



## Short communication

# Variability in physico-chemical characters of mango genotypes collected from Kuttanad tracts of Kerala

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### ABSTRACT

An extensive survey was conducted during 2011-13 to identify the elite mango (*Mangifera indica* L.) types among its natural population existing in Kuttanad tracts of Kerala. The ripe fruits of 28 selected genotypes were analyzed for physical and quality parameters. There was significant variation among the collections. Individual fruits ranged from 60.17-920.03 g, pulp weight 40.13-780.98 g, fruit length 8.32-19.20 cm, fruit diameter 14.29-31.28 cm, fruit volume 58.65-918.75 cc, and specific gravity 1.00-1.05 g/cc. Similarly, the chemical parameters also varied significantly. The TSS varied from 9.83-21.0°Brix, ascorbic acid 2.40-91.33 mg/100 g, acidity 0.16-0.92% and total sugars 7.43-51.70%. Wide range of variability in physico-chemical parameters amongst suggested that superior genotypes could be selected for commercial cultivation based on their usage.

**Key words:** Mango, physico-chemical characters, seedling variability.

Kerala has mango cultivation over an area of 74.44 thousand hectares with an annual production of 441.43 thousand tonne with productivity of 5.93 t ha<sup>-1</sup> (FIB, 3). Mango is an important fruit tree crop grown in Kuttanad tracts of Kerala as mixed crop in homesteads along with coconut. Mango is also planted along the highways as shade trees in many parts of Kuttanad. Detailed information on these indigenous mango varieties/ clones grown in Kuttanad tracts are lacking. Since most of these trees are seedling in origin a lot of variability exist in fruit quality. Hence, an attempt was made to study the natural variations in the genotypes.

This study was conducted in the Horticulture department of Regional Agriculture Research Station, Kumarakom under Kerala Agriculture University during 2010-14. A survey was conducted in 33 *panchayats* of Alappuzha, Kottayam and Pathanamthitta districts coming under the Kuttanad tracts. Only seedling progenies were included in this study and tagged for identification. The fully matured fruits were collected from each trees and were ripened in laboratory under ambient conditions. The sample size in each genotype was five fruits. Organoleptic study was also conducted. The physical, morphological and biochemical characters of the fruits were recorded. The data on physical parameters like fruit weight, pulp weight, peel weight, stone weight were recorded with the help of an electronic balance. The chemical parameters were analyzed following the standard procedures. Total soluble solids (TSS) was measured

with the help of a hand refractometer (AOAC, 2). Reducing sugars, non reducing, total sugars and titratable acidity were also estimated (Ranganna, 7). Ascorbic acid content was estimated following the methods of Sadasivam and Manickam (8). Analysis of variance (ANOVA) using SPSS version 19 was performed to ascertain the differences in fruit parameters among different mango selections.

A significant variation in physico-chemical characters of fruits was observed among 28 mango selections surveyed. The information related to these parameters enables to select the superior chance seedling clones, which could have different uses (Simi *et al.*, 12; Radha and Manjula, 5; Radha and Nair, 6; Satyavati *et al.*, 10).

The results of this study showed considerable variability in fruit characters (Table 1). Highest variability was observed for pulp weight and minimum for specific gravity. The fruits of selection AKM-3 showed superiority in average fruit weight (920.03 g) and pulp weight (780.98 g), whereas the selections AKM-8 (60.17 g) possessed lowest fruit weight (Table 2). The peel weight was also highest in AKM-3 (69.64 g). The stone weight ranged from 9.80 to 82.41 g and was maximum in AKM-3 followed by AMM-1. The maximum fruit length was observed in KKM-2, while maximum fruit diameter was in AKM-3. The variation in length and diameter of fruits in mango varieties was also earlier observed by Sharma *et al.* (11) and Singh *et al.* (13).

Result of the qualitative analysis of mango fruits indicated that the selection KKM-3 (21.0°Brix) (Table 3) showed superiority for TSS followed by KKM-2, AKM-

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**Table 1.** Physico-chemical variations in fruits of mango selections from Kuttanad tracts of Kerala.

Parameter	Mean	CV (%)	SD	Range	
				Min.	Max.
Fruit wt. (g)	274.63	63.81	175.24	60.17	920.03
Stone w(. g)	40.54	46.60	18.89	9.80	82.41
Pulp wt. (g)	209.51	72.73	152.38	40.13	780.98
Peel w(. g)	25.61	55.88	14.31	8.36	69.64
Fruit length (cm)	13.11	21.82	2.86	8.32	19.20
Fruit dia. (cm)	22.24	21.31	4.74	14.29	31.28
Fruit vol. (cc)	273.14	64.14	175.18	58.65	918.75
Specific gr. (g/cc)	1.01	1.00	0.01	1.00	1.05
TSS (°Brix)	16.27	18.93	3.08	9.80	21.00
Total sugars (%)	31.26	43.95	13.74	7.43	51.70
Reducing sugar (%)	4.01	34.91	1.40	1.79	8.14
Acidity (%)	0.40	52.50	0.21	0.16	0.92
Ascorbic acid (mg/100 g)	28.09	93.34	26.22	2.40	91.33

CV = Coefficient of variation, SD = Standard deviation

**Table 2.** Variability in physical characteristics of fruits among mango selections.

Genotype	Fruit wt. (g)	Peel wt. (g)	Pulp wt. (g)	Seed wt. (g)	Fruit length (cm)	Fruit dia. (cm)	Fruit vol. (cc)	Sp gr. (g/ cc)
APM-1	196.68	11.23	146.59	38.50	12.13	21.66	196.59	1.00
APM-2	95.30	10.50	70.53	19.70	8.60	17.91	95.01	1.00
AMM-1	480.25	36.17	358.97	82.41	16.20	25.15	477.05	1.01
KPM-1	70.50	11.64	46.36	11.91	9.50	15.36	70.15	1.00
AKM-1	214.07	13.88	167.08	31.91	14.08	22.67	213.78	1.00
AKM-2	250.07	20.98	184.32	44.34	11.40	19.56	249.61	1.00
AKM-3	920.03	69.64	780.98	69.42	14.54	31.28	918.75	1.01
AKM-4	380.01	31.26	317.40	31.69	16.27	28.66	377.35	1.01
AKM-5	200.06	28.28	136.10	44.68	12.03	14.29	199.26	1.00
AKM-6	420.35	38.24	329.26	52.21	15.07	25.98	419.97	1.00
AKM-7	380.03	17.48	310.83	51.65	14.73	23.03	379.71	1.00
AKM-8	60.17	8.36	40.13	11.56	8.32	14.73	58.65	1.01
AKM-9	220.07	15.79	168.75	35.40	12.5	22.50	216.43	1.02
AKM-10	220.09	20.95	184.73	44.39	15.25	22.40	219.43	1.00
AKM-11	80.02	10.43	59.80	9.80	9.53	16.10	78.40	1.01
KKM-1	303.33	18.36	240.02	40.90	11.57	17.02	298.10	1.02
KKM-2	480.20	57.04	384.54	48.24	19.20	29.10	479.68	1.00
AKM-12	399.93	36.33	363.40	18.36	17.60	24.60	399.35	1.00
AKM-13	300.12	35.9	214.50	49.53	14.1	26.13	299.38	1.00
KKM-3	340.08	27.77	256.00	56.25	14.19	26.04	339.57	1.00
KKM-4	140.11	15.50	102.00	22.56	12.20	19.60	139.25	1.01
AKM-14	220.01	23.98	151.74	44.40	12.17	22.50	219.10	1.00

Contd...

Table 2 Contd...

Genotype	Fruit wt. (g)	Peel wt. (g)	Pulp wt. (g)	Seed wt. (g)	Fruit length (cm)	Fruit dia. (cm)	Fruit vol. (cc)	Sp gr. (g/ cc)
AKM-15	240.03	34.4	139.21	67.04	11.17	22.13	229.08	1.05
AKM-16	339.89	27.71	257.48	56.27	14.43	25.96	339.25	1.00
KKM-5	140.01	19.00	106.00	15.50	12.07	19.50	139.44	1.00
KKM-6	120.16	17.10	67.13	35.97	9.63	17.46	119.35	1.01
KAM-1	159.66	20.06	67.88	34.25	10.67	20.93	158.65	1.01
AKM-17	318.33	39.03	214.52	66.24	18.01	30.50	317.53	1.01
CD <sub>0.05</sub>	12.47	1.63	1.53	1.63	0.61	0.70	12.70	0.009

**Table 3.** Variability in chemical characteristics of different mango selections.

Genotype	TSS (°Brix)	Total sugars (%)	Red. sugar (%)	Ascorbic acid (mg/100 g)	Acidity (%)
APM-1	18.30	48.85	3.04	44.00	0.19
APM-2	14.10	51.70	5.50	91.33	0.24
AMM-1	13.80	7.43	3.68	4.00	0.51
KNM-1	11.30	10.70	3.43	7.53	0.54
AKM-1	17.50	49.96	3.25	18.00	0.42
AKM-2	15.90	38.28	3.69	60.33	0.51
AKM-3	17.40	33.03	4.79	8.40	0.21
AKM-4	11.20	26.11	4.18	2.40	0.92
AKM-5	11.00	17.80	2.70	2.50	0.46
AKM-6	9.80	14.80	1.79	7.46	0.26
AKM-7	18.30	47.67	3.86	7.12	0.49
AKM-8	18.30	18.24	2.56	11.00	0.26
AKM-9	17.10	46.26	3.86	76.00	0.33
AKM-10	19.10	32.93	2.68	74.47	0.51
AKM-11	18.00	48.07	4.64	42.52	0.22
KKM-1	19.00	20.10	2.08	80.83	0.28
KKM-2	19.20	28.20	8.14	27.45	0.26
AKM-12	19.10	32.89	3.96	8.50	0.34
AKM-13	18.00	36.72	2.95	8.50	0.30
KKM-3	21.00	32.55	5.49	25.85	0.22
KKM-4	16.00	39.06	4.67	17.50	0.23
AKM-14	18.00	36.98	4.49	22.05	0.84
AKM-15	12.40	14.43	3.38	42.07	0.33
AKM-16	12.40	12.19	5.33	13.05	0.82
KKM-5	16.00	39.11	4.60	17.72	0.23
KKM-6	18.00	49.04	3.21	8.01	0.16
KAM-1	17.50	15.68	3.26	25.84	0.73
AKM-17	17.60	26.46	6.97	32.07	0.35
CD <sub>0.05</sub>	0.30	2.29	0.44	4.70	0.06

10, AKM-12 and KKM-1. In our study TSS value ranged between 9.8° to 21.0°Brix (Table 1). Earlier, Sathyavathi *et al.* (10) reported that TSS of fruits of local types of Kerala varied from 10° to 24°Brix. Similarly, Salvi and Gunjate (9) also reported significant variation for pulp TSS in different mango genotypes at Vengurle. The range of TSS existing in the indigenous genotypes were comparable with the commercial mango varieties. Furthermore, they were also found free from most of the pests and diseases commonly found in commercial varieties of Kerala. The total sugars were found to be high in APM-2 and was on par with AKM-1. The highest value for reducing sugar was obtained for KKM-2. The ascorbic acid content was highest in AMP-2.

All these physico-chemical parameters of mango fruits may be given due consideration to operate selection procedure for identifying the promising selections for table purpose. According to Navprem *et al.* (4) the variability existing in the germplasm can be exploited for strategic future mango improvement programmes. The results of the present experiment indicate that many of indigenous mango types in low land of Kuttanad met the standard parameters for considering the fruit to be of high quality. These selections were propagated through soft-wood grafting and evaluated on large scale before their commercial release.

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