

EVALUATION OF SOME MANGO CULTIVARS ON THE BASIS OF THEIR BIOCHEMICAL COMPOSITION

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INTRODUCTION

About a thousand varieties of mango are estimated to exist in India. A beginning has already been made to evaluate the potential importance of a large number of these mango cultivars (Rameshwar *et al.* 5). Other workers (Sadhu and Bose 11, Dhar *et al.* 1) have highlighted the physico-chemical characteristics of a few locally available mangoes. Mango varieties differ in their characteristics like TSS, sugars, acidity proteins and vitamins. Moreover, the performance of a particular variety in local areas may not be indicative of its real importance at a national level unless it is grown in different mango growing areas. The present study has been planned to investigate the biochemical qualities of mango cultivars in one of the main mango growing regions like Lucknow (U.P.).

MATERIALS AND METHODS

Large scale mango germplasm collection is in progress at the Experimental Station of the Central Mango Research Station (IIHR), Lucknow. Some of the varieties which came into bearing during 1979 were picked, ripened and then the pulp was analysed. However, the fruits were not of excellent quality, typical of variety.

TSS : Total soluble solids were determined in diluted mango pulp by hand refractometer 'Erma' and suitable adjustment was made for temperature.

Reducing sugar : Reducing sugar was determined by titration with Fehling solution (Ranganna, 6).

Titrate acidity : Diluted pulp (1 : 10) was titrated with 0.1 N NaOH using phenolphthalein as an indicator.

β -Carotene : Homogenized 5 g of mango pulp with 20 ml of acetone, 30 ml of hexane and 0.1 g Mg Co₃. It was transferred to a funnel with cotton plug, placed on the separator funnel. The debris was washed twice with 15 ml of acetone and once with 15 ml of hexane. Combined extract was washed 3 times with distilled water. The supernatant was collected in 50 ml volumetric flask and made up the volume with 9 per cent acetone (Ranganna 7). It was purified by passing through 1 × 10 cm column containing quartz, alumina and anhydrous Na₂SO₄ granular in the ratio of 1 : 3 : 3. The column had approximately 2 cm plug of non-absorbent cotton immediately over the sintered disc. The colour was measured at 436 nm. (modified from Goodwin 2).

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Tannin : Tannin contents were determined by the method described by Ranganna (8), however, instead of Folia-Denis, Folin-Ciocalteu reagent was used.

Protein : Protein was precipitated in 1-2 ml of diluted (1 : 10) mango pulp with 10 per cent TCA. The precipitate was centrifuged and then dissolved in 1N NaOH at 50°C for 1 hr. Protein concentration was estimated by the method of Lowry *et al.* (4).

pH : pH was determined in diluted (1 : 4) mango pulp on the digital pH-meter.

Vitamin C : L-Ascorbic acid was assayed by titrimetric method of 2,6-dichlorophenol indophenol (Horwitz, 3).

RESULTS AND DISCUSSION

Among the large number of world germplasm collection at the Central Mango Research Station, some of the varieties which came into bearing during 1979 were assessed for their potential in processing and nutritive value. Besides, many of these cultivars are quite popular in their original habitat but it is to be seen whether these varieties can flourish in other mango growing area like Lucknow (U.P.) and at the same time, maintain their desirable characteristics.

The analysis of mango cultivars revealed significant variations in biochemical characteristics (Table I). Such differences have also been pointed out by other investigators (Dhar *et al.* 1). Among the mango cultivars screened, Dashehari (25.5 per cent) had the highest TSS contents followed by Mallika (21.5 per cent) while maximum reducing sugar was estimated in Kolanka Goa (6.5 per cent) and next in Neelam (6.1). Mallika was found good source of β -carotene. Langra fruit was the richest in Vitamin C (43.6 mg/100 g pulp) and also in tannins (246 mg/100 g pulp). L-Ascorbic acid is said to help retain flavour in the processed mango products (Saha, 10). Surprisingly, Baneshan, Akhadhya, Kolanka Goa, Rumani and Dori were low in tannins which may be considered a favourable characteristics for fresh consumption of fruits. As a matter of fact, Langra, Dashehari, Mallika and Chausa, mostly popular in U.P., were high in tannins which may be attributed to astringency but this is perhaps masked by their excessive sweetness. Gilas (480 mg/100 g pulp) and Royal Special (450 mg/100 g pulp) were high in protein contents.

It may be pointed out that among the list of mango cultivars tested, it is difficult to pick out the best variety. From nutritional points of view high sugars, proteins and vitamins may be regarded as a plus points. Too high acidity or tannins are generally considered negative attributes. However, Dashehari with lowest protein percentage has been adjudged as best on organoleptic tests (Roy *et al.* 9). At times, taste preferences surmount other considerations in commercializing a particular variety of fruit.

All the observations (Table I) were analyzed statistically for any correlation among various characteristics (Table II). There was a significant correlation of tannins with TSS, β -carotene and L-ascorbic acid. Although tannins may not be useful but their increment caused conspicuous upward trend in other desirable characteristics especially, TSS and vitamin C. Higher the protein lower was the reducing sugars. (Cor. Coef.-607)—a contradiction between two preferred characteristics. Apparently, pH and acidity were negatively correlated.

TABLE 1
Physico-chemical characteristics of pulp of mango cultivars. The observations indicate an average of 3 readings

Cultivar	T. S. S. (%)	Reducing sugar (%)	Acidity (%) (as citrate)	β -Carotene mg/100 g pulp	Tannins mg/100 g pulp	Protein mg/100 g pulp	pH	Vitamin C mg/100 g pulp
Dashehari	25.5	3.93	0.37	3.74	198	184	4.48	11.92
Chausa	21.1	5.34	0.28	2.25	125	294	4.83	13.94
Langra	21.0	3.49	0.51	3.30	246	335	4.49	43.56
Mallika	21.5	5.66	1.09	5.28	162	250	5.43	20.05
Royal Special	15.2	2.28	0.19	5.07	117	450	4.80	9.97
Dori	18.0	3.42	0.17	2.79	77	330	5.00	9.88
Baneshan	18.0	5.62	0.50	0.91	49	246	4.61	8.50
Kolanka Goa	16.2	6.53	0.16	1.33	69	190	4.82	14.77
Rumani	16.4	3.19	0.16	1.64	71	300	5.53	10.58
Paipatio	12.6	2.89	0.17	2.50	86	320	5.37	10.12
Muthwar Pasand	14.4	4.36	0.35	2.64	94	257	4.80	12.96
Neelam	17.6	6.11	0.94	0.63	106	230	3.81	9.60
Surungudi	20.0	3.43	0.16	1.33	107	405	5.47	10.93
Akhadya	16.0	3.67	0.16	0.74	63	334	5.26	9.72
Gulalya	12.0	5.75	0.69	1.60	68	274	4.19	8.95
Gilas	18.2	4.28	0.18	4.12	73	480	4.74	7.84
Average	17.7 \pm 3.53	4.31 \pm 1.36	0.38 \pm 0.23	2.49 \pm 1.48	109 \pm 54	307 \pm 85	4.85 \pm 0.48	13.33 \pm 8.60

TABLE 2
Correlation coefficients of different physico-chemical characteristics of sixteen cultivars of mango

Sl. No.	T. S. S. 1	Reducing Sugars 2	Acidity 3	β -Carotene 4	Tannins 5	Proteins 6	pH 7	Vitamin C 8
1.	1.000							
2.	0.052	1.000						
3.	-0.065	0.463	1.000					
4.	0.308	-0.320	-0.375	1.000				
5.	0.677 ⁺⁺	-0.126	0.121	0.518 ⁺	1.000			
6.	-0.168	-0.607 ⁺	-0.367	0.327	-0.102	1.000		
7.	-0.025	-0.455	-0.877 ⁺⁺	0.143	-0.165	0.287	1.000	
8.	0.361	-0.029	0.093	0.267	0.785 ⁺⁺	-0.060	0.077	1.000

⁺⁺Significant at 1% level.

⁺Significant at 5% level.

In this study, important biochemical characteristics of 16 mango cultivars have been discussed viz-a-viz processing and nutritive value. Further investigation on screening of mango varieties are continuing at this Station.

SUMMARY

There is a programme of world mango germplasm collection at the Experimental Station of the Central Mango Research Station, Lucknow (U.P.). Some of these varieties were analyzed to determine their prospective processing and nutritive values. The per cent TSS (17.7 ± 3.5), reducing sugar (4.3 ± 1.4), acidity ($.32 \pm .23$), and mg per cent of β -carotene (2.5 ± 1.5) tannins (109 ± 54), protein ($.31 \pm .08$), vitamin C (13.3 ± 8.6), and pH ($4.8 \pm .5$) displayed significant differences among different cultivars. Interestingly, local varieties like Dashehari, Mallika and Langra were found to be high in tannins (162-246 mg/100 g pulp) and average in protein contents. However, tannins had significant correlation with TSS, β -carotene and vitamin C. Proteins and reducing sugars had reciprocal correlation. From the point of view of nutritive value, many other varieties excelled local mangoes.

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