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Impact of CFLD's on Productivity and Profitability of Blackgram in Farmers, Fields of West Godavari District, India

Podapati Vinayalakshmi [a++*], N. Mallikharjuna Rao [b], G. Naveen Kumar [c], A. Rajesh [d#] and A. Srinivasa Rao [b]

[a] *Crop Production, Krishi Vigyan Kendra, Undi, India.*
[b] *Krishi Vigyan Kendra, Undi, West Godavari dt, A.P, India.*
[c] *RA, MANAGE, Hyderabad, Telangana, India.*
[d] *Agricultural Polytechnic, Kalikiri, A.P, India.*

Authors' contributions

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

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ABSTRACT

The Krishi Vigyan Kendra, UNDI, West Godavari district has conducted 100 Cluster Frontline Demonstrations (CFLD) on blackgram with variety TBG-104 in 40 ha area during seasons *kharif* and *rabi*, 2022- 2023. CFLD is the most appropriate method for showcasing the output potential of recently released technology in large scale on farmers' fields. The results indicated that higher yield *i.e.*, 10.48 q/ha and 14.10 q/ha was realized with TBG-104 variety, which was 18.08 and 10.58%

[++] *Subject Matter Specialist;*
[#] *Principal;*
**Corresponding author: E-mail: vinaya.podapati126@gmail.com;*

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more compared to farmers practice variety PU-31 with 8.87 q/ha and 12.75 q/ha during *kharif* and *rabi*, respectively. The net returns of Rs. 30,058, Rs. 51, 890 per ha and B:C ratio of 1.91, 2.14 were also higher with demonstration plot compared to farmers practice plot (Rs. 20,250, Rs. 41,855 per ha and 1.61,1.90) during *kharif* and *rabi*, respectively.

Keywords: Productivity; profitability; blackgram; extension gap; technology gap.

1. INTRODUCTION

"Pulses are important sources of proteins, vitamins and minerals and are popularly known as "Poor man's meat" and "rich man's vegetable", which contribute significantly to the nutritional security of the country" [1]. "Besides, pulses possess several other qualities such as improving soil fertility and physical structure, fitting in mixed/inter-cropping system, crop rotations and dry farming and providing green pods for vegetable and nutritious fodder for cattle as well" [2].

India is the largest producer and consumer of urdbean. The blackgram production of India was 2.78 million tons [3] still less than the future estimated demand of 29-30 million tons. "The targeted production and productivity is possible by way of harnessing this yield gap by growing pulses in new niches, precision farming, quality inputs, soil test-based INM and mechanized method of pulse cultivation complimented with generous governmental policies and appropriate funding support to implementing states/stakeholders" [4].

Blackgram production contributes to 11 percent of India's total pulses production (25.46 million tons in 2020-21). Among the major producing states, productivity was highest in Andhra Pradesh (915 kg/ha).

"In the West Godavari district, it is also one of the important pulse crop grown in uplands and tail-end areas, but the full potential of the crop was not realized by farmers due to the low adoption of new technologies. So, there is a need to improve the production potential of blackgram" [5-8].

"According to the Vision-2030 document prepared by the ICAR-Indian Institute of Pulses Research (IIPR), Kanpur, a growth rate of 4.2% has to be ensured to meet the projected demand of 32 million tons of pulses by 2030. This will, however, require a paradigm shift in research, technology generation and dissemination, popularization of improved crop management practices and commercialization along with capacity building of the stakeholders in frontier areas of research" [4].

"In India, pulses, therefore, have always received due attention both in terms of requirement by consumers and adequate programmatic support from the government at the production front. Addressing this concern of significance, the Ministry of Agriculture and Farmers Welfare, Govt. of India had initiated a nationwide cluster frontline demonstration (CFLD) programme on pulses under National Food Security Mission-Pulses (NFSM-Pulses) since 2015-16. The basic strategy of the Mission is to promote and extend improved technologies, *i.e*., seed, micro-nutrients, soil amendments, integrated pest management, farm machinery and implements, irrigation devices along capacity building of farmers. The ICAR through its Krishi Vigyan Kendras (KVKs) across the country has been implementing this CFLD programme on different pulse crops to boost the production and productivity of pulses with improved varieties and location-specific technologies" [4].

"The Krishi Vigyan Kendra (KVK), Undi has successfully implemented cluster frontline demonstrations on blackgram during seasons *kharif* and *rabi seasons*, 2022-2023 in a systematic manner on farmers' field under the close supervision of their scientists to show the worth of new/ proven varieties with technological packages in their respective districts for enhancing production and productivity of blackgram" [4]. With this background, the present investigation was undertaken with the specific objectives of assessing the performance of CFLD on blackgram in terms of yield, extension gap, technological gap and economic gains by the farmers.

2. MATERIALS AND METHODS

The study was carried out by conducting 100 Cluster Frontline Demonstrations (CFLD) on blackgram with variety TBG-104 in 40 ha area in farmers fields of Buttayagudem, Gurrapugudem, Singarajupalem and Pedapadu villages of West Godavari district, Andhra Pradesh during the *kharif* and *rabi seasons*, 2022- 2023. The TBG-104 (high yielding, shiny seeded, resistant to Yellow Mosaic Virus) variety with integrated crop management practices like seed treatment, pre-emergence application of pendimethalin, post-emergence application of Imazethapyr, erection of yellow sticky traps and blue sticky traps, recommended dose of fertilizer application and spraying of micronutrients displayed in demonstration plots, In contrast PU-31 dull-seeded variety, high seed rate, no seed treatment and indiscriminate use of fertilizers and pesticides were treated as farmer's practice. Training to farmers, Field days and group meetings were also organized to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. Throughout the duration of the demonstration program, the KVK scientists used to routinely visit the farmer's field (control) and the cluster frontline demonstration fields to provide close supervision and data collecting. Data on yield were gathered at harvest time from the farmers' practices as well as the plots that were on display. To calculate the benefit-cost ratio, farmers were consulted with the details of both systems' profit margins and cultivation costs. The economic parameters were calculated based on the prevailing market prices of inputs and minimum support prices of outputs.

Extension Gap = Demonstrated yield-Farmers' practice yield

Technology Gap= Potential yield- Demonstration yield

Technology index =$\frac{Potential\ yield - Demonstration\ yield}{Potential\ yield} \times 100$

2.1 Data Aanalysis

[9] contend that "informed objective decisions are based on facts and numbers, real, realistic and timely information". Furthermore, according to [10], "descriptive statistics deals with describing a collection of data by condensing the amounts of data into simple representative numerical quantities or plots that can provide a better understanding of the collected data" (p. 272). Therefore, this study analyzed data collected with descriptive statistics such as percentages supported with tables for clarity.

3. RESULTS AND DISCUSSION

3.1 Yield

Results of the study revealed that transmission of developed technology under CFLD in blackgram resulted in higher yield *i.e*., 10.48 q/ha and 14.10 q/ha which was 18.08 and 10.58% more compared to farmer's practice *i.e*., 8.87 q/ha and 12.75 q/ha during *kharif* and *rabi seasons*, respectively which is depicted in Table 1. The higher yield in the demonstration plot was might be due to the inclusion of an improved variety of seed, seed treatment and integrated nutrient and pest management practices. Similar to the present findings, the yield improvement through adoption of developed technology has also been reported in earlier studies of CFLD's [10,11,12].

3.2 Net Returns and B:C Ratio

The net returns of Rs. 30,058, Rs. 51, 890 per ha and B:C ratio of 1.91, 2.14 were also higher with demonstration plot compared to farmer's practice plot (Rs. 20,250, Rs. 41,855 per ha and 1.61,1.90) during *kharif* and *rabi*, respectively. The increase in net returns and B:C ratio was due to increase in yield and price of the produce was also higher in the demonstration plot due to shiny nature of the seed as the PU 31 is dull.

3.3 Technology Gap

An average technology gap of 7.71 q/ha (Table 2) was calculated during the demonstration period. "The data reflects that there is further potential for increasing yield by implementation of better technological interventions reducing the technological gap and ultimately lowering down technology index. The technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions" [13].

3.4 Extension Gap

An extension gap of 1.61 and 1.35 q/ha (Table 2) was recorded during *kharif* and *rabi* seasons, 2022-23. "On an average, the extension gap observed during both seasons was 1.48 q/ha which is a wide gap. This emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of the latest production technologies with high-yielding variety will subsequently change this alarming trend of galloping extension gap" [14,15,16]. This finding is corroborated with earlier findings [14,15,16].

Table 1. Effect of cluster frontline demonstrations on yield and economics of blackgram

S. No.	Particulars	*kharif*, 2022		*rabi*, 2022-23	
		Demo plot	Farmers practice	Demo plot	Farmers practice
1	Average yield (q/ha)	10.48	8.87	14.10	12.75
2	Increased yield (%)	18.08	-	10.58	-
5	Net returns (Rs./ha)	30,058	20,250	51,890	41,855
6	B: C ratio	1.91	1.61	2.14	1.90

Table 2. Impact of technological intervention on gap analysis in blackgram

Season	Yield (q/ha)			Technology gap (%)	Extension gap (%)	Technology Index (%)
	Potential	CFLD	Farmers practice			
kharif	20	10.48	8.87	9.52	1.61	47.6
Rabi	20	14.10	12.75	5.90	1.35	29.5
Average	20	12.29	10.81	7.71	1.48	38.5

3.5 Technology Index

"The technology index is another important tool for judging the adoption and impact of different technologies. It is derived as the ratio between technology gap and potential yield in terms of percentage. The lower value of technology index means better performance of technological intervention. In the present study, the technology index varied from 47.60 to 29.50 percent (Table 2). The data reveals that the demonstrated technology showed better results in the *rabi* season in comparison to the *kharif*. Similar results were also obtained by different investigators" [17,18]. Large variations in the technology index might be due to variation in existing weather condition, soil fertility status and insect-pest infestation.

4. CONCLUSION

The outcome showed that cluster frontline demonstrations created greater awareness and made a positive impact on the local farming community as they were motivated by the adoption of high-yielding latest varieties with an improved package of practices increase the productivity and profitability in blackgram. The beneficiary farmers of CFLDs also play an important role as source of information and quality seeds for wider dissemination of the high-yielding varieties of blackgram for other nearby farmers.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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