

Original Research Article

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Performance of Cluster Bean Variety MDU 1 in Thiruvarur District, India

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ABSTRACT

Performance of Cluster bean (*Cyamopsis tetragonoloba*) was demonstrated to popularize the variety MDU 1 among the farmers of Thiruvarur district in Cauvery Delta Zone of Tamil Nadu by ICAR-Krishi Vigyan Kendra, Tamil Nadu Agricultural University during 2015-16 on farmer's field. Cluster bean cultivar "MDU 1" and "local variety" were used for the demonstration during two seasons for onsite acceptance. Farmers were encouraged and educated for all the updated technological aspects of cluster bean cultivation from seed treatment to harvesting. Results of front line demonstration revealed that MDU 1 variety recorded 39.41 per cent augmented yield (119.0 q/ha) over the local check variety (85.0 q/ha). The high yielding MDU 1 cluster bean variety recorded a net return and cost benefit ratio of Rs. 60,928 and 2.90 respectively, where as in the local cultivar it was only Rs. 29,500 and 1.98 respectively. Subsequently this positive result encouraged 100 farmers in Thiruvarur district to start up the small scale farming of cluster bean with the technical direction suggested by ICAR-KVK, Thiruvarur.

Keywords

Cluster Bean,
Front Line
Demonstration,
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Introduction

The erstwhile Thanjavur district which has been trifurcated in to Thanjavur, Thiruvarur and Nagapattinam districts is a fertile zone of Cauvery delta. Though this is the rice bowl of Tamil Nadu, vegetables are also cultivated in a considerable area especially in Mannargudi block. Cluster bean is an annual legume crop

and one of the famous vegetables popularly known as guar. This crop is cultivated for its green vegetable, dry pod, as forage crop and also for green manure because being a legume crop it conserves soil nutrients. It is a self-pollinated crop belongs to the family Fabaceae. Cluster bean originated in India and Pakistan and is considered as a short day upright or bushy annual plant

(Purseglove, 1981). It is a drought tolerant, warm season legume crop with deep and well developed root system, cultivated mainly as rain fed crop in arid and semi-arid regions during rainy (kharif) season for vegetable. Its young pods are used as vegetables, which also known for cheap source of energy (16 Kcal), protein (3.2g), fat (1.4 g), carbohydrate (10.8 g), vitamin A (65.3 IU), vitamin C (49 mg), calcium (57 mg) and iron (4.5 mg) for every 100 g of edible portion (Ashwini *et al.*, 2019).

The productivity of the crops per unit area could be increased by implementing recommended scientific and sustainable management production practices using suitable high yielding varieties. Frontline demonstration is the new concept of field demonstrated evolved by the Indian Council of Agriculture Research (ICAR) with main objective of demonstrate newly released crop production technologies and its management practices in the farmer, under different agro climatic region of the country under the farming situations. While demonstrating the technologies in the farmer's field the scientist are required to study the factors contributing higher crop production. Field constraint of production and thereby generate production data and farmers feedback information. Taking into account of the above considerations, frontline demonstration (FLDs) were carried out in a systematic manner on farmer field to show the worth of a new variety and convincing farmer to adopt improved production management practices for enhancing productivity of cluster bean.

Materials and Methods

Front Line demonstrations were carry out in ten farmers field by the ICAR-Krishi Vigyan Kendra, to study the production and financial feasibility of scientific cultivation technologies on cluster bean in Thiruvarur

district of Cauvery Delta Zone of Tamil Nadu state during month of June to September and October to December season (two consecutive seasons) of 2015-16 in the farmer field in different village at Mannargudi, Needamangalam, Kodavasal, Valangaiman and Nannilam blocks. The study was conducted in an area of 10 hectares with acreage of 1 hectare per farmer under front line demonstration with active participation of farmers in respective villages.

Ahead of conducting FLDs, the group meetings and skill trainings were imparted to the selected farmers concerning about various aspect of cluster bean cultivation. To demonstrate the scientific cluster bean production technology, bottle necks in cluster bean production were identified though participatory approach preferential ranking technique. Previously the farmers used to cultivate only the locally available cluster bean variety with low yield potential i.e. 7-8 tonnes per hectare which is highly susceptible to powdery mildew disease due to the unawareness of the latest high yielding MDU 1 variety.

Front Line Demonstrations were conducted on new cluster bean variety MDU-1 with a yield potential of 13 t/ha and resistant to powdery mildew disease to sustain cluster bean cultivation and generate more income in the farm front. Initially KVK, Thiruvarur has provided some important critical inputs like seeds and nutrient formulations i.e., IIHR vegetable special. The package of practices demonstrated were superior varieties, seed treatment, maintenance of optimum crop density, recommended dose of fertilizer. The spacing followed was at 0.40 m x 0.15 m sown with the seeds rate of 10 kg/ha. The participating farmer was trained on all aspects of cluster bean production techniques. To study the of front line demonstration out of 10 participating farmer, total of 50 farmer were

selected as respondent through proportionate sampling. Production and economic data for FLDs and local practices were collected and analyzed. The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al.*, (2000) (Table 1).

Results and Discussion

Bottle necks in cluster bean cultivation

Cluster bean cultivation locations field constrains were reported in this field experiment. Preferential ranking scientific techniques were utilized to categorize the problems faced by the respondent farmer in concerned villages. The circumstances specified by the different farmers are given in Table 1. Assessment of table, point out that lack of appropriate high yielding variety (80.00%) was given the top most rank followed by low technical knowledge (75.00%). In view of the ranks given by the farmer for the different constraint revealed that lack of suitable high yielding varieties, low technical knowledge, low soil fertility status and other constraint such as labour cost high, marketing of the farm produce were found to reduce cluster bean production. Between all the constraints, low soil fertility and water scarcity got least concerns. Similar studies are also reported by (Dhaka *et al.*, 2010; Ranawat *et al.*, 2011; Sreelakshmi *et al.*, 2012) in crops variety demonstrations.

Results of the front line demonstration

Assessment of effectiveness levels between demonstrated varieties and local crop variety is given in Table 2. From this FLD it was observed that productivity of cluster bean in Thiruvarur district through improved crop management technologies and varieties shows a increasing trend. The maximum yield reordered is 126 qha⁻¹ and the minimum yield

recorded is 109 qha⁻¹. The farmers practice i.e. local control recorded a yield of 85 qha⁻¹ only. The front line demonstration trial yield and potential yield of the improved varieties of crop has measured to estimate the yield gaps which were further characterized into technology index. The technology gap show the gap in the demonstration yield over potential yield (34 qha⁻¹). Technology index show the feasibility of the variety at the farmers field. The lower the value of technology index is ideally favourable.

Decreased value of technology index over the years of technology demonstration was also observed by many scientists at different agro climatic conditions in different crops (Sawardekar *et al.*, 2003, Dhaka *et al.*, 2010, Kumar, 2012, Kumar, 2013 and Kumar, 2014). The extension gap recorded in the present study was 34 qha⁻¹ whereas the technology gap observed was 11qha⁻¹. This extension and technology gaps draw attention to educate the farmers through various mean for the implementation of improved agricultural production technologies to get sustainable and profitable yield trends. The data arrived on technology gap express a decreased trend mirror the farmer corporation in conducting demonstration with hopeful results subsequent year.

The technology gap observed might be due to the variation in soil fertility status and whether condition. Mukharji (2003) also reported that depending on identification and use of farming situation, specific intervention might have more impact in attractive productivity. Parallel result was also in accordance with Mitra *et al.*, (2010) and Katare *et al.*, (2011).

The monetary viability of improved technology over traditional farmer's practices was calculated depending on the existing market prices of inputs and vegetable cost

(Table 3). The cost benefit analysis revealed that, cost of production of cluster bean with improved technology reworked Rs. 32,000 ha⁻¹ whereas it recorded only Rs. 30000 ha⁻¹ in farmers practice. The additional cost incurred in under improved technology was primarily due to supplementary cost involved in the cost of improved seed material.

Front line demonstration with improved variety and scientific production techniques recorded higher revenue of net return (Rs. 60928/ha) with higher benefit cost ratio (2.90) as compared with local variety recorded least values for net return (Rs. 29500/ha) and benefit cost ratio (1.98).

Growth and yield parameters

The results revealed (Table 4) that among the two varieties; MDU 1 recorded the highest plant height of 132.50 cm and the least values recorded in local check (128.00 cm). In the case of days to 50 per cent flowering, MDU 1 recorded the lowest (40.60d) whereas local check found the highest days (48.50 d).

According to Premalakshmi *et al.*, (2017), plant height is an important trait by which growth and vigour of the plants were measured. In cluster bean, fruit length is one of the desirable characters for vegetable purpose. Regarding fruit characters, recorded values were significantly different from each other. MDU 1 recorded the highest values of the traits *viz.*, number of fruits per plant (156.00), fruit length (11.90 cm), fruit girth (4.20 cm) and individual fruit weight (3.20 g) as compared to local check variety. Lokesh and Shivsankara (1990) reported that pod weight strongly associated with fruit length, fruit weight and total yield. Fruit yield is determined by the fruit weight and number of fruits per plant therefore yield is complex character and dependent on its component traits and their inheritance any change in these

would reflect on total yield (Premalakshmi *et al.*, 2017).

Regarding incidence of powdery mildew, MDU1 recorded the very low incidence (1 – 3.2 %) whereas local check variety (farmer practice) recorded the high incidence of 20 – 35 per cent. Regarding yield characters, MDU1 recorded the highest yield per plant (201.60 g) whereas local check recorded the lowest yield per plant (156.20 g). Similarly, MDU 1 recorded the highest yield of 119 q/ha followed by and local check registered the lowest yield (85 q/ha). This might be due to number of laterals per plant which have facilitated production of more number of flowers per cluster thus leading to higher yield.

The yield and financial gaps among conventional practices and demonstration was perceptibly higher. Under these circumstances there is urgent call for to make stronger extension services to train the farmers in all cultivation aspects and the implementation of improved cluster bean production technology. However, the yield level under FLD was better than the local varieties and performance of these varieties could be further improved by adopting recommended production technology. Hence, it can be observed that increased yield was due to adoption of high yielding varieties and condition frontline demonstration of proven technology. This will subsequently increase the income as well as the livelihood of the farming community. From the above research finding it can be also conclude that the maximum number of the respondents had medium level of knowledge and extent of adoption regarding recommended cluster bean production technology. The study reported lack of suitable improved varieties as major constraint by the beneficiaries and is ranked first followed by low technical knowledge.

Table.1

S. No	Particulars	Formula
1.	Extension gap (qha ⁻¹) =	Demonstration yield (qha ⁻¹) – yield of local check (qha ⁻¹)
2.	Technology gap (qha ⁻¹) =	Potential yield (qha ⁻¹) - Demonstration yield (qha ⁻¹)
3.	Technology index (%) =	Potential yield (qha ⁻¹)- Demonstration yield/ Potential yield x100

Table.1 Ranking by farmers for various constraints (n=100)

S. No.	Constraints	Percentage	Ranks
1.	Lack of high yielding varieties	80.00	I
2.	Labour problem	65.00	III
3.	Low soil fertility	35.00	V
4.	Marketing of the farm produce	50.00	IV
5.	Low technical know how	75.00	II
6.	Water scarcity through canal	30.00	V

Table.2 Yield of potential of cluster bean as affected by improved MDU 1 variety and improved cultivation techniques over local practices in Cauvery Delta Zone

Year	Variety	Area (ha)	Demo. (No.)	Potential Yield (qha ⁻¹)	Demonstration yield of improved technology (qha ⁻¹)				Extension gap (qha ⁻¹)	Technology gap (qha ⁻¹)	Technology index (%)
					Max.	Min.	Avg	Local			
2015-16 June-September	MDU 1	10	10	130	126	109	119	85	34	11	8.46

Table.3 Economics of cluster bean as affected by improved MDU 1 variety and production techniques over local practices in Thiruvavur district

No. of Demo.	Area (ha)	Yield (q/ha)			% Increase in yield	*Economics of demonstration (Rs./ha)				*Economics of check (Rs./ha)				
		Demonstration	Check			Gross Cost	Gross Return	Net Return	** BCR	Gross Cost	Gross Return	Net Return	** BCR	
10	10	H	L	A	85.0	39.41	32000	92928	60928	2.90	30000	59500	29500	1.98
		126	109	119										

* Economics to be worked out based total cost of production per unit area and not on critical inputs alone. ** BCR= Gross Return/Gross Cost : H – Highest Yield, L – Lowest Yield A – Average Yield

Table.4 Growth and yield characters of cluster bean as affected by improved MDU 1 variety and production techniques over local practices in Thiruvarur district

Treatment	Plant height (cm)	Days to 50 % flowering	No. of fruits per plant	Individual fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	Yield per plant (g)	Yield per ha (q/ha)	Incidence of powdery mildew disease (%)
MDU-1	132.5	40.6	156.0	3.2	11.9	4.2	201.6	119.0	1-3.2
Local check	128.0	48.5	138.0	2.7	9.6	3.6	156.2	85.0	20-35
Mean	130.3	44.6	147.0	3.0	10.8	3.9	178.9	102.0	--
SD	3.2	5.6	12.7	0.4	1.6	0.4	32.1	24.0	--
CV	2.4	12.5	8.7	12.0	15.1	10.9	17.9	23.6	--

Based on the results obtained in current study it is concluded that new crop varieties / hybrids and improved production technologies is to be popularized in new area through front line demonstrations. Additionally this will certainly facilitate in decreasing the extension and technology gaps.

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