sustainable cotton production technology. Indian Journal of Extension Education and Rural Development. 21: 60-62.

Reddy, A.A. (2004). Consumption pattern, trade and production potential of pulses. Economic and Political Weekly. 39(44): 4854-4860.

Sanjay, K., Dev, J., Singh, R. and Kumar, S. (2020). Role of cluster frontline demonstrations in enhancing black gram productivity under rainfed conditions in district Bilaspur of Himachal Pradesh. Journal of Krishi Vigyan. 9(1): 293-297.

Sanjay, K., Kaushik, P., Verma, R.C.J.S. (2022). Increasing productivity and profitability of summer moong through frontline demonstration (FLD) in Kaithal district of Haryana. The Pharma Innovation Journal. 11(7): 14-17.

Sanjeev, A., Singh, O. and Makkar, G.S. (2020). Frontline demonstrations of capsicum, turmeric, garlic and chilli in district Rupnagar in sub-mountainous zone of Punjab. International Journal of Current Microbiology and Applied Sciences. 9(7): 3690-3696.

Shankar, M., Aariff Khan, M.A., Bharat, T., Pallavi, S., Naaiik, R.V.T.B., Sumalini, K., Singha, A.K., Divya, P., Nongrum, C. and Amrita, S. (2020). Yield gap and economic analysis of cluster frontline demonstrations (CFLDs) on pulses in Eastern Himalayan Region of India. Journal of Pharmacognosy and Phytochemistry. 9(3): 606-610.

Singh, H.R., Tiwari, P.S., Singh, H., Kumar, V. and Kumar, A. (2018). Increase pulse production through front line demonstrations. Bhartiya Krishi Anusandhan Patrika. 33: 43-47. doi: 10.18805/BKAP83.

Singh, P.K., Tiwari, A., Verma, D.K., Singh, R.K., Singh, R. and Verma, G.S. (2020). Impact of front line demonstration on yield and profitability of chickpea (*Cicer arietinum* L.) in Eastern Uttar Pradesh. International Journal of Current Microbiology and Applied Sciences. 10: 173-179.

Sumathi, P. (2012). Role of front line demonstrations on transfer of pulses production technologies in Vellore district of Tamil Nadu. Agriculture Update. 7(1 and 2): 47-50.

Uma, G.M. and Prabhu, R. (2016). Growth Scenario of major agricultural crops in Tamil Nadu. Indian Journal of Natural Sciences. 7(37): 11401-11413.