



Short communication

Variability among drumstick (*Moringa oleifera* Lam.) accessions from central and southern Kerala

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Abstract

Twenty eight accessions of drumstick from central and southern Kerala were evaluated. Morphology, yield and quality attributes of these accessions were substantially different. Accessions from Thiruvananthapuram (MO 13, 24 and 26) showed three distinct flowering peaks in a year, while others showed one or two peaks. Fruits per plant (174 to 612), fruit yield (8.94 to 70.46 kg per tree), leaf vitamin A (8108 to 13216 I.U) and fruit vitamin A (95 to 185 I.U.) also showed considerable variations. Vitamin C content in leaf and fruit was highest for MO 18 (226 mg per 100 g leaf and 129 mg per 100 g fruit). Overall ranking showed the relative superiority of MO 26 and MO 28 over others.

Keywords: Flowering, growth, quality, yield

Drumstick (*Moringa oleifera* Lam.), is a multipurpose tree vegetable belonging to the family Moringaceae. The crop is grown all over the country for its nutritious pods, leaves and flowers, which are rich sources of proteins, vitamins and minerals (Rajkumar et al., 1973). In spite of its nutritional and medicinal importance, the crop still remains underexploited (Peter, 1979). Kerala, being a place with tremendous bio-resource diversity, a study was undertaken to determine the variability among drumstick populations in terms of growth, yield and quality and to identify superior genotypes.

A survey was carried out in central and southern Kerala during April-May 2003 to locate morphologically distinct drumstick trees. Information on history, age and the special attributes of individual trees were gathered. Based on uniqueness and yield, 28 trees between the age group of 10 to 20 years were identified (Table 1). Data on growth, flowering, yield and its attributes were recorded *in situ* by conducting periodical field visits. While flowering pattern was observed over a one-year period,

aspects such as flower number, colour and shedding and fruit characters like length, girth, number and average fruit weight were evaluated during the summer season of 2003. Limb cuttings of these 28 accessions were planted in the experimental field at Vellayani for further investigations. The accessions were ranked based on biometric characters and the overall ranking was worked out by summing up the individual scores (Rajamony et al., 1994); accession with the lowest overall score was given the highest rank. Vitamin A and C concentrations of the leaves and fruits were estimated by the methods of Srivastava and Kumar (1998) and Sadasivam and Manickam (1992) respectively.

Accessions from different locations showed considerable variability in growth, flowering, yield and fruit attributes (Table 2). Fruit characters, especially length was variable (Fig. 1), which influences the handling, packaging and transportation procedures. MO 28 produced the longest fruits (100 cm), and MO 20, the shortest ones (32 cm). Fruit girth ranged from 4.22 cm (MO 8) to 8.36 cm

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Table 1. Details of drumstick accessions and their overall ranking

Acc. No.	Location	Tree age (years)	Other features	Overall score ¹	Final rank
MO 1	Puthussery, Palakkad	15	Medium-sized tree, long fruits	149	7
MO 2	Paravattom, Thrissur	10	Medium-sized tree, small fruits	253	25
MO 3	Kalathode, Thrissur	12	Medium-sized tree, profuse branching and fruiting	206	20
MO 4	Punkulam, Thiruvananthapuram	10	Medium-sized tree, profuse bearing	176	13
MO 5	Vellayani, Thiruvananthapuram	12	Medium-sized tree, regular bearing	291	26
MO 6	As above	15	Medium-sized tree, regular bearing	209	21
MO 7	Nagercoil	10	Large tree, extra long fruits	103	3
MO 8	Vellayani, Thiruvananthapuram	12	Large tree, medium-sized fruits	210	22
MO 9	As above	15	Medium-sized tree, medium-sized fruits	192	16
MO 10	As above	15	Large tree, profuse bearing, medium-sized fruits, susceptible to fruit rot	139	6
MO 11	Kanjikuzhy, Kottayam	17	Medium-sized tree, profuse bearing	166	12
MO 12	Thrissur	14	Medium-sized tree, medium-sized fruits	165	11
MO 13	Statue, Thiruvananthapuram	10	Profuse flowering, susceptible to fruit rot	160	10
MO 14	Kallada, Kollam	14	Profuse bearing	203	19
MO 15	Vellayani, Thiruvananthapuram	10	PKM-1 released from TNAU	116	4
MO 16	Ettumanoor, Kottayam	16	Small tree with profuse bearing	188	15
MO 17	Edapazhanji, Thiruvananthapuram	18	Medium-sized tree, profuse flowering and fruiting	220	24
MO 18	Vazhuthacaud, Thiruvananthapuram	12	Large tree, heavy bearing	147	7
MO 19	Vallakadavu, Thiruvananthapuram	15	Medium-sized tree, profuse flowering and fruiting	215	23
MO 20	Vallakadavu, Thiruvananthapuram	10	Medium-sized tree, small pointed fruits	194	17
MO 21	Manacaud, Thiruvananthapuram	12	Large tree, profuse flowering and fruiting, large leaflets	181	14
MO 22	As above	14	Large tree, long and fleshy fruits, drooping due to fruit weight	159	9
MO 23	Fort, Thiruvananthapuram	17	Medium-sized tree, small fruits, seeds bulging	199	18
MO 24	Thycaud, Thiruvananthapuram	20	Large tree, flowering and fruiting throughout the year	127	5
MO 25	Pulimoodu, Thiruvananthapuram	15	Medium-sized tree, regular bearing	149	8
MO 26	Vazhuthacaud, Thiruvananthapuram	20	Medium-sized tree, flowering and fruiting throughout the year	88	1
MO 27	Vatyoorkavu, Thiruvananthapuram	20	Medium-sized tree, average-sized fruits	147	7
MO 28	Parottukonam, Thiruvananthapuram	10	Large tree, very long and fleshy fruits	102	2

¹Sum of the individual scores for biometrical and the biochemical attributes studied (Rajamony et al., 1994)

(MO 28) with a mean of 5.68 cm. The highest fruit weight (227.3 g) and total fruit yield (70.46 kg) were also noted for MO 28. Number of fruits per tree is yet another important factor that decides the yield potential of trees; it ranged between 74 (MO 16) and 612 (MO 24). As expected, larger fruits had more seeds; such fruits, however, were less abundant than fruits of moderate size. Regarding fruit colour, the accessions MO 24, 20, 18 and 23 produced greyish green fruits, while all others produced green fruits.

Vitamin A content in leaf ranged from 8108 (MO 1) to 13215.8 I.U. (MO 26). Maximum vitamin A and C contents in fruit were, however, observed in MO 10 (184.7 I.U.) and MO 18 (129 mg 100 g⁻¹) respectively.

Three accessions from Thiruvananthapuram (e.g., MO 13, 24 and 26) showed three flowering peaks in a year (Feb, May, and Aug) while MO 16 (from Kottayam) recorded just one peak (April-May); all others were intermediate. Variability in flowering time was reported



Fig. 1. Variation in fruit morphology of drumstick accessions- a representative sample

by several previous workers too (Ramachandran et al., 1980; Pushpangathan et al., 1996; Mathew and Rajamony, 2004). Flowers per inflorescence also showed considerable variations (e.g., 25 in MO 22 and 65 in MO 28).

Overall ranking (Table 1) indicates that MO 26, an accession from Thiruvananthapuram is the best with remarkably high fruit length, girth, weight and yield followed by MO 28. Other promising accessions include MO 7, 15 and 24 with an overall score of 103, 116 and 127 respectively. The profound variability among the drumstick accessions can be utilized for evolving new types with better yield and quality attributes. The adaptability of these accessions should, however, be further evaluated by conducting multi-location trials. Nonetheless, as an *ad hoc* step, these elite clones can be recommended for cultivation in the southern region of Kerala.

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Table 2. Flower number, fruit characters, and vitamin A and C concentrations (fruits and leaves) of drumstick accessions from central and southern Kerala

Parameter	Mean	SD	Max	Min
Flowers/inflorescence (no.)	49.9	10.49	65.23	25.4
Fruit length (cm)	51.64	19.17	100.0	32.3
Fruit girth (cm)	5.68	1.18	8.36	4.22
Fruits (no. plant ⁻¹)	326	125	612	174
Fruit weight (g)	75.32	56.89	227.3	25.3
Yield (kg plant ⁻¹)	27.35	17.57	70.46	8.3
Seeds (no. fruit ⁻¹)	20.47	3.16	25.6	14.6
Leaf vitamin A (I.U.)	10839	1349	13216	8108
Fruit vitamin A (I.U.)	141.2	32.5	184.7	94.6
Leaf vitamin C (mg 100 g ⁻¹)	208.3	15.2	231.3	175.2
Fruit vitamin C (mg 100 g ⁻¹)	114.8	11.9	129.2	87.5

SD= standard deviation

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