Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; SP2: 722-725

Anuratha A
Assistant Professor (SS&AC), ICAR Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Needamangalam, Thiruvarur, Tamil Nadu, India

R Ravi
Assistant Professor (Forestry), Forestry College and Research Institute, TNAU, Mettupalayam, Tamil Nadu, India

Selvi J
Assistant Professor, (FSN), Community College and Research Institute, TNAU, Madurai, Tamil Nadu, India

Correspondence
Anuratha A
Assistant Professor (SS&AC), ICAR Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Needamangalam, Thiruvarur, Tamil Nadu, India

Impact of cluster frontline demonstration on black gram in Nagapattinam district of Tamil Nadu

Anuratha A, R Ravi and Selvi J

Abstract
The present study was carried out at Krishi Vigyan Kendra, Nagapattinam district of Tamil Nadu to know the yield gap between improved package and farmers' practice under Front Line Demonstration. Black gram (*Vigna mungo* L.) is one of the most important pulse crop cultivated in Nagapattinam district of Tamil Nadu. It is having lower yield in farmer's field due to multiple constraints. One of the major constraints of its lower productivity was non-adoption of improved technologies. Front line demonstrations on Improved Crop Management practices were conducted at 59 framer's fields of Nagapattinam district during Kharif season from 2014-15 to 2016-17. The improved technologies recorded a mean yield of 7.09 q ha^{-1} which was 30.2 per cent higher than the yield obtained with farmers practice (5.79 q ha^{-1}), besides having higher mean net income of Rs.17107 ha^{-1} with a B: C ratio of 1.94 when compared to farmers practice (Rs. 10633 ha^{-1} and 1.65). The average technological gap, extension gap and technological index noticed were 1.81 q ha^{-1}, 1.63 q ha^{-1} and 20.32 per cent respectively. The higher average grain yield was recorded in demonstration plots over the years compared to local check due to increased knowledge and adoption of full package of practices.

Keywords: Black gram, Front line demonstrations (FLD), productivity, farmer's field, net returns.

Introduction
Pulses have great importance in Indian agriculture as they have rich source of protein (17 to 25 per cent) as compared to that of cereals (6 to 10 per cent), their ability to fix atmospheric nitrogen and improve the soil fertility. Among pulses, black gram is one of the most important crop. Protein malnutrition is prevalent among men, women and children in India. Pulses contribute 11 per cent of the total intake of proteins in India (Reddy, 2010) [7]. 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. Keeping the cheapest source of protein, it is important to increase pulses production to provide a balanced diet among the socially and economically backward classes. Pulses are water saving crops and more than 92 per cent of the area under pulses is rainfed. About 23 million tons of pulses are need to be imported every year to meet the domestic demand. The yield of pulses is less than the global average. Adoption levels for several components of the improved technology of the crop were low emphasizing the need for better dissemination. Several biotic, abiotic and socio-economic constraints inhibit exploitation of the yield potential of black gram and these are needed to be addressed. Crop growth and yield are limited through poor plant nutrition and uncertain water availability during the growth cycle. Inappropriate management may further reduce the fertility of soil (Rabbinge, 1995) [5].

The major constrains or lower yield of black gram is mainly attributed to their cultivation on poor soils with inadequate and imbalanced nutrition, use of local varieties, use of disease susceptible varieties, lack of seed treatment, lack of Integrated Weed Management (IWM) and lack of Integrated Pest Management (IPM) (Shetty *et al.*, 2013) [9]. Front line demonstration (FLD) is one of the most powerful tools of extension because farmers, in general, are driven by the perception that "Seeing is believing". The main objective of front line demonstrations is to demonstrate newly released crop production and protection technologies and its management practices in the farmer's field. During demonstration in the farmer's field, scientists are required to study the factors contributing higher crop production, field production constraints and there by convince the farmer to adopt the technology for higher yield. Here in front line demonstration farmer's participatory approach is very useful method of owning and continuous interacting with scientists and getting the useful tips for getting higher yield in farmers own field which otherwise get lower yields (Bhargau *et al.*, 2017) [1] and (Thakur *et al.*, 2016) [11]. Keeping this in view Frontline demonstrations on black gram were conducted to demonstrate the production potentials and economic benefits of latest improved technologies of black gram on farmer's fields.

Methodology

Front line demonstrations were conducted on 59 farmers' fields of Nagapattinam district during *Kharif* seasons of 2014-15 to 2016-17 on medium to deep black soils with low to medium fertility status under pulse based cropping system.

Based on the problems faced by the farmers, the front line demonstration were designed and conducted at farmer's field. Each demonstration was conducted on an area of 0.4 ha and the same area adjacent to the demonstration plot was kept as farmer's practices. High yielding YMV resistant variety black gram VBN 6 was taken in the experimentation.

The Integrated Crop Management (ICM) technology comprised the improved variety, proper season, recommended seed rate, seed treatment with bioagents, proper nutrient and pest management based on economic threshold level (Table 1).

Table 1: Improved production technology and Farmers practices of black gram under FLD

S. No	Technology	Improved practices	Farmers practice	GAP (%)
1.	Variety	VBN 6	Local	Full gap
2.	Land preparation	Ploughing and Levelling	Ploughing and Levelling	Nil
3.	Pre emergent herbicide	Pendimethalin @2.5 l/ha	No herbicide	Full gap
4.	Seed rate	8 -10 kg/ha	12 kg/ha	Partial gap
5.	Seed treatment	Biofertilizers & Pseudomonas	No seed treatment	Full gap
6.	Fertilizer dose	INM	Indiscriminate application	Partial gap
7.	Foliar application of nutrient	TNAU pulse wonder @ 5 kg/ac	DAP 2 % Spray	Partial gap
8.	Plant protection	IPM	Indiscriminate application	Full gap

The yield data were collected from both the demonstration and farmers practice by random crop cutting method. Qualitative data was converted into quantative form and expressed in terms of per cent increase in yield. (Narasimarao *et al.*, 2007) [3].

The data was further analysed by using simple statistical tools. The extension gap, technological gap, technological index along with the benefit cost ratio were worked out (Samui *et al.*, 2000) [8] 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

Constraints in black gram production

Before the conduct of the FLDs, preferential ranking techniques were utilized to identify the constraints faced by the respondent farmers in black gram cultivation. The ranks given by the different farmers are presented in Table 2. The finding indicate the lack of suitable high yielding varieties (85.63 per cent), yellow mosaic virus (80.27 per cent) and delayed sowing (73.34 per cent) were there major constraints. Similar findings were reported by Sreelakhshmi *et al.* (2012) [10]. Based on the constraints, the FLD were conducted with high yielding black gram variety (VBN 6) and other major critical inputs for cultivation.

Table 2: Ranks given by farmers for different constraints.

Sl. No	Constraints	RBQ	Overall rank
1.	Lack of high yielding varieties	85.63	I
2.	Sucking pest incidence (Yellow mosaic virus)	80.27	II
3.	Delayed sowing	73.34	III
4.	Non adoption of seed treatment	71.20	IV
5.	Inadequate nutrient management	66.00	V
6.	Weed infestation	63.20	VI
7.	Pod borer infestation	54.22	VII
.8.	Labour shortage	51.76	VIII
9.	Terminal drought during flowering	36.00	IX

Performance and yield

Frontline demonstrations are effective educational tools in introducing various new technologies to the farmers to boost the farmer's confidence level by comparison of productivity levels between improved production technologies in demonstration trials. The performance of Black gram crop owing to the adoption of improved technologies was assessed over a period of three years and is presented in Table 3 and 4.

From the demonstration it revealed that, the integrated crop management practice in black gram recorded 30.29 per cent increase in the yield as compared to the farmers practice (5.79 q/ha) as against 7.09 q/ha in ICM practice. However, average highest yield (8.20 q/ha) was recorded during 2013-14. This may be attributed to sufficient and more than average rainfall distributed fairly during the pod setting to physiological maturity stage, better utilization of applied nutrients (Poonia and Pithia, 2011) [4]. The above findings are in similarity with the findings of Raju Teggelli *et al.* (2015) [6] and Tomar (2010) [12]. The higher yield of black gram under improved technology was due to use of latest high yielding varieties, integrated nutrient management and integrated pest management (Veeramani *et al*., 2017) [14].

Table 3: Impact of improved production technology on productivity of black gram

Year	Variety	FLD (Nos)	Yield(q/ha)				% increase in yield over local check
			Improved practices				
			Maximum	Minimum	Average	Local check	
2013-14	VBN 6	10	8.50	7.10	8.20	6.50	26.2
2014-15	VBN 6	10	7.40	5.80	6.60	4.90	34.6
2015-16	VBN 6	39	7.25	6.12	6.47	4.98	29.9
Total		59	23.15	19.02	21.27	17.38	90.7
Average			7.72	6.34	7.09	5.79	30.2

Technology Gap

The technology gap means the differences between potential yield and yield of demonstration plot. The technology gap of demonstration plots were 0.70, 2.30 and 2.40 q/ha during 2013-14, 2014-15 and 2015-16 (Table 4) respectively. On an average technology gap under three year FLD programme was 1.81 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, crop production, protection practices and local climatic situation.

Extension Gap

Extension gap means the differences between demonstration plot yield and farmers yield. Extension gap were 1.7, 1.7 and 1.49 q/ha during 2013-14, 2014-15 and 2015-16 (Table 4), respectively. On an average extension gap under threes FLD programmes were 1.63 q/ha which emphasized the need to educate the farmers through various extension programs *i.e.*, front line demonstration for adoption of improved production and protection technologies, to revert the trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap.

Technology Index

Technology Index indicates the feasibility of the evolved technology in the farmers' fields. Lower the value of technology index, higher is the feasibility of the improved technology. The technology index varied from 7.86 to 27.3 per cent (Table 4). On an average technology index was observed 20.32 per cent during the three years of FLD programmes, which shows the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of black gram.

Table 4: Indication of potential yield, demonstration yield, farmers yield, technological gap, extension gap and technology index

SI. No	Potential yield (kg ha^{-1})	Demonstration yield (kg ha^{-1})	Farmers Yield (kg ha^{-1})	Technological gap (q/ha)	Extension gap(q/ha)	Techno logy index
1.	890	820	650	0.70	1.70	7.86
2.	890	660	490	2.30	1.70	25.8
3.	890	647	498	2.43	1.49	27.3
Average	890	709	546	1.81	1.63	20.32
Total	2670	2127	1638	5.43	4.89	60.96

Economic Return

Data in Table 5 reveals that the cost involved in the adoption of improved technology in Black gram ICM varied and was more profitable. The cultivation of black gram under improved technologies gave higher net return of Rs. 22000, 13840 and 15480 per ha respectively, as compared to farmers practices (Rs 16000, 6420 and 9480 per ha in 2013-14, 2014-15 and 2015-16 respectively). An average net return and B:C of demonstration field is 17107 Rs/ha and 1.94 respectively as compared to farmers practice (Rs 106333 per ha and1.65). Similar findings were reported by Raju Teggelli *et al.* (2015) [6]. The benefit cost ratio of ICM of Black gram under improved cultivation practices higher than farmer's practices in all the years and this may be due to higher yield obtained under improved technologies compared to local check (farmers practice). These finding are in line with the findings of Mokidue *et al.* (2011) [2].

Table 5: Economics of improved techonologies and farmers practice in black gram

Year	Total cost of cultivation (Rs.ha^{-1})		Gross Returns (Rs.ha^{-1})		Net Returns (Rs.ha^{-1})		B:C ratio	
	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check
2013-14	19000	16500	41000	32500	22000	16000	2.16	1.96
2014-15	18500	17100	32340	23520	13840	6420	1.75	1.38
2015-16	16870	15420	32350	24900	15480	9480	1.92	1.61
Total	54370	49020	105690	80920	51320	31900	5.83	4.95
Average	18123	16340	35230	26973	17107	10633	1.94	1.65

Conclusion

It is concluded from the study that there exists a wide gap between the potential and demonstration yields in Black gram mainly due to technology and extension gaps and also due to the lack of awareness about new technology in black gram cultivation in Nagapattinam district of Tamil Nadu. The FLD produces a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology in farmers, which they have been advocating for long time. This could be circumventing some of the constraints in the existing transfer of technology system in the Nagapattinam district of Tamil Nadu. The productivity gain under FLD over existing practices of black gram cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of black gram in the district.

References

1. Bhargav KS, Khedkar NS, Gayatri GR, Gupta N. Evaluation of front line demonstration on chick pea and pigeon pea in Shajapur District of MP. International Journal of Pure Applied Bioscience. 2017; 5(5):293-297.
2. Mokidue I, Mohanty AK, Sanjay K. Correlating growth, yield and adoption of urd bean technologies. Indian J Extn. Edu. 2011; 11(2):20-24.
3. Narasimha Rao S, Satish P, Samuel G. Productivity improvement in soybean. *Glycine max* L. Merrill through technological interventions. J Oilseeds Res. 2007; 24(2):271-273.
4. Poonia TC, Pithia MS. Impact of frontline demonstrations of chickpea in Gujarat. Legume Res. 2011; 34(4):304-307.
5. Rabbinge R. Ecoregional approaches, why, what and

how. In: Ecoregional approaches for sustainable land use and food production (Bouma, J., Kuybenhoven, J., Bouman, J., Luyten, C. and Zandastra, H.G. Ed). Kluwer Academic Publishers, Dordrecht, the Netherlands, 1995.
6. Raju G, Teggelli, Zaheer Ahamed B, Anand Naik, Siddappa. Transfer of Improved Technology of Black Gram Production through Frontline Demonstrations (FLDs) in Kalaburagi region of Northern Karnataka Trends in Biosci. 2015; 8(11):2814-2817
7. Reddy AA. Regional disparities in food habits and nutritional intake in Andhra Pradesh, India, Regional & Sectoral Econ. Stud. 2010; 10(2):125-134.
8. Samui SK, Mitra S, Roy DK, Mandal AK, Saha D. Evaluation of front line demonstration on groundnut. Journal of the Indian Society Costal Agricultural Research. 2000; 18(2):180-183
9. Shetty PK, Ayyappan S, Swaminathan MS. (Eds). Climate change and sustainablefood security. ISBN: 978-81-87663-76-8, National Institute of Advanced Studies, Bangalore and Indian Council of Agricultural Research, New Delhi, 2013.
10. Sreelakhshmi CH, Sameer CV, Kumar, Shivani D. Producvity enhancement of Pigeon pea (*Cajanus canjan* L.) through improved production technology. Madras Agril J. 99(4-6), 185-189
11. Thakur AP, Shurya Bhushan. Economic impact of front line demonstrations onbcereal & pulse crops in Godda district of Jharkhand. Journal of Economic & Social Development. 2016a; 12(2):106-111.
12. Tomar RKS. Maximization of productivity for chickpea (*Cicer arietinum* Linn.) through improved technologies in farmers' field. Indian J Natul. Produ. and Resource. 2010; 1(4):515-517.
13. Tomar RKS, Sharma P, Yadav LN. Comparison of yield and economics of irrigated chickpea under improved and local management practices, Int. Chickpea Pigeonpea News Lett. 1999; 6:22-23.
14. Veeramani S, Joshua Davidson, Anand G, Pandiyan M. Cluster front line demonstration in blackgram variety Vbn 6 at Vellore district of Tamil Nadu. Agriculture update. 2017; 12:475-478.