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ASSESSMENT OF QUALITY CHARACTERS OF MANGO FRUITS (*MANGIFERA INDICA*) AT AMBIENT CONDITION

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Abstract: The present study was conducted to assess the quality of mango fruits. The total sugar, total soluble solids, reducing sugar, acidity, ascorbic acid and carotene were estimated. The least TSS was found in Safdar pasand (11.07%) and highest in Amrapali (22.033%) on 7th day of storage. The minimum total sugar was found in Safdar pasand (7.33%) and highest in Amrapali (17.217%) on 7th day of storage. The maximum reducing sugar recorded in Bombai (4.33%) while it was minimum in Dashehari (3.113%) on 7th day of storage. The highest acidity (0.090%) was observed in Dashehari while minimum in Bhuto-bombai (0.030%) on completion of thirteen day of storage. The maximum ascorbic acid was found in Meglanton (8.250mg/100g pulp), it was least in Bombai (0.440 mg/100g pulp) on thirteen days storage period.
Keywords: Shelf-life, TSS, Ascorbic acid, Acidity and Total sugar.

Introduction

The mango (Mangifera indica) belonging to family Anacardiceae is considered as one of the choicest fruits of the world, because of its attractive colour, delicious taste and excellent nutritional properties. Mango is largest subtropical fruit in India, where it occupies about 54% of the world production (Chauhan and Dabhas, 1997).

Like other fruits marketable quality of mango also depends on a series of operations starting from initial production until, they are in the hands of final consumer. Thus, post harvest management for quality mango fruits must aim to ensure that the fruits reach market desired by consumer. The demand of mango in the world market is increasing especially in temperate countries due to social changes and globalization (Procter and Cropley, 1994) still supply of quality mango are restricted due to improper handling and in adequate transport facilities.

Losses of fresh mango fruits may be quantative (e.g. water loss, physical injuries, physiological break down, decay) or qualitative (eg. loss of acidity, colour and nutritive value). As because respiratory rate and storage life are related, hence climacteric fruits like

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mango which have high respiratory rate obviously have shorter post harvest life. In addition to these metabolic changes these may be losses in quality due to mechanical damage, physiological disorders, diseases and pest infestations. The present study was conducted to evaluate the quality characters of mango fruits.

Materials and Method

Mango varieties and hybrid like Safdar pasand, Gulabkhas, Himsagar, Dashehari, Bombai, Meglantun, Bhuto-bombai and Amrapali were compared for their quality during mango season of 2005-06. Fully matured fruits of different varieties and hybrids were harvested from the orchard of Horticultural Research Station, Mondouri and were brought to laboratory. The selected fully matured fruits 5.00 kg of each varieties and hybrid replicated three times, were stored in plastic tray and allow to ripe at ambient condition with temperature ranges between 30-35^{0}C and relative humidity 60-80%.

The total soluble solid content of fruits were measured with the help of hand refractometer, by the principle of total refraction, caliberated at ^{0}Brix. The total sugar content of fruit was determined by the help of Fehling's solution by copper reduction method using methylene blue as indicator (A.O.A.C., 1984). The titratable acidity was determined by volumetric procedures. The ascorbic acid content of fruit was estimated by using 2, 6 dichlorophenol-endophenol dye titration method (Rangauna, 1977). All the dates are subjected to statistical analysis using completely randomized factorial design (Sundarra et al, 1972).

Results and Discussion

The total soluble soild (TSS) content of majority of varieties increased up to seven days (Safdar pasand, Gulabkhas, Himsagar, Dashehari and Meglanton) while upto Nine days (Bombai, Bhuto-bombai and Amrapali) of storage and decline thereafter till the termination of storage (Table-1) increase in TSS during ripening may be associated with the transformation of pectic substances, starch, hemicellulose or other polysaccharide in soluble sugar and dehydration of fruits (Bhullar et al., 1981). After peak of ripening a decrease in TSS might be due to senescence changes after the fruit had attained a climacteric peak. Sahni and Khurdiya (1989) reported similar results in mango. The least TSS was found in Safdar pasand (11.067%) and highest in Amrapali (22.033%) on 7th day of storage.

The initial value of total sugar increased with the advancement of storage period up to 5 day of storage in Safdar pasand while upto 7 day, in other varieties except Bombai, Bhuto-bombai and Amrapali in which it increased upto 9 day of storage and declined thereafter (Table-2). These findings are in close agreement with the findings of Sahni and Khurdiya

(1989). The minimum total sugar was found in Safdar pasand (7.33%) and highest in Amrapali (17.217%) on 7th day of storage. The changes in sugar during storage are very much related with TSS. An increase in sugar upto certain period during storage was probably due to conversion of starch and polysaccharides into soluble sugars and dehydration of fruits. Similar results were obtained by Pandey et al. (1974) in mango. The decline in total sugar after attaining the peak might be due to its faster utilization in respiration when the fruits were over ripe, similar results were recorded in mango fruits (Yanru Zeng *et al.,* 1995 and Hoda *et al.,* 2001).

The initial value of reducing sugar increased slightly with the advancement of storage period upto 5th day of storage in Himsagar, while up 7 days in other varieties except Dashehari, Bombai, Bhuto-bombai and Amrapali in whihh it increased up to 9 day of storage and declined there (Table-3). However, maximum reducing sugar recorded in Bombai (4.33%) while it was minimum in Dashehari (3.113%) on 7th day of storage.

An increase in reducing sugar up to certain period during storage might be due to conversion of polysaccharide and disaccharide in to monosaccharide (glucose, fructose). The decline in sugar after attaining the peak might be due to its faster utilization in respiration, when the fruits were overripe. In Hawaii, mango cv. 'Pope', 'Fairchild' and 'Haden' have sucrose as major source in full ripe and half ripe fruits, where as fructose content remained fairly constant at different stage of ripeness (Yoneya, 1990). In cv. 'Haden' level of sucrose increased rapidly, but amount of starch decreased during ripening, while reducing sugar, comprised mainly of fructose increased slightly during the ripening (Castrello, et al., 1992).

During storage the titratable acidity declined gradually through out the period of storage life (Table-4). The acidity during storage might be converted into sugars and their derivatives or used in respiration and was responsible for this decreasing trend. Bhuller et al., (1981); Kumar and Dhawan (1995), Kumar (1998), and Hoda et al., (2001) also recorded similar results in mango. The highest acidity (0.090%) was observed in Dashehari followed by Gulabkhas (0.083%) while it was least in Amrapali and Bhuto-bombai (0.030%) on completion of thirteen day of storage.

The ascorbic acid content of fruits decreased gradually during storage in all the varieties (Table-5). Variation in decreasing trend might be due to different level of oxidation in different varieties. This finding is in agreement with the finding of Kumar (1998) and Hoda et al., (2001) in mango. The highest ascorbic acid was observed in Meglanton (8.250

mg/100 g pulp) followed by Gulabkhas (4.00 mg//100 g pulp) while it was least in Bombai (0.440 mg/100g pulp) on completion of 13 days storage period.

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Table 1: Changing pattern of total soluble solid (T.S.S.) (^{0}Brix) of fruits at days after harvest.

Varieties	1	3	5	7	9	11	13	Mean
Safdar pasand	6.067	10.700	11.067	11.067	10.100	10.100	10.100	9.886
Gulabkhas	7.467	11.067	13.033	13.033	8.100	7.100	7.100	9.557
Himsagar	10.967	15.033	17.100	17.133	16.100	15.100	13.500	14.990
Dashehari	6.033	14.100	16.067	18.033	18.033	16.300	14.167	14.676
Bombai	9.967	12.067	14.067	14.033	14.100	13.100	13.100	12.919
Meglanton	7.967	8.033	12.033	12.067	11.100	11.067	10.100	10.338
Bhuto-bombai	6.067	8.067	10.067	13.067	14.100	12.100	11.067	10.648
Amrapali	9.067	10.033	18.033	22.033	23.100	22.100	21.067	17.919
Mean	7.950	11.137	13.933	15.058	14.342	13.371	12.525	

SEm for Tr. (Var.) = 0.0337 CD at 5% = 0.943
SEm for days = 0.0315 CD at 5% = 0.0882
SEm for days x Tr. (Var.) = 0.0891 CD at 5% = 0.2494

Table 2: Changing pattern of total sugar (%) of fruits at days after harvest.

Varieties	1	3	5	7	9	11	13	Mean
Safdar pasand	2.120	7.337	7.500	7.333	7.167	7.167	4.553	6.168
Gulabkhas	3.540	7.500	8.500	8.500	4.600	3.500	3.500	5.663
Himsagar	7.537	10.460	11.957	12.167	11.583	11.000	8.667	10.481
Dashehari	2.350	11.167	10.083	12.833	12.833	11.583	9.667	10.073
Bombai	7.383	8.133	10.083	10.150	10.217	8.333	7.167	8.781
Meglanton	4.233	4.633	8.133	8.133	7.550	7.500	7.167	6.764
Bhuto-bombai	2.550	4.667	7.250	8.500	10.217	8.067	7.550	6.971
Amrapali	4.533	7.333	12.833	17.217	17.500	17.217	12.833	12.781
Mean	4.281	7.654	9.543	10.531	10.208	9.295	7.638	

SEm for Tr. (Var.) = 0.0623 CD at 5% = 0.1744
SEm for days = 0.0583 CD at 5% = 0.1632
SEm for days x Tr. (Var.) = 0.1648 CD at 5% = 0.4614

Table 3: Changing pattern of reducing sugar (%) of fruits at days after harvest.

Varieties	1	3	5	7	9	11	13	Mean
Safdar pasand	1.690	2.140	2.207	3.600	3.050	2.627	2.167	2.497
Gulabkhas	2.457	2.723	2.853	3.317	2.903	2.600	2.050	2.700
Himsagar	1.583	3.327	3.650	3.600	2.983	2.550	2.083	2.825
Dashehari	1.637	3.057	2.283	3.113	3.127	2.417	2.000	2.519
Bombai	3.450	3.600	3.850	4.333	4.383	4.000	3.233	3.836
Meglanton	2.733	3.100	3.413	3.630	3.327	2.667	2.417	3.041
Bhuto-bombai	2.500	2.800	3.117	3.633	4.000	3.627	2.783	3.209
Amrapali	1.217	2.293	2.850	3.157	3.340	3.110	3.107	2.724
Mean	2.158	2.880	3.028	3.417	3.389	2.950	2.480	

SEm for Tr. (Var.) = 0.0298 CD at 5% = 0.0834
SEm for days = 0.0319 CD at 5% = 0.0893
SEm for days x Tr. (Var.) = 0.0843 CD at 5% = 0.2360

Table 4: Changing pattern of acidity (%) of fruits at days after harvest.

Varieties	1	3	5	7	9	11	13	Mean
Safdar pasand	0.957	0.850	0.750	0.733	0.080	0.080	0.063	0.502
Gulabkhas	1.920	1.400	0.517	0.120	0.107	0.090	0.083	0.605
Himsagar	1.113	0.740	0.177	0.150	0.120	0.100	0.080	0.357
Dashehari	0.537	0.440	0.247	0.237	0.237	0.200	0.090	0.284
Bombai	0.200	0.177	0.140	0.100	0.100	0.050	0.047	0.116
Meglanton	0.180	0.127	0.090	0.090	0.060	0.050	0.040	0.091
Bhuto-bombai	0.170	0.130	0.070	0.060	0.033	0.030	0.030	0.075
Amrapali	0.367	0.270	0.170	0.100	0.037	0.033	0.030	0.144
Mean	0.683	0.516	0.270	0.198	0.096	0.079	0.058	

SEm for Tr. (Var.) = 0.0064 CD at 5% = 0.0179
SEm for days = 0.0060 CD at 5% = 0.0168
SEm for days x Tr. (Var.) = 0.0170 CD at 5% = 0.0476

Table 5: Changing pattern of ascorbic acid (mg/100g pulp) of fruits at days after harvest.

Varieties	1	3	5	7	9	11	13	Mean
Safdar pasand	32.400	4.733	2.700	1.797	1.800	1.767	1.667	6.695
Gulabkhas	24.850	15.667	13.500	4.450	4.500	4.407	4.000	10.196
Himsagar	28.800	8.417	4.000	4.000	3.333	2.750	2.500	7.686
Dashehari	22.400	12.000	9.600	6.400	4.500	4.167	3.750	8.974
Bombai	5.400	3.600	1.800	1.700	1.800	0.570	0.440	2.187
Meglanton	36.00	36.000	28.700	18.000	9.000	8.750	8.250	20.671
Bhuto-bombai	45.00	43.200	40.250	36.000	9.000	4.250	3.917	25.945
Amrapali	27.00	22.500	18.000	9.000	4.500	4.250	3.167	12.631
Mean	27.731	18.265	14.819	10.168	4.804	3.864	3.461	

SEm for Tr. (Var.) = 0.0741 CD at 5% = 0.2074
SEm for days = 0.0694 CD at 5% = 0.1943
SEm for days x Tr. (Var.) = 0.1962 CD at 5% = 0.5493