Asian Journal of Agricultural Extension, Economics & Sociology

Volume 41, Issue 10, Page 61-66, 2023; Article no.AJAEES.104281
ISSN: 2320-7027

Impact of Cluster Front Line Demonstrations on Productivity, Profitability and Yield Gap of Blackgram in Nellore District of Andhra Pradesh, India

K. Kiran Kumar Reddy [a], M. Mallikarjun [a*], G. L. Siva Jyothi [a], V. Tejaswini [a], S. Lokesh Babu [a] and D. Vijay Kumar Naik [a]

[a] *Krishi Vigyan Kendra, ANGRAU, Nellore, Andhra Pradesh-524004, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2023/v41i102142

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/104281

Original Research Article

Received: 11/06/2023
Accepted: 17/08/2023
Published: 28/08/2023

ABSTRACT

The Cluster Frontline Demonstrations (CFLDs) on Blackgram var. TBG-104 was conducted by Krishi Vigyan Kendra (KVK), Nellore to find out the seed yield, technological gap, extension gap, technology index and economics during 2020 to 2022 (3 years) covering 150 farmers. The result of the study revealed that the yield of blackgram was found to be 953, 1000 and 1103 kg/ha during the years 2020-21, 2021-22 and 2022-23, respectively as compared to 752, 760 and 900 kg/ha, respectively under the farmer's practice. The increase in yield over farmers practice was found to be 25.1, 33.4 and 22.6% respectively during the years 2020-21, 2021-22 and 2022-23. The 3-year

**Corresponding author: E-mail: mallikarjunpsb@gmail.com;*

average data on the technology gap, extension gap and technology index were found to be 980 kg/ha, 215 kg/ha and 49% respectively. The average net return and B:C ratio in demonstrations was found to be Rs. 27439.00 /ha and 1.79 as against Rs.13334 and 1.38 in farmer's practice. The findings show that utilising TBG 104 over farmer's varieties could increase the seed output of Blackgram in the Nellore district and CFLD could be a useful method to reduce yield disparities.

Keywords: Demonstration; extension gap; technology gap; technology index.

1. INTRODUCTION

Blackgram (*Vigna mungo*) commonly called as Urad in India. Its principal place of origin is India and it is primarily grown in Asian nations including Pakistan, Myanmar, and some regions of Southern Asia. Blackgram area accounts for about 19 per cent of India's total pulse acreage which contributes 23 per cent of total pulse production. India being the largest producer as well as consumer of blackgram in the world, produces 23.4 lakh tonnes of blackgram annually from 46.7 lakh hectares of land, with an average productivity of 501 Kg/ha [1]. Andhra Pradesh produced 3.65 lakh tonnes of blackgram in 3.93 lakh hectares with productivity of 929 kg/ha [2]. However, the productivity of blackgram in Nellore district is far below (696 kg/ha) than the state average [3]. Due to low systematic efforts to develop a package of technology that might ensure high seed yield of this crop, the average yield obtained at farmers' fields is poor [4]. There could be various reasons for the low productivity of blackgram in Nellore district in the state like non-availability of quality seed or improved variety, imbalanced use of fertilizer, rainfed cultivation in marginal and sub marginal lands and low knowledge on pest and disease management [5]. Various trials on varietal performance, integrated nutrient management, water management and weed control were carried out to address the problem of the low productivity of blackgram in the Nellore district. However, CFLD may be a more effective means of bridging the gap between farmers and extension specialists [6]. Because it allows for the quick dissemination of technology through extension activities like group discussions and field days, it is carried out under the direction of KVK scientists to demonstrate the production potentiality of location-specific newly released technologies with proper crop management practices on large areas (clusters) in various locations. Hence, CFLD on blackgram variety TBG 104 was conducted in Nellore district to increase the productivity and to reduce the extension and technology gap.

2. MATERIALS AND METHODS

A total of 150 front line demonstrations were conducted from the year 2020 to 2022 under rainfed conditions in Nellore district of Andhra Pradesh. Each demonstration was conducted on an area of 0.4 ha. The ICM practice included sowing of improved variety (TBG 104), seed treatment + neem oil application at 25-30 DAS + arrangement of sticky traps to monitor sucking pest vectors + spraying of monocrotophos @ 1.6 ml per litre of water at flowering to pod formation stage for insect management + spraying of carbendazim for control of leaf spot (Table 1). The demonstrations were conducted in sandy clay loam soils which are low to medium in fertility status. Yield data for the improved practice and farmers' practice were recorded at the time of threshing. The season-wise details of sowing and harvesting were presented in Table 1. The yield gain in demonstrations above farmers' practice was computed using the method proposed by Yadav et al. [7].

2.1 Estimation of Technology Gap, Extension Gap and Technology Index

The estimation of technology gap, extension gap and technology index were done using formula given by Samui et al. [8].

2.2 Economic Analysis

The price of inputs, including as seeds, fertilizer, insecticides, etc., provided by the KVK or purchased by the farmers, as well as labour costs and other operational expenses, are included in the cost of cultivation. Gross returns were calculated by transforming the harvest into money during the demonstration at the going market rate. By subtracting the cost of cultivation from the gross returns, net returns were calculated. According to Deva et al. [9], the cost ratio was computed by dividing gross returns by cultivation costs.

Table 1. Production techniques followed in blackgram crop under Cluster Front Line Demonstration and farmers' practice in Nellore district of Andhra Pradesh

Parameter	Demo Practice	Farmers Practice	Gap
Variety	Tirupati Minumu-1 (TBG 104)	LBG 752	Full
Seed rate	20-25 kg/ha	25-30 kg/ha	Partial
Seed treatment	Insecticide followed by Fungicide	No seed Treatment	Full
Method of sowing	Line sowing	Broadcasting	Full
Fertilizer dose	20:40 N: P_2O_5 (Based on soil test values)	High dose or low dose of fertilizers	Partial
Weed management	Pre emergence application of pendimethalin along with one need-based hand weeding	Pre emergence application of pendimethalin along with one need-based hand weeding	Nil
Plant protection	Neem oil application at 25-30 DAS+ Arrangement of sticky traps to monitor sucking pest vectors + Need based pesticide and fungicide application	No monitoring of pests and applying higher doses of pesticides and fungicides based on input dealer recommendation.	Partial
Irrigation	Rainfed	Rainfed	Nil

3. RESULTS AND DISCUSSION

3.1 Comparison of Production Practices

It was clear that most farmers did not use advised and upgraded technology, which left a significant gap in blackgram production (Table 1). Farmers used more seed than what was ideal and suggested, which increased the cost of seed input. Additionally, farmers did not treat their seeds, which is a practice that protects seeds from soil and seed-borne diseases as well as emerging seedlings from pest insects that wreak havoc on crop emergence and early growth [10]. Despite the various efforts of agriculture scientists and officials from the line departments, many farmers in the nation are neither familiar with nor adhere to the practice. The information (Table 1) showed that farmers either did not apply any suggested fertilisers based on soil tests or, when they did, applied either higher or lower doses of fertilisers without top dressing, which resulted in poorer yields. Similar findings were recorded by Singh et al. [11].

3.2 Yield

The yields of blackgram in demonstration plots under improved practices and general farming practices are presented in Table 2, which clearly show that the use of improved variety helps to increase the productivity of blackgram under rainfed conditions. The average grain yield of blackgram under improved practices is 1018 kg/ha which is 26.9 % higher than farmers' practices. The University's improved package of practices, which were put into practice under the guidance of KVK scientists, were primarily responsible for the increase in seed yield of the demonstration plots. The use of TBG 104 increased yield while lowering the prevalence of YMV disease. When compared to farmers' practices, the introduction of seed treatment, use of fertilisers based on the results of soil tests and adoption of plant protection measures for YMV vector management really increased blackgram output. It was clear that, given the same environmental factors, the demonstration's yield outperformed the farmer's practice. Results of demonstrations and agro-technologies that followed inspired farmers who didn't use these technologies (Table 2). These findings were in corroboration with the findings of Borah et al. [12] and Mathiyazhagan et al. [13].

3.3 Technology Gap

The technology gap is the difference between potential yield of the variety and yield observed in demonstration plot and the technology gap had been decreased over the years of study. The technology gap of 1047, 1000 and 897 kg/ha was observed during the years 2020-21, 2021-22 and 2022-23 respectively (Table 2). The observed technological gap may be explained by a number of limitations, including differences in soil fertility levels, the availability of moisture, the control of insect pests and diseases, and the variable weather patterns that occurred over the crop season at various places. Similar findings were observed by Nath et al. [14]. The results were positive since the technological gap demonstrates the farmers' cooperation in carrying out the CFLDs.

3.4 Extension Gap

Extension gap is the difference between the yield of demonstration plot and farmer’s plot. Extension gap of 191, 250 and 203 kg/ha were observed during the years 2020-21, 2021-22 and 2022-23 respectively (Table 2). The ANGR Agricultural University's recommended set of practices, coupled with high producing cultivars, were subsequently helpful in raising the yield in demonstration plots. By instructing the farmers using a variety of extension methods, it is important to emphasise the extension gaps generated. The present study was in line with earlier findings of Baishya et al. [15].

3.5 Technology Index

The technology index shows how practical advanced technology is in agricultural settings. The more the technology index values are lower, the more likely it is that it will be able to pass through a farmer's field. Maximum technology index value 52.3 per cent was noticed during 2020-21 while, minimum value of technology index of 44.8 per cent was noticed during 2022-23 (Table 2). As the Nellore district depends mostly on the North-East Monsoon for its dryland crops, this change in the technology index was caused by unequal meteorological conditions in the demonstration area during the study years. Additionally, the decline in the technology index during the years of study amply indicated the viability of the technologies shown in frontline demonstrations. Similar findings in reducing the technology index by adopting the FLDs were also noticed by Basumatary et al. [16] and Nagarjuna et al. [5].

3.6 Economic Returns

The economic analysis revealed the demonstration plots were more profitable than farmer practices over the course of all the demonstration years, as evidenced by better gross returns, net returns, and benefit: cost ratios (Table 3). The mean cost of cultivation in demonstrations was Rs. 35447/ha which is less than farmers practice (Rs. 36534/ha), where an additional cost of Rs. 1087 were incurred by farmer due to high seed cost and pest management practices followed. From the data (Table 3), gross returns and net returns were increased as a result of the technology exhibited over farmers' practices throughout the study. Cultivation of blackgram under improved technologies gave higher gross returns and net returns of Rs. 62886/ha and Rs. 27439/ha respectively over farmers practice of Rs. 49867/ha and Rs. 13334/ha. The benefit cost ratio of demonstration plots was 1.79 as against 1.38 in farmer’s practice. Thus, the agricultural community in the Nellore district's yield potential and economic returns can be increased by implementing enhanced production practices in blackgram. These results were in line with the earlier findings by Kumar et al. [17] and Venkanna et al. [18].

Table 2. The year-wise average yield, Technology gap, extension gap and technology index of blackgram in Nellore district of Andhra Pradesh

Variety	Season/Yr	Area (ha)	Yield (kg/ha)			% Increase in yield over farmers practice	Technology Gap (kg/ha)	Extension Gap (kg/ha)	Technology Index (%)
			PY*	DP*	FP*				
TBG 104	*Rabi*-2020-21	20	2000	953	762	25.1	1047	191	52.3
TBG 104	*Rabi*-2021-22	20	2000	1000	750	33.4	1000	250	50
TBG 104	*Rabi*-2022-23	20	2000	1103	900	22.6	897	203	44.8
Average		20	2000	1018	804	26.9	980	215	49.0

**PY- Potential Yield *DP- Yield in Demo Practice; *FP- Yield in Farmer Practice*

Table 3. Economic analysis of CFLD's of blackgram in Nellore district of Andhra Pradesh

Year	Cost of Cultivation		Grosss Returns		Net Returns		B:C Ratio	
	DP*	FP*	DP*	FP*	DP*	FP*	DP*	FP*
2020-21	39600	40828	60039	48006	20439	7178	1.52	1.18
2021-22	34500	35600	62400	47600	27900	12000	1.81	1.34
20222-23	32240	33173	66218	53996	33978	20823	2.05	1.63
Mean	35447	36534	62886	49867	27439	13334	1.79	1.38

**PY- Potential Yield *DP- Yield in Demo Practice; *FP- Yield in Farmer Practice*

4. CONCLUSION

The results of the study showed that the yield of blackgram in Andhra Pradesh's Nellore district can be boosted to a higher level by using the suggested practices and upgraded technologies. The usage of quality seed and the appropriate combination of practices as offered by the ANGRAU may be responsible for the rise in blackgram production. The demonstrations' financial success raised awareness and encouraged additional farmers in Blackgram to follow ICM practices. Thus, it can be stated that by implementing scientific intervention in the farmer's field, technology gaps and extension gaps can be minimised, leading to an improvement in the output and productivity of blackgram in the Nellore district of Andhra Pradesh.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India; 2003. India. Available:http//:agricoop.nic.in Access on 22.04.2022.
2. DES. Directorate of Economics and Statistics, Government of Andhra Pradesh; 2021. Available:www.des.ap.gov.in Access on 22.04.2022.
3. Anonymous. Hand Book of Statistics SPS Nellore District 2016 Andhra Pradesh. Government of Andhra Pradesh. 2018; 63.
4. Veeramani P. Effect of plant spacing on the growth and yield of blackgram (*Vigna mungo*). Journal of Krishi Vigyan. 2019; 8(1):101-4.
5. Nagarjuna D, Mallikarjun M, Jyothi GL, Sumathi V. Impact of Cluster Frontline Demonstration on Productivity and Profitability of Blackgram. Journal of Krishi Vigyan. 2022;11(1):206-10.
6. Sumathi P. Role of front line demonstrations on transfer of pulses production technologies in Vellore district of Tamil Nadu. Agriculture Update. 2012; 7(1/2):47-50.
7. Yadav DB, Kamboj BK, Garg RB. Increasing the productivity and profitability of sunflower through front line demonstrations in irrigated agro-ecosystem of eastern Haryana. Haryana journal of Agronomy. 2004;20(1&2):33-5.
8. Samui SK, Maitra 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):180-3.
9. Deva S, Rao GM, Vinayalakshmi P, Rao CV. Micronutrients spray on yield and economics of cotton in rainfed areas of Prakasam district in Andhra Pradesh. Journal of Krishi Vigyan. 2019;8(1):208-11.
10. Sharma KK, Singh US, Sharma P, Kumar A, Sharma L. Seed treatments for sustainable agriculture - A review. Journal of Applied and Natural Science. 2015; 7(1):521-39.
11. Singh DV, Mukhi SK, Mohapatra MR. Yield gap analysis of toria (*Brassica campestris*) through front line demonstrations in Kandhamal district of Odisha. Indian Journal of Extension Education. 2016; 52(3&4):167-70.
12. Borah D, Borah P, Ojha I, Rabha H, Deka P. Impact Assessment of Cluster Front Line Demonstration on Popularization of Toria in Udalguri District of Assam. Asian Journal of Agricultural Extension, Economics & Sociology. 2021;39(3):52-9.
13. Mathiyazhagan S, Jayasudha J, Geetha K, Saminathan VR. Impact of Cluster Front Line Demonstration in Black Gram at Pudukkottai District of Tamil Nadu. Asian Journal of Agricultural Extension, Economics & Sociology. 2022;40(9):325-9.
14. Nath RK, Bhuyan MK, Bhagawati G, Baishya BK, Deka P. Yield gap analysis of

rapeseed (*Brassica campestris* var. Toria) in Kokrajhar district of Assam, India. Asian Journal of Agricultural Extension, Economics & Sociology. 2021;39(10):425-8.
15. Baishya BK, Bora P, Bhuyan MK. Impact of cluster front line demonstration on productivity and yield gap of lentil in Kokrajhar District of Assam. Asian J of Agri Ext, Eco & Soc. 2022;26;40(12):290-4.
16. Basumatary MM, Deka RS, Bezbaruah R, Hoque J. Productivity and profitability of toria through frontline demonstrations (CFLD) in Morigaon District. Asian Journal of Agricultural Extension, Economics & Sociology. 2022;40(9):202-8.
17. Kumar S, Dev J, Singh R, Kumar S. Role of cluster frontline demonstrations in enhancing black gram productivity under rainfed conditions in district Bilaspur of Himachal Pradesh. Journal of Krishi Vigyan. 2020;9(1):293-7.
18. Venkanna Y, Rao BB, Srinivas A, Vinayak R, Naresh B. Performance of cluster front line demonstrations on integrated crop management in red gram (*Cajanus cajan*) using variety PRG-176 in Peddapalli District under North Agroclimatic Zone of Telangana State in India. Asian Journal of Agricultural Extension, Economics & Sociology. 2022; 40(8):96-103.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/104281