Assessment of Cluster Bean (*Cyamopsis tetragonoloba*) Varieties for Growth and Yield Characters

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ABSTRACT

Assessment of cluster bean varieties for growth and yield characters was conducted at five different farmers' fields at Manjakollai village, Bogalur block and Vazhuthur village of Mandapam blocks of Ramanathapuram district during the year 2016-17. The aim was to assess the performance of high yielding cluster bean varieties suitable for Ramanathapuram district namely MDU 1, Pusa Navbahar, Pusa Sadabahar and local. The experiment was laid out in randomized block design (RBD) with four treatments with three replications. The observation on plant height (cm), days to 50 per cent flowering (days), number of fruits per plant, individual fruit weight (g), fruit length (cm), fruit girth (cm), yield per plant (g), yield per ha (t/ha) and B:C ratio were recorded and analysed statistically. The results revealed that the highest plant height was recorded in MDU 1 (128.50 cm) and minimum length in local (88.87 cm). In case of days to 50 per cent flowering, Pusa Sadabahar took minimum number days(39.40d) whereas in local check, the value was 44.85d. It was found that MDU1 recorded the highest number of fruits/plant (149.70), individual fruit weight (2.98 g), fruit length (13.40 cm), fruit girth (4.63 cm), yield/ plant (211.60 g) and yield/ha (14.20 t/ha). In local variety, all these values were lowest for all these yield traits. MDU 1 registered the highest benefit to cost ratio of 2.94, whereas local check recorded 1.84. Due to highest yield of 14.2 t/ha, MDU1 was found to be most suitable under Ramanthapuram condition.

Key Words: Cluster bean, Fruit weight, Local check, MDU1, Pusa Sadabahar,Yield.

INTRODUCTION

Cluster bean (*Cyamopsis tetragonoloba* L.) is an important arid leguminous crop, highly suitable for arid and semi-arid regions. It is one of the important arid crops with tremendous potential for vegetable purpose (tender pods) and more specifically for its industrial usage (gum). In India it is mainly grown in Rajasthan, Haryana, Gujarat, Tamil Nadu, Andhra Pradesh, Maharashtra and Punjab. India becomes the leading producer of gaur with 60 pe rcent of the world production followed by Pakistan with 35 per cent (Rao, 2001). In Tamil Nadu, cluster bean is cultivated on about 600ha area mainly in Tirunelveli, Thoothukudi, Madurai, Theni, Dindigul, Namakkal, Coimbatore, Cuddalore, Ramanathapuram, and Virudhunagar districts. It is relatively tolerant to saline, alkaline,

drought condition, gives higher yield under adverse climatic conditions and therefore, preferred by small and marginal farmers. Ramanathapurm farmers were unaware about newly released high yielding varieties and new technologies of cluster bean and only cultivated Pusa Naubahar, local and private varieties and getting low yield and low income. Therefore, the present study was undertaken to assess the performance of high yielding cluster bean varieties suitable for Ramanathapuram district.

MATERIALS AND METHODS

The present experiment was conducted at five farmers' fields at Manjakollai and Vazhuthur villages of Bogalur and Mandapam blocks during *Rabi* season of 2016-17. MDU 1 seeds were purchased from Agricultural College and Research

Institute, Madurai whereas, Pusa Naubahar and Pusa Sadabahar seeds from the Indian Agricultural Research Institute, New Delhi. The field was thoroughly ploughed, well decomposed farmyard manure was applied at the rate of 25t/ha and formed ridges and furrows. MDU1, Pusa Navbahar, Pusa Sadabahar and local check were used for this study. The seeds were sown at a spacing of 60 x 30 cm on one side of the ridges. The recommended cultivation practices were followed as per the crop production guide, 2013. Arka vegetable special were purchased and applied as foliar application during 30th and 60th days after sowing. Regular field visits were made by the team of KVK scientists. The trial was laid out in randomized block design (RBD) with four treatments and three replications and data were analysed statistically (Panse and Sukhatme,1985).

RESULTS AND DISCUSSION
Vegetative parameters

All characters recorded were significantly different. The results revealed (Table 1) that among the four varieties, MDU 1 recorded the highest plant height of 128.50 cm followed by Pusa Navbahar (119.22 cm). The lowest plant height was noticed in local check of 88.87 cm. In the case of days to 50 per cent flowering, Pusa Sadabahar recorded the lowest (39.40d) followed by MDU1 (41.25d) whereas local check found the highest days (44.85 d). According to Premalakshmi *et al* (2017), plant height is an important trait by which growth and vigour of the plants were measured and recorded the maximum plant height of 112.00 cm in Virudhunagar local. Deka *et al* (2015) reported that 40 - 60d variation in days to 50 per cent flowering and depends on date of sowing.

Fruit characters

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 (149.70), fruit length (13.40 cm), fruit girth (4.63 cm) and individual fruit weight (2.98 g) followed by Pusa Navbahar (133.20; 11.70 cm; 3.50 cm and 2.78 g). The local check registered the lowest values in all the fruit characters (89.4; 10.50 cm; 3.26 cm; 1.71 g). Lokesha 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 – 3.5 %) where as local check variety (farmer practice) recorded the high incidence of 15 – 20 per cent.

Yield characters

MDU1 recorded the highest yield per plant (211.60 g) followed by Pusa Navbahar (162.58 g), whereas local check recorded the lowest yield per plant (112.36 g). Similarly, MDU 1 recorded the highest yield of 14.20 t/ha followed by Pusa Navbahar (10.58 g/ha) and local check registered the lowest yield (7.24 t/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 reduction also might be due to failure of north east monsoon during the year 2016 -17 and led to severe drought, as a result, plant growth character values were reduced. Premalakshmi *et al* (2017) reported that Thadayampatti local recorded the highest yield of plant (321.29 g / plant) whereas Virudhunagar local registered the highest yield per ha of 15.94 t/ha and also stated that potential yield was recorded under Madurai condition (22.5 t/ha). Deka *et al* (2015) reported that Pusa Navbahar recorded the highest yield of 12.46 t/ha in *kharif* season of Assam condition.

Economics

The gross cost of cultivation almost similar for three improved varieties but local practice was the

Table 1. Growth and yield characters of cluster bean varieties.

Treatment	Plant height (cm)	Days to 50 % flowering (days)	No. of fruits per plant	Individual fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	Yield per plant (g)	Yield per ha (t/ha)	Incidence of powdery mildew disease (%)
MDU-1	128.50	41.25	149.70	2.98	13.40	4.63	211.60	14.20	1- 3.5
Pusa Navbahar	119.22	42.30	133.20	2.78	11.70	3.50	162.58	10.58	5 – 10
Pusa Sadabahar	102.54	39.40	115.60	2.30	10.58	3.42	148.22	9.14	10 – 12
Farmers practice (Local check)	88.87	44.85	89.40	1.71	09.55	3.16	112.36	7.24	15 - 20
SEd	0.221	0.090	0.478	0.001	0.045	0.002	0.780	0.036	
CD (P=0.05%)	0.467	0.197	0.912	0.003	0.102	0.004	1.456	0.089	

Table 2. Economics of cluster bean varieties at Ramanathapuram district.

Treatment	Yield per ha (t/ha)	Gross Cost (Rs.)	Gross Income (Rs.)	Net Returns (Rs.)	B:C ratio
MDU 1	14.20	21,200	66,600	45,400	2.94
Pusa Navbahar	10.58	20,600	47,610	27,010	2.31
Pusa Sadabahar	9.14	19,100	41,130	22,030	2.15
Farmers practice (Local check)	7.24	17,200	32,580	15,380	1.84

lowest gross cost (Table 2). Among the cluster bean varieties, market preference was high for var. MDU 1 and fetched higher prices. MDU 1 recorded the highest net profit of Rs. 45,400/ha with the benefit to cost ratio of 2.94 followed by Pusa Naubahar (Rs.27,010/-ha, 2.31) while the local check registered the lowest net profit of Rs. 22, 030/-ha and B:C ratio of 1.84. It was found that farmers were very much convinced with the performance of var. MDU1, fetches higher income, higher yield and recorded the low incidence of powdery mildew when compared with Pusa Naubahar and local check.

CONCLUSION

The findings of the present assessment revealed that cultivating MDU 1 and Pusa Navbahar in Ramanathapuram district were more beneficial due to their yield contributing characters *viz.,* yield per plant, yield per ha and net returns with benefit cost ratio which recorded the more values when compared to farmers practice variety. Farmers realised that MDU1 was better choice of variety in terms of yield and market price. Therefore, MDU 1 was found suitable for Ramanathapuram district of Tamil Nadu and recommended for large scale cultivation.

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