**IMPACTS OF CLUSTER FRONTLINE DEMONSTRATIONS ON YIELD AND ECONOMICS OF BLACKGRAM IN SOUTHERN PART OF TAMILNADU, INDIA**

ABSTRACT

Cluster Frontline Demonstrations were laid out to upscale improved technologies for enhancing the productivity of blackgram during rabi 2022-23 & 2023-24 by Krishi Vigyan Kendra, Virudhunagr, Tamil Nadu (India). One hundred and fifty demonstrations were conducted in 60 ha with the active participation of the farmers. The results of the demonstrations revealed that the average yield of blackgram under improved technology ranged from 8.4 to 8.6 q/ha with a mean of 8.5 q/ha; which was 25 per cent higher as compared to farmer’s practices (6.4 q/ha). The study exhibited reduced mean extension gap (2.32 q/ha) and technology gap (5.07 q/ha) with lower technology index (42.58 %) due to the higher yield realized in VBN 11 demonstration plots. The average mean net return (Rs. 38049.5/ha) and mean B: C ratios (2.09) were higher in improved technologies than the farmers’ practices (Rs.21282.5/ha) and mean B: C ratio (1.57). The present study resulted in substantial increase in productivity and returns to the farming community through the adoption of improved technologies.

**Key words**: Cluster Front Line Demonstrations, Blackgram, Economics, Extension gap,

Technology gap, Technology index

**Introduction**

“Pulses play a significant role to address national food and nutritional security and tackle environmental challenges. Blackgram is an important pulse crop grown throughout the country. The crop can withstand adverse climatic conditions and improves the soil fertility by fixing atmospheric nitrogen in the soil. Black gram is a crucial part of the Indian diet since it is a supplement to a cereal-based diet and contains vegetable protein” (Gnanasekaran *et al*.,2024;Abraham et al. 2024). Blackgram is an important pulse crop in Virudhunagar district cultivated in an area of 3733 ha. However, its productivity is very low compared to national productivity due to unavailability of improved varieties and non-adoption of improved cultivation practices in the district. It is identified that there are several factors responsible for low pulse productivity and high yield gap which are mostly related to inputs and their inefficient management.

Venudevan *et al*. (2024) stated that “the productivity of blackgram per unit area could be boosted by adopting improved practices in a systematic manner along with high-yielding varieties. In this view, Krishi Vigyan Kendra, Virudhunagar, conducted the Cluster Front Line Demonstration (CFLD) for transferring the latest package of practices to the farmers of Virudhunagar district. The goal of the present study was to increase blackgram production and productivity by showcasing improved technological practices through Cluster Frontline Demonstrations”.

**Materials and Methods**

 The demonstrations were carried out at Kathalampatti, N.Mettupatti, Chithambarapuram villages of Virudhungar District of Tamil Nadu State during Rabi 2022-23 & 2023-24. Blackgram, VBN 11 variety is resistant to viral diseases such as Mungbean Yellow Mosaic and Leaf Curl, duration of 70-75 days suitable for all seasons of Tamil Nadu with an average yield of 8.4 to 9.5 q/ha. Farmers were trained on scientific cultivation practices of black gram, VBN 11 by scientists of KVK, Virudhunagar before laying out the demonstrations. Each demonstration was laid out in an area of 0.4 ha in a cluster of 50 farmers in three villages and farmers’ practice was treated as control. The package of improved technologies *viz*., improved variety (VBN 11), optimum seed rate (8 kg/acre), seed treatment with TNAU Vithai Amirtham (10 ml/kg), foliar application of TNAU Pulse wonder (2 kg/acre) and need based plant protection measures were demonstrated (Table 1). Method demonstrations of TNAU Vithai Amirtham seed treatment were conducted at all the three villages to make the farmers aware of the technology know how. The data from CFLD and farmers’ practices were analyzed to study the impact of Cluster Front Line Demonstrations.

 **Flowchart 1: Flowchart for conducting demonstration of CFLD**

Training on ICM techniques in Pulses

Selection of farmers

Method demonstration of TNAU Vithai aAirtham seed treatment & TNAU Pulse wonder

Distribution of critical inputs

Recorded observations and analyze the impact

Farm Advisory Services by Scientists of KVK Virudhunagar

The following formulae for calculating the technology gap, extension gap and technology index was suggested by Samui *et al*. (2000)

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmers’ yield

|  |  |  |
| --- | --- | --- |
|  |  | Potential yield- Demonstration yield |
| Technology index | = | ­­­­­­­­­­­­­­­--------------------------------------------- X 100 |
|  |  |  Potential gap |

The demonstration fields were monitored and observed by the scientists of KVK,Virudhunagar. The yield parameters for both the CFLD plots and the farmers’ practice were recorded at the time of harvest. The cost of cultivation and profit of both the systems were worked out as per the prevailing market price.

**Results and Discussion**

**Technology gap:** An average technology gap of 5.07 q/ha was calculated during the demonstration period. The data reflects that there is further potential for increasing yield by implementing better technological interventions, reducing the technological gap, and ultimately reduced the technology index. Mukherjee, (2003) stated that “the technological gap may be attributed to the dissimilarity in the soil fertility status and weather conditions. Hence, location specific recommendation with improved variety are necessary to minimize the technology gap for yield level in different situations” (Rachhoya *et al.,* 2018).

**Extension gap:** In CFLD plots an extension gap of 2.41 and 2.23 q/ha was recorded during 2022-23 and 2023-24 respectively. On an average, extension gap observed during both the years was 2.32 q/ha which is a wide gap. This emphasized the need to educate the farmers on adoption of improved agricultural production technologies through various means to reduce this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually influence the farmers to discontinue the old technology and to adopt new technology. This finding is in confirmation with the findings of Meena *et al*., (2020); Singh *et al*., (2019).

**Technology index:** Another important tool for assessing the impact and adoption of various technologies is the technology index. The technology index in this study varied from 44.03 to 41.12%. Lower technology index value indicates the effectiveness of technological intervention. Similar results reported by Jha *et al*. (2020) in pulses demonstration. Variations in the current weather, soil fertility and insect-pest infestation may be the cause of the wide range in the technology index.

**Yield & Economics:**

It was observed that Cluster Frontline Demonstration plots recorded higher yield (8.5q/ha), higher gross returns (Rs. 52790/ha) and net returns (Rs. 38049.5/ha) in comparison to farmers practice (Rs.35438.5/ha and Rs. 21282.5/ha) (Table 2 & 3). Similar trend of yield enhancement under frontline demonstrations was documented by Saikia *et al*., 2018 and Sheeba *et al*., 2024. The benefit cost ratio recorded was also higher (2.09) in recommended practice as compared to farmer’s practice (1.57). Similar economic benefits after adoption of improved technologies like high cost benefit ratio, high yield and maximum net return under frontline demonstrations on pulses were documented by Jha *et al*., 2020 and Singh *et al*., 2019. The results are also in conformity with the findings of Singh *et al*., 2018 and Krishnakumar *et.al.,*2025 who reported higher net returns as well as benefit cost ratio in other pulses and brinjal as compared to farmers practice.

**Table 1. Details of improved and Farmers practice in blackgram VBN 11.**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No** | **Particulars** | **Improved practice** | **Existing practice** |
| 1. | Variety | VBN 11 |  VBN 8 |
| 2. | Land preparation | Ploughing and Levelling | Ploughing and Levelling |
| 3. | Seed rate | 8kg/ac | 6kg/ac |
| 4. | Seed treatment  | TNAU Vithai amirtham @10 ml /kg | No seed treatment  |
| 5. | Weed management | Two hand weeding on 15 and 30 days after sowing. | One hand weeding on 30 days after sowing. |
| 5. | Foliar application of nutrient | TNAU pulse wonder @ 5 kg/ha | DAP 2 % Spray |
| 6. | Plant protection  | Need based IPM | Indiscriminate use of pesticides |

**Table 2.Impact of technological intervention on yield, technology gap,extension gap and technology index of CFLD and farmers practice in blackgram VBN 11**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Yield (q/ha) | Increase over farmers practice (%) | Technology Gap  | Extension Gap  | Technology Index (%) |
| CFLD  | Farmers Practice  |
| 2022-23 | 8.4 | 6.2 | 26 | 5.31 | 2.41 | 44.03 |
| 2023-24 | 8.6 | 6.5 | 24 | 4.83 | 2.23 | 41.12 |
| **Mean** | **8.5** | **6.4** | **25** | **5.07** | **2.32** | **42.58** |

**Table 3. Economic analysis CFLDS and Farmers Practice in Blackgram VBN 11**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Gross cost (Rs/ha)** | **Gross returns (Rs/ha)** | **Net Returns (Rs/ha)** | **BC Ratio** |
| **CFLD**  | **Farmers Practice**  | **CFLD**  | **Farmers Practice**  | **CFLD**  | **Farmers Practice**  | **CFLD**  | **Farmers Practice**  |
| 2022-23 | 24384 | 22050 | 52145 | 34852 | 37364 | 20140 | 2.13 | 1.58 |
| 2023-24 | 25835 | 23075 | 53435 | 36025 | 38735 | 22425 | 2.06 | 1.56 |
| **Mean** | **25109.5** | **22562.5** | **52790** | **35438.5** | **38049.5** | **21282.5** | **2.09** | **1.57** |

 **CONCLUSION**

Cluster Front Line Demonstrations on Blackgram VBN 11 results indicated that technology gap may be reduced by adopting scientific methods of blackgram cultivation besides increasing the productivity of blackgram in the Virudhunagar district. It was observed that potential yield can be achieved by imparting scientific knowledge to the farmers. Horizontal expansion of improved technologies may be achieved by the implementation of various extension activities like training programs, field days, exposure visits, *etc*., organized in CFLD programmes. As the gaps still exists, the CFLDs should be continued in coming years so that gaps may be minimized as more and more area is covered under blackgram. Therefore, cluster frontline demonstrations (CFLD) were effective in updating the knowledge, skills, and attitude of farmers and enhancing the production and productivity of black gram in the Virudhunagar district.

**Conflict of interest**

 All authors declare that they have no conflict of interest in publication of this article.

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