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Studies on genetic diversity for quality parameters of mango (*Mangifera indica* L.) genotypes

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Abstract

The present investigation entitled “Studies on genetic diversity for quality parameters of mango (*Mangifera indica* L.) genotypes”. was carried out at the orchards of local farmers’ in the vicinity of malihabad and Unnao region for recording observations of biochemical characters of various genotypes on works was done in laboratory of Horticulture, Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University, Lucknow (U.P), India during both the year (2019 and 2020), respectively. The thirty mango genotypes were collected and evaluated for distinct biochemical characters. These genotypes showed a wide range of variability in biochemical characters of fruit viz., T.S.S, reducing sugar, non-reducing sugar, total sugars, acidity, ascorbic acid, total carotenoids respectively.

Keywords: Mango, genotypes, variability, biochemical characters

Introduction

Mango (*Mangifera indica* L.) is the choicest fruit of India and occupies a prominent place among the best fruits of the world. It is widely grown in the tropical and subtropical regions world over. It belongs to the family Anacardiaceae. Mughal emperor Babar recognized the mango as the choicest fruit of India (Yadav and Singh, 2017). Mango is most popular among the tropical fruits of the world and has been rightly described as ‘King of Fruits’ owing to its delicious taste, captivating flavor and attractive aroma. Mango fruits are rich sources of Vitamin A and good sources of Vitamin C. They contain a good amount of minerals, particularly potassium. It is mainly used for both consumptions as ripe fruits and for processing into various products sliced, jam, jelly, squashes, syrups, nectars, baby food, mango leather, toffee, etc. Unripe fruits are also used for making chutney and pickles. Mango seed oil or mango butter is extracted from mango kernels resembling cocoa butter. The ash of burnt leaves is a household remedy for burns and scalds. The wood is used for furniture, floor and ceiling boards, window frames, packing boxes and splints, brush backs, plywood, shoe heel, and agricultural implements. According to Hindu mythology, mango is accepted as a holy tree and leaves and twigs are used in religious functions. Mango thrives well in a tropical and sub-tropical climate. It can be grown from sea level to an altitude of about 1400 meters. The favorable temperature is 18 °C to 35 °C, though it can tolerate temperatures high as 48° C. if trees are given regular irrigation. Mango is found growing well in areas receiving 250 mm to 2500 mm of annual rainfall. High humidity, rainfall, and frost during the flowering period are harmful. The climate of Lucknow is quite suitable for quality mango production. A number of attempts have been made to find out, the suitable mango cultivars with good phenotypic and Physico-chemical attributes for this region. Further, confusion exists in the nomenclature of mangoes due to different local names for the same variety. The evaluation of genotypes is an important process in order to screen the potential cultivars from the collection for any specific region. Although a cultivar may express a unique behavior under a certain area, it may fail or sustain that peculiar character when grown under different locations.

Materials and Methods

The experiment was conducted using thirty distinct mango genotypes for two consecutive years (2019 and 2020). The trees were 22 to 24 years old and maintained at Farmers’ orchards of malihabad region. There were three replications in the experiments conducted under completely randomized design (CRD).

These genotypes were maintained following uniform cultural practices to ensure yield of quality fruits. Three representative, healthy and uniform trees of each genotype were selected for study. Standard method and procedures were followed for recording various biochemical attributes.

Results and Discussion

On the basis of the analysis a perusal of data (Table-1) clearly revealed that a wide variability was observed in T.S.S, reducing sugar, non-reducing sugar, total sugars, acidity, ascorbic acid, total carotenoids of different mango genotypes. Chausa had maximum T.S.S (24.02°Brix) and the minimum value was noted genotype MBL-4 (15.43°Brix). However, the present findings partially agreed with the results of Bhuyan and Guha (1995) [4], Sengupta *et al.* (2006) [14], Kumar *et al.* (2008), Gill and Dhillon (2008) [7], Uddin *et al.* (2006), Bakshi *et al.* (2013) [2], Okoth *et al.* (2013), Shafique *et al.* (2006) and Abourayya *et al.* (2011) [1]. Maximum reducing sugar, non-reducing sugar and total sugars percentage was found in Amrapali (5.31%, 13.20% and 18.50%) respectively. Whereas, the minimum was noted in genotype MBL-4 (3.13%, 6.71% and 9.83%). Sengupta *et al.* (2006) [14], Chaudhari *et al.* (1997), Uddin *et al.* (2006), Bakshi *et al.*

(2013) [2] and Shafique *et al.* (2006) were reported that variation of sugar due to varietal characters of fruits. Minimum acidity percentage was observed in Chausa (0.173%) while, Maximum acidity was recorded in genotype MBL-4 (0.374%). These findings related to acidity are in accordance with the result of Kumar (1997), Chaudhari *et al.* (1997) [6] and Singh *et al.* (1985). The maximum ascorbic acid was recorded in the Langra (51.44 mg/100 g) and minimum ascorbic acid was observed in genotype MBL-2 (17.07mg/100g juice). Variation in ascorbic acid was reported by Gowda and Ramanjaneya (1994), Mitra *et al.* (2001) [12], Bhowmick and Banik (2005) [3] and Chatterjee *et al.* (2005) [5]. There were highly significant differences in total carotenoid content. The maximum total carotenoids were recorded in Amrapali (8.75 mg/100 g) and the minimum value was noted in Fazli (1.79 mg/100 g). These findings related to total carotenoids are in accordance with the results of Hoda *et al.* (2003) [8], Singh and Singh (2004), Kumar and Singh (2005) and Modesto *et al.* (2016) [13]. Total carotenoids provide an expression of natural appearance to the fruit product and their higher content in fruits offers distinct advantages, particularly in the international trade where the addition of artificial colour is discouraged.

Table 1: Biochemical characters of mango genotypes

Treatments	Genotypes	T.S. S (°Brix)			Reducing sugar (%)			Non-reducing sugar (%)			Total sugars (%)		
		2019	2020	Pooled	2019	2020	Polled	2019	2020	Polled	2019	2020	Polled
T-1	Amrapali	21.32	21.38	21.35	5.34	5.27	5.31	13.13	13.26	13.20	18.47	18.53	18.50
T-2	Nayab	20.29	19.99	20.14	3.72	3.39	3.56	8.94	8.58	8.76	12.66	11.96	12.31
T-3	Bombay Green	19.59	20.02	19.81	4.82	4.93	4.88	8.95	8.46	8.71	13.77	13.39	13.58
T-4	Makhan	19.31	19.03	19.17	4.87	4.46	4.67	10.06	9.42	9.74	14.93	13.87	14.40
T-5	Green Sweet	19.20	19.62	19.41	4.55	4.36	4.46	10.18	10.11	10.15	14.73	14.47	14.60
T-6	Langra	20.55	20.31	20.43	5.15	4.97	5.06	11.51	10.54	11.03	16.66	15.51	16.09
T-7	Hushnara	17.64	18.28	17.96	3.45	3.20	3.33	10.55	10.13	10.34	14.01	13.32	13.67
T-8	Desi-Sipia	16.60	16.28	16.44	3.51	3.49	3.50	8.12	8.54	8.33	11.64	12.03	11.84
T-9	Sultan	17.86	18.12	17.99	4.02	3.97	4.00	9.33	9.01	9.17	13.35	12.98	13.17
T-10	Dashehari	18.39	18.98	18.69	5.03	4.88	4.96	11.62	9.69	10.66	16.65	14.57	15.61
T-11	Zardalu	20.04	19.60	19.82	4.82	4.54	4.68	9.03	9.29	9.16	13.85	13.83	13.84
T-12	Taimurya	17.33	17.63	17.48	3.79	4.00	3.90	10.60	10.32	10.46	14.39	14.32	14.36
T-13	Desi – Amin	18.68	17.60	18.14	3.16	3.28	3.23	7.31	8.02	7.67	10.44	11.31	10.88
T-14	Chausa	23.90	24.13	24.02	5.18	5.12	5.15	12.87	12.17	12.52	18.06	17.29	17.68
T-15	Lucknow Safeda	17.41	18.36	17.89	4.48	4.42	4.45	11.95	10.95	11.45	16.43	15.37	15.90
T-16	Tukumi	16.64	15.79	16.22	3.73	3.85	3.79	9.98	9.43	9.71	13.71	13.28	13.50
T-17	Fazli	17.78	17.89	17.84	4.49	4.03	4.26	11.34	10.62	10.98	15.83	14.65	15.24
T-18	Ramkela	18.35	17.91	18.13	3.80	3.41	3.61	10.36	9.90	10.13	14.16	13.31	13.74
T-19	Neelum	18.49	19.38	18.94	4.52	4.09	4.31	11.15	11.29	11.22	15.67	15.38	15.53
T-20	Shahtuki	17.90	17.22	17.56	4.19	3.86	4.03	10.45	10.55	10.50	14.65	14.41	14.53
T-21	Khasam-Khas	19.23	19.25	19.24	4.27	4.02	4.15	10.52	9.64	10.08	14.79	13.66	14.23
T-22	Jauhari	21.65	20.34	21.00	4.16	3.72	3.94	9.85	9.96	9.91	14.01	13.68	13.85
T-23	Rangila	19.21	19.26	19.24	4.08	4.32	4.20	8.55	7.99	8.27	12.64	12.31	12.48
T-24	MBL-2	18.61	18.58	18.60	4.80	4.27	4.54	9.77	8.93	9.35	14.57	13.20	13.89
T-25	MBL-3	19.96	19.79	19.88	4.54	4.34	4.44	9.00	9.06	9.03	13.54	13.40	13.47
T-26	MBL-4	15.28	15.57	15.43	3.15	3.11	3.13	6.55	6.86	6.71	9.70	9.97	9.83
T-27	MBL-5	19.75	19.02	19.39	3.43	3.85	3.64	10.07	9.79	9.93	13.50	13.64	13.57
T-28	MBL-6	17.95	16.65	17.30	4.26	4.15	4.21	9.56	9.65	9.61	13.82	13.80	13.81
T-29	MBL-7	19.92	20.07	20.00	4.04	4.11	4.08	9.24	10.36	9.80	13.28	14.47	13.88
T-30	MBL-8	19.20	18.39	18.80	4.36	3.96	4.16	9.52	9.49	9.51	13.88	13.45	13.67
	SE(m)	0.80	0.632		0.28	0.21		0.60	0.39		0.59	0.46	
	C.D at 5%	2.27	1.79		0.80	0.60		1.90	1.11		1.68	1.30	

Treatments	Genotypes	Acidity (%)			Ascorbic acid (mg/100g)			Total carotenoids (expressed as β-carotene mg/100g)		
		2019	2020	Pooled	2019	2020	Pooled	2019	2020	Pooled
T-1	Amrapali	0.176	0.185	0.181	34.23	35.84	35.04	8.34	8.16	8.25
T-2	Nayab	0.234	0.224	0.229	28.19	27.95	28.07	2.67	2.30	2.49
T-3	Bombay Green	0.249	0.253	0.251	29.57	29.57	29.57	3.17	3.27	3.22

T-4	Makhan	0.241	0.258	0.250	30.02	31.06	30.54	2.19	2.25	2.22
T-5	Green Sweet	0.284	0.282	0.283	27.18	25.07	26.13	3.06	3.09	3.08
T-6	Langra	0.219	0.210	0.215	51.12	51.76	51.44	4.36	4.00	4.18
T-7	Hushnara	0.291	0.298	0.295	25.39	26.15	25.77	2.47	2.44	2.46
T-8	Desi-Sipia	0.328	0.319	0.324	15.72	16.24	15.98	2.11	2.23	2.17
T-9	Sultan	0.316	0.332	0.324	30.88	32.49	31.69	2.65	2.42	2.54
T-10	Dashehari	0.279	0.311	0.295	30.73	30.44	30.59	3.69	3.60	3.65
T-11	Zardalu	0.293	0.295	0.294	29.43	28.76	29.10	3.91	3.65	3.78
T-12	Taimurya	0.342	0.345	0.344	25.65	26.38	26.02	2.67	2.51	2.59
T-13	Desi – Amin	0.310	0.297	0.304	31.49	30.76	31.13	2.47	2.49	2.48
T-14	Chausa	0.161	0.184	0.173	35.90	36.01	35.96	4.60	4.55	4.58
T-15	Lucknow Safeda	0.312	0.330	0.321	28.76	25.28	27.02	5.26	5.37	5.32
T-16	Tukumi	0.342	0.310	0.326	29.53	31.01	30.27	2.58	2.55	2.57
T-17	Fazli	0.346	0.302	0.324	27.77	28.17	27.97	1.72	1.86	1.79
T-18	Ramkela	0.278	0.312	0.295	25.46	25.15	25.31	2.32	2.21	2.27
T-19	Neelum	0.286	0.272	0.279	33.63	29.77	31.70	4.14	3.99	4.07
T-20	Shahtuki	0.342	0.345	0.344	29.70	30.54	30.12	2.62	2.75	2.69
T-21	Khasam-Khas	0.294	0.292	0.293	23.29	24.43	23.86	3.49	3.39	3.44
T-22	Jauhari	0.231	0.252	0.242	18.21	17.66	17.94	2.65	2.61	2.63
T-23	Rangila	0.245	0.281	0.263	19.08	20.24	19.66	2.56	2.69	2.63
T-24	MBL-2	0.378	0.290	0.334	16.95	17.19	17.07	2.75	3.15	2.95
T-25	MBL-3	0.256	0.295	0.276	18.16	16.67	17.42	2.20	2.25	2.23
T-26	MBL-4	0.321	0.370	0.346	29.79	29.07	29.43	1.86	1.98	1.92
T-27	MBL-5	0.251	0.291	0.271	18.18	22.47	20.33	2.44	2.16	2.30
T-28	MBL-6	0.321	0.304	0.313	17.02	21.01	19.02	2.11	1.97	2.04
T-29	MBL-7	0.291	0.257	0.274	22.17	21.89	22.03	1.95	2.05	2.00
T-30	MBL-8	0.241	0.248	0.245	20.49	20.40	20.45	2.16	2.19	2.18
	SE(m)	0.019	0.020		1.24	1.12		0.22	0.28	
	C.D at 5%	0.054	0.058		3.54	3.18		0.64	0.84	

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