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Physico-chemical characters of some newly evolved mango hybrids

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ABSTRACT

The investigations were carried out to analyse the physico-chemical characters of newly evolved mango hybrids. The fruits were exceptionally of large size in the hybrids H-1-6, H-1-9, H-4-2, H-1-4 and H-13-7, which were cross between Amrapali x Sensation. Peel was found very thin in H-2-1 (Amrapali x Lal Sundari). Most of the hybrids had thicker peel in comparison to their parents. Maximum stone size and pulp: stone ratio were observed in H-1-9 and H-13-7, respectively. Fruits of the hybrids namely, H-1-1, H-1-6, H-1-9, H-13-1, H-2-2 and H-2-3 produced attractive red shoulders on yellowish background. Highest ascorbic acid and total sugar content were recorded in H-13-8 and H-3-5, respectively.

Key words: Mango, new hybrids, physico-chemical characters.

INTRODUCTION

Mango (*Mangifera indica* L.) "The King of Fruits" is an important member of the family Anacardiaceae and is believed to have originated in the Indo-Burma region (De Candolle, 2; Popenoe, 7; Mukherjee, 4). It is the most popular fruit among millions of people in the Orient, particularly in India, and is the choicest of all indigenous fruits. It occupies relatively the same position in the tropics as is enjoyed by the apple in temperate America and Europe. So far as many as 30 mango hybrids have been released in India due to hybridization work carried out over past 40 years. Each of them being improvement over the regional preferential variety for certain specific characters. Therefore the present study is amide to evaluate the performance of some newly evolved mango hybrids based on physico-chemical characters.

MATERIALS AND METHODS

Sixteen mango hybrids and three parents were included in the study. The hybrids are under field evaluation for their future possible release. Whereas, one hybrid (H-13-1) has been released as Pusa Arunima during February, 2002 by IARI, New Delhi. These are grouped in two categories (Table 1).

Physico-chemical analysis work was carried out on 16 hybrids along with three parents (Amrapali, Sensation and Lal Sundari), which were used for the evolution. All the hybrids and parents are of nine to ten-year-old except the hybrids like H-13-1, H-13-7 and H-13-8, which were of over 20-year-old. Standard procedures were followed for estimation of different quality parameters. The experiment was laid out in the Randomized Block Design (RBD).

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Table 1. Newly evolved mango hybrids and parents used for the study.

Parentage	Hybrids	No. of hybrids
Amrapali x Sensation	H-1-1, H-1-4, H-1-6, H-1-9, H-3-5, H-3-7, H-4-1, H-4-2, H-13-1, H-13-7 and H-13-8	11
Amrapali x Lal Sundari	H-2-1, H-2-2, H-2-3, H-2-6 and H-2-11	5
	Total	16

RESULTS AND DISCUSSION

Among hybrids, H-1-1 gave the minimum fruit weight (181.0 g), which was at par with H-1-4 (184.8 g), H-13-7 (186.2 g) and H-3-7 (189.5 g). The longest fruit was harvested from H-1-6 (12.57 cm), which was followed by H-1-9 (12.16 cm) and H-4-2 (12.15 cm). Hybrid H-2-6 gave the maximum fruit width (6.63 cm) followed by H-13-1 (6.44 cm). Whereas, the minimum fruit width was recorded in H-3-7 (4.37 cm) followed by H-4-1 (4.44 cm) and H-3-5 (Table 2). Similar results were also reported by Sarkar *et al.* (8).

Similar trends were recorded for the fruit volume. The peel was found very thin in H-2-1 (1.07 mm), which was closely followed by H-3-5 (1.14 mm), H-4-1 (1.24 mm) and H-2-11 (1.25 mm). Hybrid H-2-3 had the thickest peel (1.94 mm) closely followed by H-3-7 (1.92 mm) and H-1-4 (1.76 mm). The maximum pulp weight was recorded in H-13-1 (170.9 g) closely followed by H-1-6 (166.0 g).

Table 2. Colour of fruit, pulp and fibreness of newly evolved mango hybrids and their parents.

Sl. No.	Genotype	Fruit colour	Pulp colour	Presence of fibrE
1.	H-1-1	Yellow, reddish shoulder	Yellow	Fibreless
2.	H-1-4	Yellowish green	Yellow	Abundant fibre
3.	H-1-6	Yellow, reddish shoulder	Yellow	Fibreless
4.	H-1-9	Yellow, reddish shoulder	Reddish yellow	Fibreless
5.	H-3-5	Yellowish green	Yellow	Abundant fibre
6.	H-3-7	Yellowish green	Reddish yellow	Abundant fibre
7.	H-4-1	Yellowish green	Yellow	Few fibre
8.	H-4-2	Yellowish green	Yellow	Few fibre
9.	H-13-1	Yellowm reddish shoulder	Reddish yellow	Fibreless
10.	H-13-7	Yellow, reddish tinge	Yellow	Fibreless
11.	H-13-8	Yellow, reddish tinge	Yellow	Fibreless
12.	H-2-1	Yellowish green	Yellow	Few fibre
13.	H-2-2	Yellow, reddish shoulder	Yellow	Few fibre
14.	H-2-3	Yellow, reddish shoulder	Yellow	Fibreless
15.	H-2-6	Yellowish green	Yellow	Few fibre
16.	H-2-11	Yellowish green	Yellow	Few fibre
17.	Amrapali (P_1)	Yellowish green	Deep orange	Fibreless
18.	Sensation (P_2)	Yellow, reddish shoulder	Reddish yellow	Few fibre
19.	Lal Sundari (P_3)	Yellow, reddish tinge	Yellow	Few fibre

Table 3. Fruit and stone characters of newly evolved mango hybrids and their parents.

Sl.No.	Genotype	Fruit weight (g)	Fruit length (cm)	Fruit width (cm)	Fruit volume (ml)	Peel thickness (mm)	Pulp weight (g)	Stone size (cm^2)	Stone weight (g)	Pulp: stone ratio
1.	H-1-1	181.0	8.49	5.80	179.6	1.59	126.7	30.35	36.19	3.50
2.	H-1-4	184.8	10.63	4.79	183.5	1.76	131.2	31.94	36.28	3.62
3.	H-1-6	233.8	12.57	4.59	232.2	1.47	166.0	35.68	47.22	3.52
4.	H-1-9	216.5	12.16	5.94	215.0	1.39	155.9	47.40	42.55	3.67
5.	H-3-5	192.7	8.19	4.49	191.3	1.14	134.9	26.31	38.75	3.49
6.	H-3-7	189.5	8.72	4.37	188.0	1.92	134.6	24.84	40.57	3.32
7.	H-4-1	213.3	9.77	4.44	211.7	1.24	149.3	30.42	43.06	3.47
8.	H-4-2	211.8	12.15	5.53	210.3	1.47	148.3	40.60	40.47	3.66
9.	H-13-1	244.2	9.63	6.44	242.6	1.42	170.9	38.67	47.42	3.60
10.	H-13-7	186.2	10.32	6.20	184.7	1.44	133.4	40.16	35.82	3.72
11.	H-13-8	195.7	9.24	6.21	194.4	1.49	137.9	35.08	37.81	3.65
12.	H-2-1	197.2	8.18	5.17	195.7	1.07	142.0	25.24	44.28	3.21
13.	H-2-2	195.0	10.63	4.88	193.6	1.48	140.4	27.64	44.62	3.15
14.	H-2-3	193.7	8.78	4.84	192.2	1.94	139.4	24.53	41.79	3.34
15.	H-2-6	194.0	11.62	6.63	192.4	1.49	139.7	36.08	42.53	3.28
16.	H-2-11	210.8	10.31	5.85	209.3	1.25	151.8	34.15	47.02	3.23
17.	Amrapali (P_1)	145.0	10.53	5.50	143.6	1.31	107.3	22.58	31.04	3.46
18.	Sensation (P_2)	153.0	9.73	7.23	150.5	1.35	99.5	44.60	32.13	3.10
19.	Lal Sundari (P_3)	111.5	8.64	5.00	110.3	1.37	73.6	22.22	22.40	3.29
	CD at 5%	10.8	0.61	0.33	10.9	0.2	7.6	4.89	2.34	0.18

P_{-1} = Amrapali as a female parent in all the hybrids, P_2 = Sensation as a male parent in hybrids S.No. (1 to 11); P_3 = Lal Sundari as a male parent in hybrids S.No. (12 to 16).

Table 4. Physico-chemical characters of newly evolved mango hybrids and their parents.

Sl. No.	Genotype	TSS (%)	Acidity (%)	TSS : acid ratio	Ascorbic acid (mg/100g)	Total sugars (%)	Reducing sugars (%)	Non-reducing sugars (%)	β-carotenoids (ml 100g)
1.	H-1-1	19.42	0.21	92.48	32.84	15.29	7.29	8.00	12755
2.	H-1-4	18.75	0.23	81.52	36.57	16.49	7.25	9.24	12658
3.	H-1-6	18.63	0.24	77.69	40.42	16.54	8.18	8.36	12227
4.	H-1-9	18.47	0.23	80.30	40.42	17.50	8.13	9.37	11257
5.	H-3-5	18.50	0.27	68.52	38.52	18.14	8.25	9.89	10449
6.	H-3-7	18.49	0.25	73.96	38.39	16.60	7.25	9.35	12211
7.	H-4-1	18.75	0.23	81.52	39.44	16.30	6.99	9.31	11549
8.	H-4-2	18.04	0.26	69.38	39.55	16.07	6.98	9.09	14102
9.	H-13-1	19.25	0.33	83.70	42.39	16.65	7.33	9.32	14213
10.	H-13-7	18.55	0.26	71.35	42.40	15.59	7.50	8.09	12732
11.	H-13-8	18.47	0.27	68.41	43.73	16.32	7.23	9.09	11710
12.	H-2-1	18.45	0.26	70.96	34.70	16.65	8.05	8.60	12765
13.	H-2-2	18.72	0.23	81.39	34.94	17.39	7.96	9.44	11682
14.	H-2-3	18.33	0.25	73.32	35.27	15.34	7.72	7.62	12213
15.	H-2-6	18.46	0.25	73.84	32.80	14.90	7.20	7.70	12078
16.	H-2-11	19.58	0.23	85.13	39.09	14.85	7.20	7.65	11337
17.	Amrapali (P_1)	23.91	0.21	113.86	32.79	16.97	7.35	9.62	15431
18.	Sensation (P_2)	14.75	0.31	47.58	42.32	16.05	7.29	8.76	10532
19.	Lal Sundari (P_3)	15.75	0.22	71.59	35.53	15.29	6.80	8.49	8758
	CD at 5%	1.26	0.03	6.4	1.28	1.73	N.S.	N.S.	209

P_1 = Amrapali as a female parent in all the hybrids, P_2 = Sensation as a male parent in hybrids S.No. (1 to 11); P_3 = Lal Sundari as a male parent in hybrids S.No. (12 to 16).

The minimum pulp weight was noticed in H-1-1 (126.7 g) followed by H-1-4 (131.2 g). H-2-3 had the smallest stone (24.53 cm^2). Anila and Radha (1) obtained similar results in Ratna compared to its female parent, Neelumunder Kerala conditions. The biggest stone was found in H-1-9 (47.40 cm^2) followed by Sensation. The lowest stone weight was observed in H-13-7 (35.82 g), which was closely followed by H-1-1 (36.19 g), H-1-4 (36.28 g) and H-13-8 (37.81 g). The stone weight was found maximum in H-13-1 (47.42 g) followed by H-1-6 (47.22 g) and H-2-11 (Table 1). The maximum pulp: stone ratio was recorded in H-13-7 (3.72). Six hybrids namely, H-1-1, H-1-6, H-1-9, H-13-1, H-2-2 and H-2-3 along with Sensation had attractive red shoulders on yellowish background (Table 3). Similar findings were recorded by Pandey and Majumder (6), Negi *et al.* (5). Genotypes H-1-9, H-3-7, H-13-1 and Sensation produced the reddish-yellow colour pulp. It was significant to note that hybrids H-1-1, H-1-6, H-1-9, H-13-1, H-13-7, H-13-8, H-2-3 and parent genotype Amrapali produced fibreless fruits. Earlier, Iyer (3) reported that light yellow colour of pulp was found dominant over orange-yellow pulp in mango. Maximum TSS and TSS: acid ratio was recorded in H-2-11 (19.58%) and H-1-1 (92.48%), respectively. Minimum acidity was recorded in H-1-1 (0.21%). Hybrid H-13-8 gave distinctly more ascorbic acid content (43.73 mg/100 g). Hybrid H-3-5 recorded the maximum total sugars, reducing sugars and non-reducing sugars content of 18.14, 8.25 and 9.89%, respectively (Table 4). Among hybrids, H-13-1 recorded the highest â-carotenoids content (14,213 µg/100 g), which was at par with H-4-2 (14,102 µg/100 g). Other varieties had moderate contents (Tables 3&4).

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