

Evaluation of Some Early Varieties of Mango (*Mangifera indica* L.) for Nectar Product Processing

Nilam R. Patel, S. D. Jarande, S. S. Mingire

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Abstract The experiment on evaluation of some early varieties of mango (*Mangifera indica* L.) for nectar product processing basis of organoleptic parameters was carried out during 2010-11. An experiment was conducted with five early varieties of mango viz. Kesar, Dashehari, Rajapuri, alphonso and Sabja in CRD with three repetitions. In respect of TSS, reducing sugar were found higher in nectar of Sabja as well as Rajapuri cultivars while, non-reducing sugar ascorbic acid and lower acidity content was found higher in nectar of Kesar and Dashehari in early varieties, which was found decreased during 6 month of storage.

Keywords Kesar, Dashehari, Rajapuri, Alphonso, Sabja.

Introduction

The mango [*Mangifera indica* L.] is a major fruit crop of South Gujarat. From mango different processed

product are made. Nectar is one of the important products of them. Mango fruit nectar could be very nutritious, commercially popular and economical. However, there are large numbers of mango varieties in India and their nectar quality may differ depending upon the flavor and other characteristics of the cultivar. India is the major producer of mango in the world with an area of 2.516 million hectares and the annual production of 184.31 lakh tones [1]. The major mango growing states are Uttar Pradesh, Andhra Pradesh, Bihar, Karnataka, Tamil Nadu, Kerala, Maharashtra, Orissa, West Bengal and Gujarat. In Gujarat total area under mango cultivation is about 142.68 thousand ha and production is about 1125.61 thousand tones, while in South Gujarat the total area and production of mango are 66,910 ha and 4,88,810 MT respectively during year 2011-12 [2].

Materials and Methods

The extraction of the pulp select healthy, disease as well as pest free fruits then selected fruits washed with water. The pulp was extracted by squeezing by hand collect them in well cleaned container to avoid any microbial attack. Then pulp was strained through 1 mm mesh stainless steel sieve. Mango nectar prepared by using mango pulp, sugar, citric acid to obtain subsequent percentage.

Mango nectar has following properties: 1. Mango pulp -20%, 2. TSS - 20%, 3. Acidity - 0.3%.

The prepared nectar will be heated upto 850 °C and potassium metabisulfite @ 100 mg/kg of final

N. R. Patel, S. D. Jarande, S. S. Mingire*
Department of Post Harvest Technology, Aspee College of Horticulture and Forestry, Navsari Agricultural University, Navsari 396450, Gujarat, India
e-mail: mingiresainath@gmail.com
*Correspondence

Table 1. Effect of various treatments on TSS, total sugar and reducing sugar mango nectar during storage.

Tr. No.	Treatments Months	TSS (%)				Total sugar (%)				Reducing sugar (%)			
		0	3	6	mean	0	3	6	mean	0	30	60	mean
T ₁	Kesar	20.03	20.17	20.27	20.14	18.13	18.26	18.47	18.29	5.50	6.13	7.90	6.51
T ₂	Dashehari	20.07	20.23	20.37	20.20	18.23	18.33	18.63	18.39	5.62	6.20	8.18	6.67
T ₃	Rajapuri	20.03	20.37	20.70	20.35	18.03	18.63	18.80	18.49	6.11	6.51	8.30	6.98
T ₄	Alphonso	20.07	20.27	20.43	20.23	18.40	18.53	18.67	18.53	5.92	6.36	8.22	6.83
T ₅	Sabja	20.06	20.47	20.83	20.43	18.46	18.66	18.93	18.68	6.22	6.71	8.41	7.12
	SEm ±	0.08	0.06	0.11	-	0.09	0.09	0.10	-	0.07	0.06	0.07	-
	CD at 0.5%	NS	0.17	0.33	-	0.29	0.27	0.31	-	0.19	0.23	0.24	-
	CV %	0.66	0.48	0.91	-	0.93	0.83	0.94	-	1.92	2.07	1.67	-

product was added and filled into the clean and sterilized plani glass bottle of 200 ml. The bottle will be sealed with crown cork immediately. The field bottle were pasteurized in boiling water for 15 minute and cooled then stored in room temperature for further storage studies.

Results and Discussion

The data on changes in TSS, total sugar and reducing sugar of mango nectar was affected by various treatments during the storage have been presented in Table 1.

Data recorded at six months of stoage revealed that maximum (20.83%) TSS was recorded in Sabja which was statistically at par with Rajapuri variety. However, Rajapuri was also at par with Alphonso variety. The minimum (20.26%) TSS was recorded in nectar of Kesar which was at par with Dashehari and Alphonso variety. The mean value of all the three and six months of storage period indicated that the maximum TSS was obtained in Sabja as well as Rajapuri and Alphonso while lowest level of TSS showed by nectar of Kesar variety. This may be due to the physico-chemical constituent of fresh mango pulp of respective varieties. Similarly, Chakraborty and Debnath [3] observed that the fourteen diverse cultivars of mango and assessed for their suitability for juice making.

The chemical composition of juice showed a slight increase trend was observed in TSS content in all the cultivars. It is evidence of present finding. At the initial stage non significant difference of TSS was

found among different processing of mango nectar. These variable results in TSS are in good agreement with the TSS remained unchanged. Further Verma and Gaur [4] found that the TSS of phalsa nectar did not change in the first month of storage and thereafter, a slight increase was observed upto end of storage period. Further Jain et al. [5] observed that the TSS of aonla nectar increased continuously during storage. This might be happened due to acidic effect of added citric acid on nectar product lead to more hydrolysis of complex polysaccharides into simple sugar. Whereas, it was decreased with the lower level of acidity in Kesar this might be happened due to partial hydrolysis of complex polysaccharides into simple sugar. Further Ahmed et al. [6] reported that the TSS of mandarin RTS increased gradually during storage studies.

The total sugar content at 6 months of storage was observed maximum (18.93%) in Sabja which was at par with Rajapuri, Alphonso and Dashehari variety. While, lowest (18.47%) to tal sugar was recorded in Kesar which was at par with Dashehari and Alphonso variety.

Looking to the initial status of the total sugars of mango nectar, the maximum (18.46%) total sugar was found in Sabja and it slowly increased throughout the storage and remained highest (18.93%) in mean value. At initial stage the lowest (18.03%) total sugar content found in variety Rajapuri and slowly increased upto 6 months and remained lowest (18.80%) than other varieties. In general, the total sugars in mango nectar recorded steady increased during storage period, which was a function of break down of insoluble

Table 2. Effect of various treatments on non reducing sugar, ascorbic acid and acidity mango nectar during storage.

Tr. No	Treatments Months	Non reducing sugar (%)				Ascorbic acid (mg/100g pulp)				Acidity (%)			
		0	3	6	mean	0	3	6	mean	0	3	6	mean
T ₁	Kesar	12.63	12.14	10.56	11.78	10.33	9.00	8.00	9.11	0.306	0.313	0.323	0.312
T ₂	Dashehari	12.61	12.13	10.44	11.72	9.86	8.66	7.66	8.73	0.306	0.324	0.330	0.317
T ₃	Rajapuri	11.75	12.12	10.49	11.46	7.90	7.36	6.33	7.19	0.303	0.353	0.353	0.335
T ₄	Alphonso	12.48	12.17	10.45	11.69	8.73	7.66	6.66	7.68	0.306	0.336	0.340	0.325
T ₅	Sabja	12.25	11.95	10.53	11.57	7.66	7.16	6.03	6.95	0.300	0.363	0.366	0.343
	SEm ±	0.09	0.13	0.14	-	0.42	0.35	0.36	-	0.003	0.04	0.01	-
	CD at 0.5%	0.28	NS	NS	-	1.28	1.07	1.11	-	NS	0.01	0.01	-
	CV %	1.30	1.84	2.32	-	8.20	7.71	9.12	-	2.24	2.16	1.84	-

polysaccharides in to simple sugars. In this treatment it contained highest levels of TSS consist of cellulose which is mainly form of sucrose are broken down into simple sugar and raised the level of total sugar. This finding is in agreement with those of Altaf et al. [7] who had observed that the total sugars content in mango nectar showed the minimum change during strage.

At 0, 3 and 6 months of storage it can be seen that the mean storage of nectar, significantly maximum (7.12%) value of reducing sugars was observed in Sabja which was at par with Rajapuri. Rajapuri is followed by Alphonso and Dashehari variety. The lowest (6.51%) reducing sugar was found in Kesar variety. In respect to higher reducing sugar content in nectar of Sabja and Rajapuri was equally good.

Data regarding changes in non reducing sugar, ascorbic acid and acidity in the mango nectar affected by various treatments during the storage have been presented in Table 2.

At 3 and 6 months the status of the mango nectar product in respect of non-reducing sugar content, showed no significant differences among mango nectar of different varieties.

Looking to the initial status of the non-reducing sugars content of mango nectar, the variety Kesar found the highest (12.63%) non-reducing sugars which decreased and remained lowest (10.56%) as compared to other varieties throughout the storage period. At initial stage the lowest level (11.75%) was found in Rajapuri. While trend of decreasing in non reducing sugar was highest during three months of

observation and then slowly decline with storage period increased. In respect to non reducing sugar in nectar of Kesar variety was found superior than rest of the varieties. This can be attributed with the acidity in the product might have helped for higher breakdown of polysaccharides lead to more conversion of non-reducing sugars into invert sugar, moreover reason for increased in reducing sugars might be contributed by the gradual degradation of polysaccharides in nectar through acid hydrolysis. This conversion into reducing sugar was minimized with same treatment only the less levels of acidity increased as in nectar of Kesar in early variety. This happening caused the increased in the levels of acidity owing to less breakdown of non reducing sugar into reducing sugar. The nectar of Sabja variety also showed the more increased in reducing sugar among the treatments having same level of acidity because having the highest levels of TSS, this increase in reducing sugars with the advancement of different varietal treatments could be mainly due to the deteriorative effect of high ambient temperature on product leading to inversion part of sucrose into glucose and fructose. Whereas, in Kesar variety exhibited less increased in reducing sugar contained lowest level of TSS. Analogous trends in reducing sugars were also recorded by Altaf et al. [7] had observed that the reducing sugars content in mango nectar showed the minimum changes during storage.

Looking to the change in ascorbic acid content in different varieties over a period of time it showed decreasing trend in all varieties. However, the mean value of all the three storage periods indicated that maximum level of ascorbic acid content was recorded in Kesar (9.11 mg/100g pulp) which was followed by

Dashehari, Alphonso, Rajapuri and Sabja variety. In general, there has been a significant decrease in ascorbic acid in mango nectar during storage period. This reduction might be due to oxidation of ascorbic acid into dehydroascorbic acid by oxygen. Ascorbic acid content of mango nectar beverages declined continuously during storage period. The highest inclined in ascorbic acid was recorded in early variety nectar of Kesar variety while, lowest ascorbic acid observed in nectar of Sabja variety. These losses of ascorbic acid were attributed to the effect of processing, storage time and exposure to light. These various observations confirmed by Ahmed et al. [6] studies that the declining trend in ascorbic acid contents of mandarin drink was increased as a function of storage. Similarly, Das [8] reported that the ascorbic acid content of jamun nectar products declined continuously during storage.

The mean value of all the three and six months of storage period indicated that the maximum acidity percentage was observed in Sabja (0.343%) as well as in Rajapuri (0.335%) followed by Alphonso variety. The increasing trend was initially at slow rate but it become faster with prolongation of storage period while the lowest level of acidity was observed in nectar of Kesar variety. There has been a significant increase in acidity percentage of mango nectar at the end of 6 months of storage. But, its pattern of increase varied according to the effect of varietal treatments. This increase in acidity percentage might be due to the accelerated degradation of pectin substances in nectar. These various findings are accordance with Altaf et al. [7] studied that the acidity content in mango nectar showed the minimum change during storage. In the present investigation little amount increase in acidity percentage was observed in early variety nectar of Kesar. This happening might be associated with the lowest level of acidity content in the product. As a result the early variety nectar of Sabja, due to pertaining highest TSS, consequently

more increase in acidity. Whereas, the minimum acidity was observed in early variety nectar of Kesar because it contained lowest levels TSS therefore less increased in acidity.

Conclusion

The evaluation of mango nectar product processing processed from different early mango varieties viz. Kesar, Dashehari, Rajapuri, Alphonso and Sabja with respect to status of nectar in bio-chemical parameters like total soluble solids, total sugar and reducing sugar, non-reducing sugar, acidity, ascorbic acid and at different storage period indicated that among different varieties under evaluation the Kesar as well as Dashehari exhibited its superiority by recording nutritional composition viz. lower amount of total soluble solids and total sugar, higher amount of ascorbic acid and non-reducing sugar, minimum acidity and reducing sugar content, at initial, 3 and 6 months of storage than rest of the varieties.

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