

ORIGINAL ARTICLE

Evaluation for Biodiversity Conservation of Juicy Type Traditional Mango Varieties (*Mangifera indica*) of South Kerala

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ABSTRACT

Kerala is having a rich genetic diversity of traditional mangoes. There exists a lot of polyembryonic mango varieties also. Many indigenous varieties are on the verge of extinction. Among native types of mangoes, juicy type have great acceptance among people. No systematic study had been conducted to characterize these traditional varieties. Concentrated efforts are needed to conserve these valuable genetic resources. Many traditional mango cultivars are seemed to resist the change in climatic situations also. Most of the introduced varieties and hybrids are not performing well under changed climatic situations and they are also highly susceptible to pests and diseases. Hence a survey was conducted by Kerala Agricultural University, Farming Systems Research Station, Sadanandapuram, with an objective of studying identifying, characterization and evaluation of juicy type traditional mango varieties from four Southern districts of Kerala. Twenty five superior lines of juicy type traditional mangoes having excellent fruit quality were identified during the study. Fruit weight of these mangoes varied from 93g to 552g, number of fruits varied from 100 to 1500 numbers. Highest TSS (26.20° brix) was noticed with the elite line PTA-1 and fruit acidity of 0.306 % , which was the lowest one was obtained with KLM-10. The highest value reported in the case of carotenoid was with KLM- 5 (5.21 mg 100g⁻¹), The top most (28.21 mg 100g⁻¹) ascorbic acid value was seen in KLM -1. From the study, it is confirmed that total sugar content of 16.01 % was expressed from KLM-1, which was the highest..

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INTRODUCTION

India is the centre of origin of mango and from there it spreads to many other tropical and sub tropical countries. Mango, the king of fruits is having a rich genetic diversity in Kerala. Many local genotypes from South Kerala shows high genetic variability. Geographical origin also had a significant role in creating the variability among mangoes. Indigenous mangoes with great genetic variability have greater capacity to adapt to the changed climatic conditions. [1]. The higher level of biodiversity among South Indian mangoes may be due to the specific variants of genes and they have a tropical growing climate, which is an advantageous factor too [2]. In spite of the rich germplasm exists in case of traditional mangoes, its genetic pool has not been even exploited to the fullest extent with respect to extent of its variability for its proper conservation and for further studies. Concerted efforts should be employed for long term safeguarding and conservation of the valuable mango genetic resources both by *ex situ* and *in situ* approaches.

Kerala's eco geographical diversity is the main reason for its rich genetic diversity of mangoes. Basic thing to species diversity is of course, the genetic diversity, which is treated as a important factor in studying a species, because the magnitude and range of heterogeneity in populations of mango species have great role in influencing its evolutionary capacity. Superior genotypes are identified with the help of identifying its genetic diversity so that it can be conserved and finally multiplied to the farmers. Mango genetic conservation works are important in long run [3].

Most of the introduced varieties and hybrids are not performing well under changed climatic situations and they are also highly susceptible to pests and diseases [5]. Many traditional mango cultivars are seemed to resist the change in climatic situations [6, 7]. Many traditional mango varieties are found as avenue trees in road sides and also in many of the farmer's fields [4]. Hence the present study is conducted with an objective of identifying, characterization and evaluation of juicy type native elite lines of mango from Southern parts of Kerala.

MATERIAL AND METHODS

Detailed study was undertaken for identifying traditional *Mangifera indica* varieties from various locations in Kollam, Thiruvananthapuram, Pathanamthitta and Alapuzha districts. Frequent visits were conducted to farmer's field for collecting information's about juicy type indigenous mangoes. Superior lines of native juicy mangoes having high fruit yield, excellent fruit quality, regular bearer, pest and disease resistance were selected for the detailed study.

Quantitative and qualitative descriptive characters of mango (IPGRI descriptor) were studied. This includes tree descriptor, leaf and inflorescence, fruit, stone, plant and fruit quality descriptors. Tree descriptor study includes, tree age, tree type, height of tree, trunk circumference, crown shape and foliage density. Leaf descriptor study includes leaf blade shape, leaf blade length, leaf blade width, petiole length, leaf apex shape, colour of young leaf, colour of fully developed leaves and leaf fragrance. Inflorescence descriptor includes secondary flowering, regularity of bearing, inflorescence position, shape and length and inflorescence colour. Fruit descriptors like fruiting period, fruit length, fruit diameter, fruit length, fruit beak type, pulp colour of ripe fruit, pulp colour and presence of turpentine flavor. Characterization of selected traditional mango varieties were done based on morphological markers.

RESULTS AND DISCUSSION

Based on the study it was seen that (Table.1) the fruit weight ranges from 93 g (KLM-3) to 552 g(KLM-7), length of mango fruits showed values between 9.00 cm (KLM-15) to 14.20 cm (KLM-1), fruit width varied from 7.3 cm (PTA-1) to 12.00 cm in (KLM-1), diameter of the fruit showed a range of 23.30 cm (PTA-1) to 30.00 cm (ALA-4), volume of fruit reported values from 309 cc (KLM-15) to 550.00 cc (KLM-1), weight of fruit pulp varied from 218.00 g (KLM-15) to 407.00g (ALA-5), peel weight varied from 18.28 g (PTA-1) to 72.67 g (KLM-8).

Table 1. Study of characteristics of fruits of juicy type native mangoes

Accession number	Fruit Weight (g)	Fruit Length (cm)	Fruit width (cm)	Fruit diameter (cm)	Fruit volume (cc)	Pulp weight (g)	Peel weight (g)
KLM1	120.00	14.20	12.00	26.00	550.00	340.17	38.93
KLM 2	150.00	13.00	9.50	26.00	350.00	319.00	40.00
KLM 3	93.00	11.00	8.00	25.50	300.67	247.00	35.00
KLM 4	107.00	13.50	10.00	29.33	520.00	350.00	69.00
KLM 5	155.00	11.00	10.00	26.00	381.00	293.00	49.00
KLM 6	210.00	10.50	8.50	24.00	320.00	198.00	42.00
KLM 7	552.00	12.00	10.50	27.00	440.00	320.00	62.00
KLM 8	126.00	11.00	8.50	25.60	320.00	238.00	72.67
KLM9	180.00	10.30	8.80	25.50	350.00	256.33	38.07
KLM 10	280.00	12.00	9.20	26.00	410.00	330.00	38.17
KLM 11	283.00	11.50	9.00	27.00	391.67	310.00	38.00
KLM 12	115.00	11.00	7.90	24.00	320.00	261.00	29.00
KLM 13	193.00	10.00	8.40	26.47	318.33	242.00	42.00
KLM 14	130.00	12.00	9.20	29.17	475.33	396.00	46.00
KLM 15	210.00	9.00	9.00	27.00	309.00	218.00	27.00
ALA 1	384.00	11.50	8.60	25.67	400.00	307.00	46.00
ALA 2	367.00	10.00	10.00	26.80	375.00	284.00	44.00
ALA 3	342.00	10.50	8.47	24.80	319.00	250.00	31.07
ALA 4	488.00	12.80	10.50	30.00	500.00	390.00	50.00
ALA 5	490.00	12.50	10.43	29.50	486.00	407.00	52.00
ALA 17	413.00	11.50	9.27	27.00	420.00	327.00	37.67
ALA 26	370.00	11.00	9.00	27.00	369.00	310.00	34.00
PTA1	403.00	9.80	7.30	23.30	390.00	357.00	18.28
PTA 2	433.00	13.00	9.00	26.00	420.00	330.00	40.00
TVM 10	430.00	12.00	9.50	28.50	460.00	335.00	38.00
CD (0.05)	22.34	1.32	1.64	2.08	23.52	16.62	4.22

It is evident from the trial results that (Table.2), fruit weight from various elite lines of climate resilient traditional mango varieties varies from 93.0 g (KLM-3) to 552.0 g (KLM-7), number of fruits per tree varies from 100.0 (KLM-4) to 1500 (KLM-12), yield of fruits from tree varied from 10.7 Kg (KLM-4) to 275.25 kg (ALA-1). Overall acceptability of these juicy type traditional mangoes based of organoleptic analysis, varies from lowest score of 6 (KLM-4) to highest score of 9 (KLM-5) and (PTA-2).

Table 2. Study of Fruit yield characteristics of juicy type traditional mangoes

Accession number	Fruit Weight (g)	Number of fruits	Yield per tree (Kg)	Overall acceptability (organoleptic)
KLM1	120.00	200	24.00	8
KLM 2	150.00	350	52.50	8
KLM 3	93.00	500	46.50	8
KLM 4	107.00	100	10.70	6
KLM 5	155.00	250	38.75	9
KLM 6	210.00	300	63.00	7
KLM 7	552.00	450	248.40	7
KLM 8	126.00	300	37.80	8
KLM9	180.00	250	45.00	8
KLM 10	280.00	600	168.00	8
KLM 11	283.00	500	141.50	8
KLM 12	115.00	1500	172.50	7
KLM 13	193.00	750	144.75	8
KLM 14	130.00	930	120.90	8
KLM 15	210.00	800	168.00	8
ALA 1	384.00	750	275.25	8
ALA 2	367.00	200	68.40	7
ALA 3	342.00	250	122.00	7
ALA 4	488.00	200	98.00	8
ALA 5	490.00	600	247.80	8
ALA 17	413.00	450	166.50	8
ALA 26	370.00	350	151.55	8
PTA1	403.00	250	107.50	7
PTA 2	433.00	300	95.19	9
TVM 10	430.00	350	168.00	7
CD(0.05)	32.50	58.74	22.42	1.04

Results of quality characteristics of fruits had a significant difference among various superior lines of native mango types (Table .3). Total Soluble Solids values had values ranged from 12.0 °Brix (ALA-5) to (PTA-1) 26.2°Brix, fruit acidity varied significantly from 0.306 % (KLM-10) to 1.50 % (PTA-2 and ALA-2). Fruit carotenoid values varied from 1.12 mg 100 g⁻¹ (KLM-12) to 5.21 mg 100 g⁻¹ (KLM-5), fruit ascorbic acid content had values ranged from 10.60 mg 100 g⁻¹ (TVM-10 and ALA-3) to 28.21 mg 100 g⁻¹ (KLM-1), total sugar content varied from 7.82 % (KLM-14) to 16.01 % (KLM-1), reducing sugar content of fruit had significant difference among different accessions varied from 1.30 % (ALA-17) to 4.9 % (KLM -1), fruit non reducing sugar had values varied from 4.02 % (KLM-3) to 12.16% (KLM-13 and PTA-1).

Table 3. Fruit quality analysis of juicy type traditional mangoes

Accession number	TSS (°brix)	Acidity (%)	Carotenoid (mg 100 g ⁻¹)	Ascorbic Acid (mg 100 g ⁻¹)	Total Sugar (%)	Reducing Sugar (%)	Non Reducing Sugar (%)
KLM1	16.00	0.420	1.40	28.21	16.01	4.90	11.00
KLM 2	17.00	0.320	4.91	24.00	7.90	1.60	6.38
KLM 3	15.0	0.320	2.27	15.00	8.31	4.13	4.02
KLM 4	13.00	0.640	4.20	15.00	9.22	3.00	6.30
KLM 5	21.00	0.640	5.21	15.20	14.20	3.03	11.06
KLM 6	19.00	1.900	2.26	15.00	10.40	2.50	8.00
KLM 7	18.00	0.960	3.00	30.00	8.21	2.27	5.83
KLM 8	14.00	0.640	2.04	24.00	13.27	3.60	9.43
KLM9	20.00	0.640	3.15	17.01	8.29	3.00	5.29
KLM 10	15.00	0.306	3.36	24.00	13.02	2.94	9.97
KLM 11	19.00	0.640	3.20	12.00	14.70	2.96	11.51
KLM 12	16.00	0.320	1.12	17.05	8.06	1.78	6.19

KLM 13	18.00	0.627	2.91	24.00	13.95	2.00	12.16
KLM 14	12.00	1.433	1.88	16.54	7.82	1.90	5.91
KLM 15	20.00	0.600	1.55	13.98	8.44	3.28	5.16
ALA 1	19.00	0.627	2.54	18.00	10.00	2.63	6.38
ALA 2	16.00	1.500	2.20	17.38	12.55	2.77	9.72
ALA 3	13.00	0.640	2.59	10.60	9.92	2.77	6.99
ALA 4	19.00	0.320	2.65	13.32	12.91	3.57	9.23
ALA 5	12.00	1.227	2.01	17.33	9.02	1.42	8.52
ALA 17	15.00	1.493	2.32	12.87	8.60	1.30	7.28
ALA 26	17.00	0.943	3.20	12.00	15.64	3.50	12.00
PTA1	26.20	0.627	2.91	24.00	13.95	2.00	12.16
PTA 2	17.00	1.500	2.20	17.38	12.55	2.77	9.72
TVM 10	17.00	0.640	2.59	10.60	9.92	2.77	6.99
CD (0.05)	1.14	0.166	0.26	2.42	2.86	0.24	2.06

CONCLUSION

Native mango accessions are very less studied, characterized and conserved. Study of these elite juicy type lines will help in conserving superior types of traditional mangoes, which are on the verge of extinction. Hence concentrated efforts should be under taken to study, characterize these elite types indigenous mango from southern parts of Kerala and its conservation and finally its multiplication and distribution to farmers. The study on morphological characterization of juicy type traditional mangoes revealed that fruit weight of the selected mangoes varied from 93g to 552g. Highest TSS (26.20° brix) was noticed with the superior line PTA-1 and in case of fruit acidity, the lowest value of 0.306 % was reported from KLM-10. Highest carotenoid content of 5.21 mg 100g⁻¹ was obtained from KLM- 5, fruit ascorbic acid content was highest in KLM -1 (28.21 mg 100g⁻¹). The study showed that highest total sugar content of 16.01 % was reported from KLM-1.

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