



# Impact of Varietal Demonstrations on the Productivity and Sustainability in Blackgram at Villupuram District of Tamil Nadu, India

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## 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

Popularization of newly released variety in a new environment through field demonstrations has an important role after variety release to increase the productivity and sustainability in a particular location. Keeping In this view, the field demonstrations were conducted at farmer's field by introducing new blackgram variety VBN 11. A total of fifteen field demonstrations were conducted by using new blackgram variety (VBN 11) at farmer's field organized by Krishi Vigyan Kendra, Villupuram, Tamil Nadu during 2023-24. The blackgram variety VBN 11 seeds were distributed to selected farmers on no cost basis for one acre along with critical inputs. The farmers cultivating variety VBN 4 was used as the check variety (farmer's practice). An average yield of 1,107 kg.ha<sup>-1</sup>

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was recorded in the VBN 11 demonstration plots which was 12.91% increase over farmers cultivating variety VBN 4 (981 kg.ha<sup>-1</sup>). The farmers have obtained additional revenue of Rs.12,580.ha<sup>-1</sup> from VBN 11 demonstrations. In this regard, one training programme on production technologies for pulses was organized for the beneficiary's farmers by KVK, Villupuram, (Tamil Nadu) before conducting the final demonstrations to improve the productivity in Villupuram District through new varietal demonstrations.

*Keywords: Blackgram; field demonstrations; VBN 11; seed yield; farmers; gross income; net income.*

## 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 (Singha et al., 2020). Besides, pulses possess several other qualities such as improving soil fertility and physical structure, fitting for mixed/inter-cropping system, crop rotations and dry farming and providing green pods for vegetable and nutritious fodder for cattle as well (Singha et al., 2020). India is the largest producer and consumer of Blackgram. The blackgram production in India was 2.78 million tonnes (Agricultural Statistics Division, 2022) still less than the future estimated demand of 29-30 million tonnes. 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 (Tiwari & Shivhare, 2017). Blackgram production contributes to 11 percent of India’s total pulses production (28.40 lakh tonnes annually from 47.60 lakh hectares with an average productivity of 596 kgs.hectare in 2022-23). Among the major blackgram cultivating states in Rabi season, Tamil Nadu ranks first in area of 2.55 lakh hectares (36.6 per cent) followed by Andhra Pradesh with 2.13 lakh hectares (30.6 percent). In Tamil Nadu, Villupuram 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 lower adoption of new technologies and new high yielding varieties. So, there is a need to improve the production potential of blackgram (Basediya et al., 2023; Basumatary et al., 2022; Vinayalakshmi et al., 2024).

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 new variety and improved crop management practices and commercialization along with capacity building of the stakeholders in frontier areas of research (Tiwari & Shivhare, 2017).

Production and productivity of any crop variety was mainly depended on choice of varieties, season and agronomic practices with supply of balanced major nutrients (Ganapathy & Jayakumar, 2023). Among the above components, selection of variety plays an important role for increasing the productivity of farming communities (Ganapathy et al., 2024). Hence it is essential to popularize the new high yielding varieties to replace the deteriorating old varieties so that overall productivity can be stabilized. Therefore, to meet the immediate needs of the pulse farmers in Tamil Nadu, there is a need to popularize the new high yielding variety (VBN 11) with good agricultural practices to meet the challenges in pulse cultivation. Cultivation of newly released short duration blackgram variety has the potential to increase the productivity and needs to be promoted and popularized. Front Line Demonstrations (FLD) of new high yielding variety with improved agriculture practices could significantly increase the farm income. This present research compares the FLD results in Villupuram District of Tamil Nadu, emphasizing relative yield advantages, cropping intensity, weed control, and plant protection measures compared to current farmer practices. Keeping in this regard, the present study was conducted at farmer’s field by field demonstrations of newly released blackgram variety VBN 11.

## 2. MATERIALS AND METHODS

### 2.1 Description of the Study Area

The short duration blackgram variety VBN 11 was used as the experimental materials in the

present study. A total of 10 field demonstrations were conducted at farmers holdings in Villupuram District, Tamil Nadu, India (latitude; 11° 46' North; longitude: 79° 46' East; altitude: 4.60 m MSL) during Rabi 2023-24 by new blackgram variety (VBN 11) and compared to check variety (farmer's practice) for yield and economics. The soil type of the demonstration fields is clay loam with pH 7.0- 7.5 and low in organic carbon content and total N content. The soil in available P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O was medium. The climatic conditions of the research locations are tropical. Average rainfall of the region is 950-1000 mm per annum and relative humidity ranges from 45-85 per cent.

## 2.2 Experimental Methodology and Crop Monitoring

The blackgram variety VBN 11 seeds were distributed to selected farmers at no cost basis for one acre along with critical inputs. The critical inputs include post emergency herbicide, bio-fertilizers (*Rhizobium*) and water soluble fertilizers. The farmers are advised to raise the crop by line sowing method after seed treatment with bio-fertilizer along with ruling blackgram variety as check. The selected farmers were trained for improved production technologies through training programmes funded by NICRA Project, organized by ICAR, Krishi Vigyan Kendra, Villupuram (TN), during 2023-24. On 15-20<sup>th</sup> day after sowing, the post emergency herbicides (Imazithipyre 10% EC) @ 250 ml/acre were applied for weed management. All the agronomic practices and need based plant protection measures were followed in all the demonstrations and control plots uniformly by monitoring the frequent visit by KVK Scientists.

## 2.3 Data Collection and Analysis

The observations were recorded on number of pods per plant and seed yield per hectare (kgs). For data collection, ten to fifteen representative plants were selected randomly in each demonstration plots in all the farmers' fields of VBN 11 as well as check variety (VBN 5). All the collected data were statistically analyzed by statistical method described by Pansi and Suckatme (Panse & Sukhatme, 1985).

## 3. RESULTS AND DISCUSSION

The results of all the demonstrations and check plots were presented in Table 1. The performance of blackgram variety VBN 11 with

comparison to the farmers cultivating variety as farmers practice (checks) was monitored periodically by KVK, Villupuram. The data on number of pods per plant revealed that, it was ranged from 25.64 to 39.35. The average of number of pods per plant in VBN 11 demonstrations was 31.03 and the check variety (farmers practice) was recorded in 27.31. The number of pods per plant of the particular variety directly contributes to seed yield. The number of pods on blackgram was already reported by (Shoba et al., 2024). With regard to seed yield in VBN 11 demonstration fields, the maximum seed yield 1310 kg.ha<sup>-1</sup> was observed and minimum yield was 950 kg.ha<sup>-1</sup>. The average seed yield of all the demonstrations was 1107.67 kg.ha<sup>-1</sup> for VBN 11 demonstrations and for farmers practice; the yield was 981 kg.ha<sup>-1</sup>. It was 12.91 % increase over the farmers practice (checks). These outcomes are somewhat comparable to (Rachhoya, 2020; Amuthaselvi et al., 2023; Ayyadurai et al., 2024). The yield improvement through front line demonstrations in moth bean has reported by (Ganapathy et al., 2024); in Greengram (Bezbaruah & Sharma, 2020; Senthil et al., 2024) and in chick pea by (Hashim et al., 2024) has reported in their research papers.

The economic analysis of field demonstrations and farmers practices was presented in Table 2. The average cost of cultivation for all the demonstrations was Rs. 42,500.ha<sup>-1</sup> and gross income was Rs. 88,560.ha<sup>-1</sup>. The farmers getting additional revenue of Rs. 12,580 ha<sup>-1</sup> by cultivating the new high yielding blackgram variety VBN 11 (demonstrations). These findings are align with those of (Anuratha et al., 2018; Ganapathy et al., 2024). The additional yield and net income (Rs. 46,060) was due to cultivating new high yielding variety along with improved production technologies and timely supply of critical inputs. Similar kind of front line demonstrations in blackgram was already reported by (Vinayalakshmi et al., 2024; Amuthaselvi et al., 2023). The VBN 11 blackgram variety produced higher yield over the check variety in all the demonstrations, clearly indicated that showing constant performance in different locations (in Villupuram district), the VBN 11 was easily adopted to new environments and having high stability over the locations in northern district of Tamil Nadu. Any new variety giving stable performance in different locations was good shine for Indian farming. The Front-Line Demonstration program effectively influenced the attitudes, skills, and knowledge related to improved or recommended practices in

**Table 1. Performance of Blackgram variety VBN 11 demonstrations at farmer's field**

S. No	Farmers Name & Address	No. of pods / Plant		Seed Yield (kg/ ha.)		
		VBN 11	Control	VBN 11 (kg/ha)	Control	% Increase
1.	Manivannan, D Naduvanandhal village	32.95	30.12	1250	1070	16.82
2.	Sivakumar, S Naduvanandhal village	28.75	27.15	1050	960	9.38
3.	Dhanaekaran, D Naduvanandhal village	25.38	23.63	980	870	12.64
4.	Nagaraj, S Naduvanandhal village	30.05	25.56	1160	1030	12.62
5.	Mani Ponnusamy Naduvanandhal village	29.85	25.52	1070	970	10.31
6.	Thiruvangadam, P Naduvanandhal village	28.75	25.75	1030	950	8.42
7.	Pakyalakshmi, V Naduvananthal village.	25.85	22.45	950	860	10.47
8.	KesavanMunusamy Naduvananthal village	29.55	26.65	1080	950	13.68
9.	RagavanSivasamy Naduvananthal village	29.35	25.57	1010	915	10.38
10.	Ajith Saravanan Puliyannur village	27.75	24.50	980	850	15.29
11.	Murugan, V Puliyannur village	37.56	32.12	1280	1110	15.32
12.	Murali, R Puliyannur village	32.325	27.90	1060	960	10.42
13.	Valarmathi, M Puliyannur village	33.74	28.51	1175	1010	16.34
14.	SivananthamThangamani Puliyannur village	39.35	36.00	1310	1150	13.91
15.	Raju Subramani Puliyannur village	34.68	28.20	1230	1060	16.04
	Mean	31.03	27.31	1107.67	981.00	12.91
	CD (0.05%)	7.03	6.65	158.41	151.32	-
	CV (%)	10.56	11.25	6.92	7.13	-

**Table 2. Yield and Economics comparison of demonstrations and farmer's practice**

<b>Treatments/ Intervention</b>	<b>Seed Yield (kg/ha)</b>	<b>Cost of cultivation (Rs/ha)</b>	<b>Gross income (Rs/ha)</b>	<b>Net income (Rs/ha)</b>	<b>B:C ratio</b>	<b>Additional Income (Rs.)</b>
Improved Variety- (VBN 11+ Improved Production Technologies)	1107	42,500	88,560	46,060	2.08	12,580
Farmer's Practice (Check variety)	981	45,000	78,480	33,480	1.74	-

pulse cultivation and fostering adoption. It also enhanced the relationship between farmers and scientists, fostering mutual confidence. During the demonstrations, farmers emerged as primary sources of information on improved production technologies and served as new suppliers of high-quality pure seeds in their locality and neighbouring areas for subsequent crops. The new variety VBN 11 along with improved production technologies demonstrated, contributed to an average increase in seed yield of 12.91 % compared to the existing practices of farmers. The cost of this yield increment was a nominal of Rs. 12580 per hectare; an amount was affordable even by small and marginal farmers.

#### 4. CONCLUSION

Tamil Nadu is an important pulse growing state in the Country faces several problems for higher productivity and this necessitates location specific blackgram variety for the zone. The cultivation of short duration variety like VBN 11, along with suitable improved production technological interventions can be an important step in this direction. This high yielding blackgram variety VBN 11 with its excellent performance in the demonstrations at Villupuram district will play a significant role in improving the productivity, profitability and sustainability in pulse cultivation.

#### 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 this manuscript.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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