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RESEARCH PAPER

Studies on innovative value added nectar prepared from banana and pineapple blended pulp during storage

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SUMMARY :

The present study deals with preparation of blended nectar using banana cv. Grand Naine and pineapple cv. Queen pulps were mixed in proportions as per treatments and processed into nectar in Completely Randomized Design with four repetitions. Physico-chemical as well as organoleptic properties of blended nectars were compared with sole banana and pineapple nectar. The nectars were studied at an interval of two months up to 12 months *i.e.* 0, 2, 4, 6, 8, 10 and 12 months of storage period. An overall result of fruit nectar prepared from banana:pineapple, 2:3 as well as 1:4 blending proportion were equally best in higher level of chemical constituents *viz*., TSS, acidity, total sugars and reducing sugars with lower level of non-reducing sugars. While proportion of 0:1 and 1:4 were highest in respect to ascorbic acid content. All chemical constituents were found increasing up to 12 months except non-reducing sugars and ascorbic acid which were decreasing during storage period. The lowest retention was found in sole banana nectar in respect to all chemical constituents except non-reducing sugars. In respect to sensory characters banana:pineapple, 1:4 as well as 0:1 blended proportions were found best having higher score pertaining to all sensory characters. All sensory characters were found decreasing during storage. The lowest acceptability was found in proportion of 1:0 in respect to all sensory parameters. Considering above chemical constituents as well as sensory characters of product; proportion of 2:3 and 1:4 were found best than rest of the proportions of nectar during storage.

KEY WORDS : Banana, Pineapple, Blended, Nectar, Storage

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Banana (*Musa paradisiaca* L.), a fruit of tropics is one of the most important fruit crops of the world as well as India which belongs to family Musaceae. It stands first in production and second in area among the fruit crops grown in India with a production of 29780 thousand MT annually from an area of 830.5 thousand hectares (Anonymous, 2011). The compositions of banana fruit contents are (per 100g of edible portion) water 75 per cent, energy 85 Kcal/ mg, protein 1.1 per cent, fat 0.2 per cent and carbohydrate 12.6 per cent. The mineral contents are calcium 8 mg, phosphorus 26 mg, iron 0.7 mg and magnesium 33 mg. Moreover, the vitamin contents are vitamin A 190 IU, thiamine 0.05 mg, nicotinic acid 0.7 mg and ascorbic acid 10 mg (Chundawat and Sen, 2002). Banana is available throughout the year in the growing areas, its short shelf-life necessitates its conversion into various value added products *viz*., banana puree, powder, wafers, flour, wine, figs, jam, canned slices, dehydrated banana slices, flakes, vinegar, ketchup, chutneys, pickles, beverages and fruit bar etc.

It is observed that instead of sole fruit products, the blended products with single as well as two or more fruits have more preferred by consumers. The innovative value added

blended products are definitely increasing the qualitative, sensory and nutritional value. The pineapple is one of the commercial fruit crop of tropical world which is available throughout the year. India produced about 1415 thousand MT of pineapple fruits from 89 thousand hectare area and has a share of 8 per cent in total world production (Anonymous, 2011). Pineapple fruits have characteristic pleasant flavour, distinct aroma, attractive golden yellow colour, exquisite sugar acid blend taste and absence of seeds, which qualifies it as one of the choicest fruit throughout the world.

Looking to the composition of pineapple fruit contents are (per 100g of edible portion) water 85.4 per cent, energy 52 Kcal/mg, protein 0.4 per cent, fat 0.2 per cent and carbohydrate 13.7 per cent. The mineral contents are calcium 18 mg, phosphorus 8 mg, iron 0.5 mg and the vitamins contents are vitamin B 15 IU, thiamine 0.08 mg, riboflavin 0.04 mg, nicotinic acid 0.2 mg and ascorbic acid 61 mg (Chundawat and Sen, 2002). Pineapple fruits are mainly consumed as fresh or canned slices. Fruits are also processed into products such as juice, syrup, jam, jelly, squash, RTS beverages and dehydrated slices (Man *et al.*, 2007). Pineapple slices and pineapple juice has a major share among the different forms of processing (Shrinivasan *et al.*, 1977).

In Gujarat, Grand Naine is commercial cultivar of banana which gives higher quality production. Recently people are utilizing nectar as desert drink with advancement of dietary habit. Considering the nutritional as well as organoleptic value of banana, it is decided to blended with pineapple with comparative study of sole banana and pineapple nectar during storage. Keeping these in view, a study was conducted to note the changes in chemical and organoleptic parameters, standardize proportion and shelf-life of banana-pineapple blended nectar during storage.

EXPERIMENTAL METHODS

The experiment was conducted at the Post Graduate and Post harvest technology laboratory of the Department of Horticulture, N.M. College of Agriculture, Navsari Agricultural University, Navsari. The uniform sized banana fruits of cv. Grand Naine were collected from Fruit Research Station, Navsari Agricultural University, Gandevi and fully matured ripe pineapple fruits of cv. Queen were collected from local market of Navsari District, Gujarat and brought to the laboratory for experimentation. The experiment was conducted in Complete Randomized Design with four repetitions during the year 2010 and 2011 processed from *Rabi* season fruits.

Banana fruits were peeled by hand and cut into small pieces after removing central portion. Pulp was prepared by homogenized the fruit pieces in blender. Whereas, pineapple fruits were peeled very carefully with sharp stainless steel knife, cut into four halves and central fibrous portion was removed. Then it was homogenized in blender. Clear fruit pulp was obtained by squeezing the fruit pulp through muslin cloth. The nectars were prepared as per method described by Lal *et al.* (1986).

Treatment details under experimentation

Treatments	Blending ratio (Banana:Pineapple)	Blended Pulp (%)	TSS ^{0}Brix	Acidity (%)
T_1	4:1	20	20.0	0.3
T_2	3:2	20	20.0	0.3
T_3	2:3	20	20.0	0.3
T_4	1:4	20	20.0	0.3
T_5	1:0	20	20.0	0.3
T_6	0:1	20	20.0	0.3

The processed products were periodically observed up to 12 months *i.e.* January 2010 and 2011. The products were subsequently used for chemical as well as organoleptic evaluation for a period of 0, 2, 4, 6, 8, 10 and 12 months of storage. Different proportions of nectars were analysed for different biochmical parameters *viz.*, TSS (^{0}Brix), titrable acidity (%), ascorbic acid (mg/100 g), total sugars (%), reducing sugars (%) and non-reducing sugars (%) according to the procedure reported by Ranganna, (1986). The sensory parameters *viz.*, colour, texture, taste, flavour and overall acceptability based on 9 point hedonic scale (Amerine *et al.*, 1965). The data obtained were statistically analysed a per Panse and Sukhatme (1967).

EXPERIMENTAL FINDINGS AND ANALYSIS

It was observed from Table 1, biochemical changes during storage period, overall TSS (^{0}B) of nectar was found highest in T_3 (Banana:Pineapple, 2:3) which was at par with T_4 (Banana:Pineapple, 1:4) and the minimum in T_5 (Banana:Pineapple, 1:0). Whereas, it had increasing trend up to 12 months during storage due to partial hydrolysis of complex polysaccharide and solubilization of pulp constituents during storage. The higher atmospheric temperature during storage conditions causing slowly degradation of polysaccharides in the product and resulting more conversion into simple soluble sugars resulting raising the level of TSS during storage. Similar kind of observations were also found by Patel (2011) in mango nectar and Syamal *et al.* (2011) in bael-aonla blended nectar.

An overall acidity (%) of nectar (Table 2) was found maximum in T_4 (Banana:Pineapple, 1:4) which was at par with T_3 (Banana:Pineapple, 2:3) and the minimum in T_5 (Banana : Pineapple, 1:0). Whereas, it had increasing trend up to 12 months during storage due to the accelerated degradation of pectin substances of pulp into soluble solids in nectar and also by formation of organic acids by ascorbic acid degradation and

de-esterification of protein molecules. These various findings are in accordance with Das (2009) in jamun nectar and Lohar *et al.* (2010) in karonda RTS beverage.

Overall ascorbic acid (mg/100g) of nectar (Table 3) was found highest in T_6 (Banana:Pineapple, 0:1) which was at par with T_4 (Banana:Pineapple, 1:4) due to sole pineapple juice because the pineapple fruits were more rich with ascorbic acid than banana fruit, while significantly lowest in T_5 (Banana:Pineapple, 1:0). Whereas, it showed decreasing trend during the storage period due to increase in temperature level

Table 1: Changes in TSS (^{0}B) of banana and pineapple blended nectar during storage

Treatments (Banana:Pineapple)	Storage period (months)							
	0	2	4	6	8	10	12	Mean
T_1 (4:1)	20.00	20.03	20.06	20.15	20.26	20.43	20.55	20.21
T_2 (3:2)	20.00	20.11	20.16	20.32	20.57	20.70	20.78	20.38
T_3 (2:3)	20.00	20.93	21.02	21.07	21.18	21.30	21.42	20.99
T_4 (1:4)	20.00	20.41	20.54	20.73	20.86	21.05	21.14	20.67
T_5 (1:0)	20.00	20.02	20.03	20.09	20.18	20.20	20.30	20.12
T_6 (0:1)	20.00	20.04	20.08	20.22	20.36	20.55	20.69	20.28
Mean	20.00	20.26	20.32	20.43	20.57	20.70	20.81	
S.E. ±	0.05	0.14	0.14	0.08	0.10	0.14	0.12	
C.D. at 5%	NS	0.41	0.40	0.24	0.28	0.39	0.34	
C.V. %	0.78	2.10	2.05	1.24	1.43	1.95	1.73	

NS=Non-significant

Table 2: Changes in acidity (%) of banana and pineapple blended nectar during storage

Treatments (Banana:Pineapple)	Storage period (months)							
	0	2	4	6	8	10	12	Mean
T_1 (4:1)	0.301	0.308	0.309	0.310	0.317	0.320	0.328	0.313
T_2 (3:2)	0.301	0.310	0.313	0.315	0.323	0.327	0.329	0.317
T_3 (2:3)	0.302	0.314	0.318	0.323	0.328	0.336	0.338	0.323
T_4 (1:4)	0.303	0.317	0.319	0.326	0.331	0.338	0.340	0.325
T_5 (1:0)	0.300	0.302	0.305	0.307	0.311	0.313	0.320	0.308
T_6 (0:1)	0.301	0.311	0.315	0.320	0.326	0.333	0.335	0.320
Mean	0.301	0.310	0.313	0.317	0.322	0.328	0.331	
S.E. ±	0.0002	0.0009	0.0009	0.0010	0.0010	0.0009	0.0008	
C.D. at 5%	0.001	0.003	0.003	0.003	0.003	0.003	0.002	
C.V. %	0.24	0.85	0.82	0.93	0.96	0.81	0.75	

Table 3: Changes in ascorbic acid (mg/100 g) of banana and pineapple blended nectar during storage

Treatments (Banana:Pineapple)	Storage period (months)							
	0	2	4	6	8	10	12	Mean
T_1 (4:1)	9.86	8.80	7.94	6.89	5.80	4.65	4.61	6.93
T_2 (3:2)	10.13	9.56	8.73	7.78	6.83	4.84	4.79	7.52
T_3 (2:3)	10.67	10.40	9.59	8.67	7.65	5.61	5.59	8.31
T_4 (1:4)	11.68	10.69	9.81	8.83	8.72	5.83	5.81	8.77
T_5 (1:0)	6.66	5.65	4.88	3.77	3.67	2.87	2.86	4.34
T_6 (0:1)	11.76	10.71	9.89	8.92	8.84	5.87	5.84	8.83
Mean	10.13	9.30	8.47	7.48	6.92	4.95	4.91	
S. E. ±	0.13	0.07	0.05	0.05	0.06	0.05	0.05	
C.D. at 5%	0.37	0.19	0.15	0.15	0.17	0.15	0.13	
C.V. %	3.87	2.19	1.87	2.06	2.53	3.17	2.85	

which was affect the ascorbic acid due to its thermolabile nature which was destroyed with temperature during storage period. Moreover, it may probably due to the process of oxidation of ascorbic acid into dehydroascorbic acid by enzyme ascorbinase. These various findings are in accordance with Lohar *et al.* (2010) in karonda RTS beverage and Syamal *et al.* (2011) in bael-aonla blended nectar.

An overall total sugars (%) of nectar (Table 4) was found maximum in T_3 (Banana:Pineapple, 2:3) which was at par with T_4 (Banana:Pineapple, 1:4) and significantly lowest in T_5

Table 4: Changes in total sugars (%) of banana and pineapple blended nectar during storage

Treatments (Banana:Pineapple)	Storage period (months)							
	0	2	4	6	8	10	12	Mean
T_1 (4:1)	14.05	14.70	15.17	16.80	17.35	18.29	18.67	16.43
T_2 (3:2)	16.35	16.45	16.79	16.96	17.50	19.30	19.65	17.57
T_3 (2:3)	17.57	17.77	17.85	19.49	20.97	22.18	22.53	19.76
T_4 (1:4)	17.19	17.68	17.75	19.13	20.56	21.71	22.35	19.48
T_5 (1:0)	13.37	13.47	14.23	16.47	17.24	18.04	18.27	15.87
T_6 (0:1)	15.20	15.53	16.28	16.83	17.42	19.15	19.55	17.14
Mean	15.62	15.93	16.34	17.61	18.51	19.78	20.17	
S.E. ±	0.15	0.13	0.15	0.14	0.20	0.19	0.18	
C.D. at 5%	0.43	0.37	0.42	0.40	0.56	0.53	0.52	
C.V. %	2.93	2.26	2.63	2.35	3.20	2.82	2.71	

Table 5: Changes in reducing sugars (%) of banana and pineapple blended nectar during storage

Treatments (Banana:Pineapple)	Storage period (months)							
	0	2	4	6	8	10	12	Mean
T_1 (4:1)	4.84	5.65	7.12	9.70	10.41	11.62	12.02	8.77
T_2 (3:2)	8.98	9.34	10.67	11.83	12.51	14.47	14.97	11.82
T_3 (2:3)	11.32	11.80	12.90	15.51	17.19	18.52	18.90	15.16
T_4 (1:4)	10.88	11.69	12.75	15.13	16.74	17.98	18.67	14.83
T_5 (1:0)	4.15	4.40	6.15	9.34	10.25	11.35	11.60	8.18
T_6 (0:1)	7.11	7.63	9.38	10.93	11.62	13.48	13.93	10.58
Mean	7.88	8.42	9.83	12.07	13.12	14.57	15.02	
S. E. ±	0.15	0.14	0.14	0.15	0.21	0.18	0.17	
C.D. at 5%	0.43	0.39	0.41	0.43	0.61	0.50	0.48	
C.V. %	5.71	4.60	4.28	3.76	4.89	3.60	3.33	

Table 6: Changes in non-reducing sugars (%) of banana and pineapple blended nectar during storage

Treatments (Banana:Pineapple)	Storage period (months)							Mean
	0	2	4	6	8	10	12	
T_1 (4:1)	9.20	9.05	8.05	7.10	6.94	6.66	6.65	7.66
T_2 (3:2)	7.37	7.12	6.11	5.14	4.99	4.83	4.68	5.75
T_3 (2:3)	6.25	5.98	4.95	3.99	3.79	3.65	3.62	4.60
T_4 (1:4)	6.31	5.99	5.00	4.00	3.81	3.73	3.68	4.65
T_5 (1:0)	9.22	9.07	8.08	7.13	6.98	6.70	6.67	7.69
T_6 (0:1)	8.09	7.90	6.90	5.90	5.81	5.68	5.61	6.55
Mean	7.74	7.52	6.51	5.54	5.39	5.21	5.15	
S. E. ±	0.04	0.05	0.05	0.06	0.05	0.06	0.04	
C.D. at 5%	0.12	0.13	0.15	0.16	0.15	0.16	0.13	
C.V. %	1.61	1.83	2.35	3.11	3.03	3.20	2.61	

(Banana:Pineapple, 1:0), whereas, it showed increasing trend up to 12 months during storage due to the breakdown of insoluble polysaccharides into simple sugars by solubilization of juice constituents during storage and hydrolysis of polysaccharides including pectin, starch as well as partial hydrolysis of complex carbohydrates, heating process for concentration and higher temperature of ambient storage condition lead to increase in total sugars in nectar. This finding is in agreement with those of Lohar *et al.* (2010) in karonda RTS beverage and Syamal *et al.* (2011) in bael-aonla blended nectar.

An overall reducing sugars (%) of nectar (Table 5) was found maximum in T_3 (Banana:Pineapple, 2:3) which was at par with T_4 (Banana:Pineapple, 1:4) and lowest in T_5 (Banana:Pineapple, 1:0), whereas, it showed increasing trend up to 12 months during storage due to the enhanced acid hydrolysis of polysaccharides and inversion of non-reducing sugars to reducing sugars. This can be attributed to partial acid hydrolysis of starch and disaccharide of pulp into invert sugars and also inversion part of non-reducing sugars into glucose and fructose. These chemical reactions were quicker under higher temperature of ambient storage conditions which lead to increased level of reducing sugars in the product. Analogous trends in reducing sugars were also recorded by Lohar *et al.* (2010) in karonda RTS beverage and Syamal *et al.* (2011) in bael-aonla blended nectar.

An overall non-reducing sugars (%) of nectar (Table 6) was found highest in T_5 (Banana:Pineapple, 1:0) which was at par with T_1 (Banana:Pineapple, 4:1) and lowest in T_3 (Banana:Pineapple, 2:3) which was at par with T_4 (Banana:Pineapple, 1:4), whereas, it showed decreasing trend up to 12 months during storage due to the hydrolysis of polysaccharides and inversion of non-reducing into reducing sugars. This can be attributed to partial acid hydrolysis of starch and disaccharide of pulp into invert sugars and also inversion part of non-reducing sugars into glucose and fructose. These chemical reactions were quicker under higher temperature of ambient storage conditions which lead to decreased level of non-reducing sugars in the product. This result is more or less similar to the studies by Patel (2011) in mango nectar and Syamal *et al.* (2011) in bael-aonla blended nectar.

An overall colour acceptability score (out of 9 points)

Table 7: Changes in sensory score for colour of banana and pineapple blended nectar during storage (out of 9 point hedonic scale)

Treatments (Banana:Pineapple)	Storage period (months)							Mean
	0	2	4	6	8	10	12	
T_1 (4:1)	7.51	7.47	7.44	7.41	7.38	7.33	7.30	7.40
T_2 (3:2)	7.70	7.65	7.60	7.55	7.52	7.49	7.46	7.56
T_3 (2:3)	8.02	7.98	7.93	7.81	7.79	7.76	7.72	7.86
T_4 (1:4)	8.39	8.37	8.32	8.29	8.26	8.22	8.18	8.29
T_5 (1:0)	7.44	7.39	7.35	7.31	7.28	7.25	7.20	7.32
T_6 (0:1)	8.44	8.38	8.36	8.33	8.29	8.26	8.22	8.33
Mean	7.92	7.87	7.83	7.78	7.75	7.72	7.68	
S. E. ±	0.08	0.07	0.06	0.07	0.04	0.06	0.05	
C.D. at 5%	0.22	0.21	0.17	0.20	0.12	0.17	0.15	
C.V. %	2.86	2.83	2.27	2.75	1.63	2.26	2.02	

Table 8: Changes in sensory score for texture of banana and pineapple blended nectar during storage (out of 9 point hedonic scale)

Treatments (Banana:Pineapple)	Storage period (months)							Mean
	0	2	4	6	8	10	12	
T_1 (4:1)	7.53	7.50	7.46	7.42	7.37	6.84	6.79	7.27
T_2 (3:2)	7.70	7.65	7.60	7.55	7.48	6.94	6.91	7.40
T_3 (2:3)	8.03	7.95	7.78	7.74	7.68	7.15	7.12	7.63
T_4 (1:4)	8.43	8.38	8.33	8.29	8.23	7.67	7.59	8.13
T_5 (1:0)	7.43	7.40	7.37	7.29	7.25	6.72	6.68	7.16
T_6 (0:1)	8.39	8.35	8.30	8.27	8.18	7.54	7.49	8.07
Mean	7.92	7.87	7.81	7.76	7.70	7.14	7.09	
S.E. ±	0.07	0.07	0.06	0.07	0.06	0.06	0.05	
C.D. at 5%	0.21	0.20	0.18	0.21	0.16	0.17	0.16	
C.V. %	2.75	2.71	2.44	2.86	2.18	2.45	2.24	

of nectar (Table 7) was found highest in T_6 (Banana:Pineapple, 0:1) which was at par with T_4 (Banana:Pineapple, 1:4) due sole pineapple juice, because pineapple have golden yellowish colour and minimum in T_5 (Banana:Pineapple, 1:0). Whereas, it showed decreasing trend during the storage. This pattern of decline of colour during storage might be attributed to the increased rate of oxidation of phenolic compounds and organic acids, which was responsible for increase the

Table 9: Changes in sensory score for taste of banana and pineapple blended nectar during storage (out of 9 point hedonic scale)

Treatments (Banana:Pineapple)	Storage period (months)							Mean
	0	2	4	6	8	10	12	
T_1 (4:1)	7.61	7.51	7.44	7.39	7.34	6.81	6.75	7.26
T_2 (3:2)	7.81	7.72	7.67	7.60	7.54	6.99	6.93	7.47
T_3 (2:3)	8.31	8.21	8.11	8.05	7.99	7.43	7.36	7.92
T_4 (1:4)	8.65	8.60	8.54	8.50	8.46	7.91	7.84	8.36
T_5 (1:0)	7.47	7.40	7.35	7.27	7.24	6.70	6.61	7.15
T_6 (0:1)	8.58	8.55	8.50	8.42	8.39	7.85	7.79	8.30
Mean	8.07	8.00	7.93	7.87	7.83	7.28	7.21	
S. E. ±	0.12	0.10	0.08	0.12	0.11	0.11	0.12	
C.D. at 5%	0.43	0.36	0.23	0.43	0.40	0.40	0.44	
C.V. %	2.34	2.16	2.61	1.81	1.97	2.13	2.29	

Table 10: Changes in sensory score for flavour of banana and pineapple blended nectar during storage (out of 9 point hedonic scale)

Treatments (Banana:Pineapple)	Storage period (months)							Mean
	0	2	4	6	8	10	12	
T_1 (4:1)	7.53	7.46	7.39	7.34	7.27	6.72	6.65	7.19
T_2 (3:2)	7.78	7.71	7.66	7.59	7.52	6.96	6.91	7.45
T_3 (2:3)	8.07	7.99	7.96	7.89	7.81	7.26	7.22	7.74
T_4 (1:4)	8.33	8.258	8.20	8.15	8.10	7.52	7.47	8.01
T_5 (1:0)	7.45	7.40	7.36	7.27	7.20	6.61	6.57	7.12
T_6 (0:1)	8.37	8.31	8.25	8.20	8.14	7.58	7.54	8.06
Mean	7.92	7.86	7.80	7.74	7.67	7.11	7.06	
S. E. ±	0.07	0.08	0.06	0.06	0.08	0.06	0.06	
C.D. at 5%	0.20	0.22	0.18	0.18	0.29	0.16	0.17	
C.V. %	2.37	2.62	2.09	2.21	1.77	2.15	2.34	

Table 11: Changes in sensory score for overall acceptability of banana and pineapple blended nectar during storage(Av. of colour, texture, taste and flavour)

Treatments (Banana:Pineapple)	Storage period (months)							Mean
	0	2	4	6	8	10	12	
T_1 (4:1)	7.55	7.49	7.43	7.39	7.34	6.92	6.87	7.28
T_2 (3:2)	7.75	7.68	7.63	7.57	7.51	7.09	7.05	7.47
T_3 (2:3)	8.11	8.03	7.94	7.87	7.82	7.40	7.35	7.79
T_4 (1:4)	8.45	8.41	8.35	8.31	8.26	7.83	7.77	8.20
T_5 (1:0)	7.44	7.40	7.35	7.29	7.24	6.82	6.77	7.19
T_6 (0:1)	8.44	8.40	8.35	8.30	8.25	7.81	7.76	8.19
Mean	7.96	7.90	7.84	7.79	7.74	7.31	7.26	
S. E. ±	0.03	0.04	0.04	0.04	0.03	0.03	0.03	
C.D. at 5%	0.09	0.13	0.11	0.12	0.08	0.09	0.10	
C.V. %	1.23	1.70	1.48	1.66	1.02	1.31	1.43	

production of black compounds resulting in browning of product during long term storage and thus it's adversely affected on colour acceptance. These observations are also similar to finding of Kothari and Bhatnagar (2010) in aonla-pineapple blended beverage and Patel (2011) in mango nectar.

An overall texture score (out of 9 points) of nectar (Table 8) was found highest in T_4 (Banana:Pineapple, 1:4) which was at par with T_6 (Banana:Pineapple, 0:1) due to the blending effect of banana and pineapple pulp. Moreover, the banana pulp has thick consistency whereas pineapple is juicy and loose textured fruit. So blending effect of both fruits were responsible for fine texture of product and minimum in T_5 (Banana:Pineapple, 1:0). Whereas, it showed decreasing trend during the storage due to the thick consistency, which was responsible for poor texture of nectar during storage. This pattern of decline of texture score during storage might be due to the adverse effect of atmospheric temperature and moisture. Similar observations found by Relekar *et al.* (2011) in sapota nectar and Patel (2011) in mango nectar.

An overall taste score of nectar (Table 9) was found highest in T_4 (Banana : Pineapple, 1 : 4) which was at par with T_6 (Banana : Pineapple, 0:1) and minimum in T_5 (Banana : Pineapple, 1:0). Whereas, it showed decreasing trend during the storage due to the hundred per cent concentration of banana pulp because the banana is sweeter than pineapple which was less acceptable by consumers. The taste score of pineapple and its maximum concentrated juce exhibited highest score as compared to banana. This pattern of decline of taste score during storage might be due to the adverse effect of atmospheric moisture and the biochemical changes during storage. Similar observations were also made by Kothari and Bhatnagar (2010) in aonla-pineapple blended beverage and Lohar *et al.* (2010) in karonda RTS beverage.

An overall flavour score of nectar (Table 10) was found highest in T_4 (Banana:Pineapple, 1:4) which was at par with T_6 (Banana : Pineapple, 0:1) and minimum in T_5 (Banana: Pineapple, 1:0). Whereas, it showed decreasing trend during the storage due to the hundred per cent concentration of banana juice. Because the banana have undesirable flavoured that was less acceptable by consumers. The flavour score of pineapple and its maximum concentrated juice exhibited highest score as compared to banana. This decrease in flavour score might be due to the influence of high temperature, storage conditions, the enzymatic degradation of phenols and oxidative changes of sugars taken place which was responsible for loss of flavour during storage. Similar types of results are also in accordance with Kothari and Bhatnagar (2010) in aonla-pineapple blended beverage and Lohar *et al.* (2010) in karonda RTS beverage.

An overall overall acceptability score of nectar (Table 11) was found highest in T_4 (Banana:Pineapple, 1:4) which was at par with T_6 (Banana:Pineapple, 0:1) and minimum in T_5 (Banana:Pineapple, 1:0). Whereas, it showed decreasing trend during the storage period due to the decline the colour, texture, taste and flavour with increasing storage period. Such identical findings were also observed by Verma and Gehlot (2006) in bael nectar, Patel (2011) in mango nectar.

Conclusion:

Looking to the chemical composition of nectar T_3 (banana:pineapple, 2:3) was highest in respect to TSS, total sugars and reducing sugars. However, proportion of 1:4 was equally best. Moreover, acidity and ascorbic acid content was higher in proportion of 1:4 and 0:1 which were equally good with 2:3 and 1:4. Hence, proportion of 2:3 was best for the chemical composition. While the sensory evaluation in respect to texture, taste, flavour and overall acceptability 1:4 was found best. However, 0:1 was equally best. Looking to the colour acceptability 0:1 proportion was best which was equally good with 1:4. Hence, most of the sensory characters were found higher in 1:4 proportion and it was best for nectar preparation. Considering chemical constituents as well as sensory attributes 2:3 and T_4 1:4 proportions were found best for nectar preparation.

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