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Assessment of Moringa Varieties for Growth and Yield Characters

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ABSTRACT

Moringa (*Moringa oleifera* Lam) grows in the tropical and subtropical regions of the world. The present study on Assessment of moringa varieties for growth and yield characters was conducted at different farmers' field at Manjakollai village of Bogalur block, Vazhuthur village of Mandapam block and Mummudichathan village of Nainarkoil blocks during 2018-19. The aim was to assess the performance of high yielding moringa varieties suitable for Ramanathapuram district. PKM-1, Bhagya **(KDM-1)** and local check (farmers' practices) were used and cultivated 1.0 ha area. The experiment was laid out in a randomized block design (RBD) with three treatments with ten replications. The observation on growth, yield parameters and economic traits were recorded and analysed statistically. The results revealed that PKM-1 variety recorded the highest values for the traits *viz.,* plant height (4.62 m), number of braches per plant (5.0), number of pods per plant (88.25), pod weight (135.25 g), yield per tree (10.82 kg) and yield per ha (20.25 t/ha) followed by Bhagya (82.35; 8.50 kg; 18.75 t/ha) whereas the lowest values was found in farmers' practices (75.26 cm; 65.25; 6.15 kg; 13.75 t/ha). Further, it was found that PKM -1 recorded the highest net returns (Rs. 41250/ ha) with the B:C ratio of 3.11 followed by Bhagya (Rs. 37250/-; 2.96). However, the farmers' practices registered the lowest net profit (Rs. 17500/-) and benefit cost ratio (1.87). The incidence of fruit fly observed the lowest in PKM-1 (11.25 %) followed by Bhagya (15.87 %) and the highest incidence was noticed in farmer's practices (23.25 %). PKM-1 recorded the 47 per cent increased yield than farmers' practices.

Key Words: Bhagya, Fruits, Moringa, PKM-1, Tree, Yield.

INTRODUCTION

Morning (*Moringa oleifera* Lam) known as horse radish tree, miracle tree or tree of life. In India it is grown all over the subcontinent grown for its tender pods and also for its leaves and flowers. Despite moringa leaves and pods are the main course of South Indian dishes; its nutritional and industrial values are yet to be known. In general, the tender leaves of moringa are used as highly nutrient leafy vegetable and as cattle feed since it possess high proteins, low fibre content, significant amount of vitamins and rich source of major trace elements, *viz.,* calcium, phosphorous and zinc. It is a multipurpose crop as all parts of the moringa tree are used for food, oil, fibre and medicine. Moringa also known as the drumstick is recognized as a vibrant and affordable source of phytochemicals, having potential applications in medicines, functional food preparations, water purification and biodiesel production. In India, moringa is cultivated in Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Maharashtra and Odissa. Andhra Pradesh is a leading in both area and production among the states of India. In Tamil Nadu, It is being cultivated at Madurai, Dindigul, Theni, Tuticorin, Ramanathapuram, Erode, Dharapuram, Karur, Coimbatore, Tirunelveli and Kanyakumari districts under large scale area. Tamil

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Nadu is one of the largest producer of moringa with an annual production of 6.71 lakh tonnes of tender fruits from an area of 13042 ha (Sekhar *et al,* 2018). Perennial and annual moringa are two types of moringa are cultivated in Tamil Nadu. Principally perennial types have been known for cultivation for a very long time. In Ramanathapuram district, Jaffa moringa (perennial type) very popular among the farmers and is being cultivated in an area of 25- 30 ha particularly Mandapam, Nainarkovil and Kamuthi blocks. Farmers are unaware about high yielding recent varieties and advanced technologies regarding moringa cultivation and getting low yield and income. With this background, the present study was carried out to assess the performance of moringa varieties suitable for Ramanathapuram district.

MATERIALS AND METHODS

The present experiment was conducted at KVK, Ramanathapuram and OFT was conducted at ten farmers' fields namely Manjakollai village of Bogalur block, Vazhuthur village of Mandapam block and Mummudichathan village of Nainarkoil block during 2018-19. PKM-1, Bhagya **(KDM-1)** and farmers' practices (Jaffa) were used for this assessment and cultivated in an area of 1.0 ha. PKM-1 seeds were purchased from Horticultural College and Research Institute, Periyakulam and Bhagya variety seeds were purchased from University of Agricultural Sciences, Dharwad and distributed to the ten identified farmers. Neem oil purchased and distributed to the farmers to control the pest. The pit size is 45 x 45 x 45 cm and 2-3 seeds were sown in each pit at a spacing of 2.5 x 2.5 m were adopted. The seeds were sown in the month of September. Before conductance of the experiment, imparted trainings to the farmers on importance, nutritive values, production and cultivation details of moringa *viz.,* ratoon crop, pinching, foliar applications of insecticides and pesticides etc. The field experiment was laid out in a randomized block design (RBD) with three treatments with ten replications as per the method was suggested by Panse and Sukhatme (1967). The cultural methods as per the package of practices recommendation (Crop Production Guide, 2013) were followed. The observations *viz.,* plant height (cm), number of branches per plant, number of fruits per plant, pod length (cm), average pod weigh (g), yield per tree (kg), yield per ha (t/ha) and economic traits such as net profit (Rs.) and B:C ratio and fruit fly incidence were recorded and analysed statistically.

RESULTS AND DISCUSSION

The present experiment results of vegetative and yield traits were presented in Table 1. It was found that PKM -1 recorded the highest values in growth, yield and economic traits as compared to other varieties. The results revealed that PKM-1 recorded the highest plant height (4.62 m) followed Bhagya (3.87 m); whereas the lowest plant height (3.14 m) was observed in farmers' practices. Number of branches per plant recorded the highest in PKM-1 (5.0) followed by Bhagya (4.37) and the lowest branches per plant noticed in farmers' practices (4.10). Sakdeo (2019) reported that demonstrated variety PKM-1 moringa recorded the highest plant height and number of branches per plant than the farmers' practices under Pune conditions. Selvakumari and Ponnuswami, (2013) reported that tree height ranged from 3.2-7.8 m among the moringa genotypes under Periyakulam conditions.

In the present study, number of pods per plant recorded the highest in moringa var. PKM-1 (88.25) followed by Bhagya (82.35); whereas the lowest number of pods was noticed in farmers' practices (65. 22). Sakdeo (2019) stated that number of pods per tree recorded the highest in PKM -1 as compared to farmers' practice under Pune conditions. Raja *et al* (2011) reported that number of fruit per tree ranged from 78.5 to 314.7 under Western India condition. In the present study, pod length observed the highest in farmers' practices (75.26 cm) whereas the lowest was exhibited in PKM -1 (62.50 cm). In the case of average individual pod weight, farmers' practices registered the highest (154.75 g) followed

Table 1. Assessment of moringa varieties for growth and yield characters.

Sl. No.	Particulars	PKM-1	Bhagya (KDM-1)	Farmers practice	SEd	CD (P= 0.05%)
1.	Plant height (m)	4.62	3.87	3.14	0.034	0.074
2.	Number of branches per plant	5.00	4.37	4.10	0.810	1.680
3.	Number of pods per plant	88.25	82.35	65.25	1.870	2.980
4.	Pod length (cm)	62.50	69.45	75.26	1.612	3.513
5.	Pod weight (g)	135.25	128.75	154.75	0.007	0.015
6.	Yield per tree (kg)	10.82	8.50	6.15	0.003	0.007
7.	Estimated yield per ha (t/ha)	20.25	18.75	13.75		
8.	Incidence of fruit fly (%)	11.25	15.87	23.25		
9.	Market preference	Very good	Good	Good		

by PKM -1 (135.25 g). Bhagya recorded the lowest pod weight of 128.75 g. This might be due to the genetic variability of the varieties. Raja *et al* (2011) stated that fruit length ranged from 32.5 to 123.1 cm under Western India condition. Balaguru *et al* (2020) reported that pod length ranged ranged from 94.70 cm to 17.40 cm under Periyakulam condition and registered the highest in PKM MO 26 (94.70 cm) and the lowest in PKM MO 35 (17.40 cm). He also stated that the highest and lowest pod weight recorded in PKM MO 26 (166.15g), PKM MO 35 (37.49g) respectively. Resmi *et al* (2006) indicated that MO 26 (Thiruvananthapuram local) was the best with remarkably high fruit length, girth, weight and yield followed by MO 28.

Regarding yield traits, PKM -1 recorded the highest in yield per tree (10.82 kg/tree) and estimated yield per ha (20.25 t/ha) followed by Bhagya (8.50 kg/tree; 18.75 t/ha) whereas the lowest yield traits were registered in farmers' practices (6.15 kg/tree; 13.75 t/ha). This might be due to genetic nature of the plant. Sakdeo (2019) reported that pod yield per tree recorded the highest in moringa var. PKM -1 (demonstration plot), whereas in farmers practices (control plot) registered the lowest yield per tree under Pune conditions. This is in accordance with the findings of Karinakar *et al* (2018), Malathi *et al* (2021) in moringa. Regarding fruit fly incidence, farmers' practices recorded the highest incidence of 23.25 per cent followed by Bhagya (15.87 %) whereas the lowest incidence was found in PKM-1 (11.25 %). It might be due to perennial trees having more incidence of fruit fly. Rajamanickam, (2020) reported that pest incidences in chilli recorded the lowest in demonstrated variety (15.50 %) and the highest incidence was noticed in farmers practices (22.50 %) under Ramanathapuram conditions.

ECONOMICS

The gross cost of cultivation almost similar for three technological options but farmers practice recorded the lowest gross cost (Table 2). Among the moringa varieties, PKM-1 exhibited the highest net profit of Rs. 41,250/- ha and cost benefit ratio of 3.11. This was followed by Bhagya (Rs. 37,250/ ha; 2.96); whereas farmers' practices recorded the lowest net profit of Rs. 17,500/- ha with the cost benefit ratio of 1.87. Malathi *et al* (2021) reported that demonstrated variety of moring PKM-1 registered the doubling the farmers income and highest net profit under Salem conditions of Tamil Nadu. Sakdeo (2019) reported that demonstrated plot registered the highest cost benefit ratio (1:3.5) whereas the farmers' practices registered the lowest cost benefit ratio (1:2.7). Similar finding were reported by Rajamanickam (2020) in chilli and Muthuramu *et al* (2015) in French bean. PKM-1 recorded the 40 per cent increased yield with

Table 2. Cost economics of different moringa varieties under Ramanathapuram conditions.

Treatment details	Yield (t/ha)	Gross cost (Rs.)	Gross expenditure (Rs.)	Net profit (Rs.)	BC ratio
PKM-1	20.25	60750	19500	41250	3.11
Bhagya	18.75	56250	19000	37250	2.96
Farmers' practices	13.75	37500	20000	17500	1.87

good market preference over farmers' practices. Rajamanickam (2019) stated the demonstrated plot recorded the 60 per cent increased yield over the farmers' practices. Hence, farmers realized the performance of moringa variety PKM-1 and was better choice in terms of yield and market preference under Ramanathapuram conditions.

CONCLUSION

It was concluded that PKM-1 recorded the highest yield (20.25 t/ha), net profit of Rs. 41,250/- ha with the benefit cost ratio of 3.11 and 40 per cent increased yield over the farmers practices. It was found that farmers were very much convinced with the performance of moringa var. PKM-1, fetches higher income, higher yield and recorded the low incidence of fruit fly when compared with Bhagya and farmers' practices.

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