



Process Optimization and Preparation of Guava Nectar Blended with Aloevera

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Received: July 27, 2019

Revised: Aug 17, 2019

Published: Aug 31, 2019

ABSTRACT

The present investigation was carried out in laboratory, Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab during Winter Season of 2018-19. Guava nectar blend with aloevera different blending proportions possess significant differences in all nutritional as well as sensory quality parameters. Results depict that there was slight increase in total soluble solids and acidity, reducing sugars but, slight decrease in pH, total sugars, ascorbic acid and antioxidant activity during storage of 90 days. The blended guava nectar prepared using different proportion of guava and aloevera juice or pulp maximum score (9) in blend using T4 (70 ml guava and 30 ml aloevera), score for color, taste, aroma and overall acceptability. During storage period of three months, no microbial counts were observed in blended guava nectar. Overall findings of investigation revealed that blended guava nectar can successfully be stored for 3 months in glass bottles with minimum changes in chemical, sensory and microbial quality.

Keywords-: Guava, Aloevera, Storage studies, Nectar, Sensory quality

INTRODUCTION

Guava (*Psidium guajava* L.) belongs to Myrtaceae family is popularly known as 'poor man's apple of the tropics, has a long history of traditional use for a wide range of ailments. It is a low evergreen tree or shrub 6 to 25 feet high, with wide-spreading branches and square, downy twigs. It is a native of tropical America. Guava is a tropical and semitropical plant. It is well known in the islands for its edible fruit. It is common in the backyards (Joseph and Priya, 2011). It has been in cultivation in India since early 17th century and gradually became a crop of commercial importance. It is available throughout the year except during the summer season. Guava fruit is known for its 'Vitamin-C', minerals like calcium, iron and phosphorous with pleasant aroma and flavor (Dhaliwal and Dhillon, 2003). The leaves of aloe vera contain protein (3.2 g), fibre (15.2 g), iron (9.4 g) and also contains good amount of vit. B₁₂, vit. C, E and carotene - a precursor or vitamin A. Aloe vera has a wide range of medicinal applications immune response against cancer. Sangeetha *et al.* (2005) blended aloe juice in combination with lime juice, pineapple, papaya, grape, and tomato pulps. Aloe vera extract and fruit juices in the ratio of 1:1 were found most acceptable. Zhi *et al.* (2008) produced a health care compound juice containing aloe vera and apple, a new type of juice, which was not as bitter as pure aloe vera juice and proved to have increased nutritional value.

At present, there is increasing demand for the fat free, low calorie and new emerging foods to prevent us from various degenerative diseases. Keeping all these facts in view, the urgent need was felt to standardize guava and aloe vera blended health drink (Nectar) for the benefit of masses in general and sufferers in particular to lead a healthy normal life without sacrificing their taste perception but combining sensory and

nutritional properties (Lavanya *et al.*, 2018)

MATERIAL AND METHODS

The experiment was carried out at laboratory of department of agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab in the year 2018-19. The collection of guava (cv. Allahabad Safeda) fruits was done from the orchard of Aham Khas Bhag Fatehgarh Sahib (Punjab). The experiment was laid out in a Completely Randomized Design (CRD) with three replication. The experiment comprised 9 treatments and Juice/ pulp from guava and aloe vera were extracted by grating the slips/ fruits following extraction by using crusher & screw type juice extractor and pulper. Produce juice/ pulp after extraction and filtration were blended in ratio of [T₁-100 ml : 0 ml, T₂-90 ml : 10 ml, T₃-80 ml : 20 ml, T₄-70 ml : 30 ml, T₅-60 ml : 40 ml, T₆-150 ml : 50 ml, T₇-40 ml : 60 ml, T₈-30 ml : 70 ml and T₉-20 ml : 80 ml (Guava: Aloe vera)] and TSS (25°B) maintained with 0.30% acidity followed by heated at 95°C for 5 min. Immediately after pasteurization, the health drink was packed in 200 ml pre-sterilized glass bottles followed by processing in boiling water for 30 min at 96±1°C. The samples followed by labeling were analyzed for physicochemical as well as sensory attributes. The total soluble solids (TSS) was determined with the help of hand refractometer and expressed as °Brix (Ranganna, 1997). The titratable acidity, sugars and ascorbic acid content were determined by the method as detailed by Ranganna (1997). Thiobarbituric acid reaction substances (% TBARS) method by Nickos *et al.* (1994) was followed to determine the antioxidant activity and percentage inhibition of peroxidation. The organoleptic evaluation of processed products was carried out since appeal to the consumers is the basic requirement

for commercial products. Sensory attributes like appearance, colour, flavour, taste etc. were scored individually. Numerical scores were assigned to each attribute (Peryam and Pilgrim, 1957). A five point scale was adopted to score each of attribute. While scoring highest score (9) was assigned to most preferred characteristic and least score (1) to the least desired. The overall rating was obtained by calculating the average of the scores.

RESULTS AND DISCUSSION

It was observed from Table 1 that TSS of blended guava nectar increased significantly from 19.93 to 21.66°B after three month storage, with the minimum TSS (20.64) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and the maximum TSS (20.81) in blend using T₁ (100 ml guava and 0 ml aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml aloe vera) value of 20.80 and T₃ (80 ml guava and 20 ml aloe vera) value of 20.80. The increase in TSS might be due to inversion of polysaccharides like starch and cellulose into simpler soluble molecules in the presence of organic acid (Sudhindra *et al.*, 2012).

Titration acidity of guava nectar varied significantly from 0.29 % to 0.37 % after three month storage has been presented in Table 1, with minimum acidity (0.29 %) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and the maximum acidity (0.38 %) in blend using T₁ (100 ml guava and 0 ml aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml aloe vera) value of 0.36 % and T₃ (80 ml guava and 20 ml aloe vera) value of 0.35 %. The increase in acidity might be due to formation of organic acid by degradation of ascorbic acid during storage of guava-jamun blended beverage as explained by Sharma *et al.* (2009) and Choudhari *et al.* (2008).

From table 2 mean pH varied significantly decrease from 4.66 to 4.57 during three month storage, with minimum pH (4.58) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and maximum pH (4.65) in blend using T₁ (100 ml guava and 0 ml aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml aloe vera) value of 4.64 and T₃ (80 ml guava and 20 ml aloe vera) value of 4.64. During processing of pulp, the pH decreased and total acidity increased. The difference might be due to the breakdown of pectin by pectolytic enzymes. The slight decrease in pH might have been due to buffering capacity of guava pulp and nectar. These are in conformity with the findings of Dubey *et al.* (2011) and Choudhari *et al.* (2008).

The total sugars significantly increased from 31.76 % to 33.53 % after three month storage has been presented in Table 2, with minimum total sugar (31.33 %) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and maximum total sugar (33.56 %) in blend using T₁ (100 ml guava and 0 ml aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml aloe vera) value of 33.43 % and T₃ (80 ml guava and 20 ml aloe vera) value of 33.21 %. This slight increase in total sugars during storage might be due to acid hydrolysis of polysaccharides as reported by Sudhindra *et al.* (2012).

Reducing sugars increased significantly from 26.19 % to 32.29 % after three month storage has been presented in Table 3, with minimum reducing sugar (27.62 %) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and maximum reducing sugar (33.42 %) in blend using T₁ (100 ml guava and 0 ml aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml aloe vera) value of 31.98 % and T₃ (80 ml guava and 20 ml aloe vera) value of

31.10 %, respectively. During processing of pulp, the pH decreased and total acidity increased. The difference might be due to the breakdown of pectin by pectolytic enzymes. The slight decrease in pH might have been to buffering capacity of guava pulp and nectar. These are in conformity with the findings of Dubey *et al.* (2011) and Choudhari *et al.* (2008).

From table 3, it can be conferred that ascorbic acid varied significantly decrease from 37.92 mg to 29.24 mg after three month storage, with minimum ascorbic acid (25.77 mg) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and maximum ascorbic acid (41.34 mg) in blend using T₁ (100 ml guava and 0 ml aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml aloe vera) value of 40.13 and T₃ (80 ml guava and 20 ml aloe vera) value of 38.27 mg. Brock *et al.*, (1998) reported that the ascorbic acid content decreased during storage probably due to thermal degradation during processing and subsequent oxidation.

The mean antioxidant activity (%TBARS) of blended guava nectar varied significantly high from 324.3 % to 356.1 % after three month storage has been presented in Table 4, with minimum antioxidant activity (315.2 %) in blended guava nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera) and high (353.6 %) in blend using T₁ (100 ml guava and 0 ml Aloe vera), which is statistically followed with T₂ (90 ml guava and 10 ml Aloe vera) value of 352.6 % and T₃ (80 ml guava and 20 ml aloe vera) value of 350.3 %. Measurement of bioactivity such as antioxidant capacity becomes more use full for assessing the overall healthiness of foods than measurement of specific micronutrients (Van B. and Jongen, 1997).

The sensory color, taste, aroma and overall acceptability score of blended guava nectar prepared using different proportion of guava and

aloe vera juice/ pulp maximum score (9) in blend using T₄ (70 ml guava and 30 ml aloe vera), which is statistically followed with T₅ (60 ml guava and 40 ml aloe vera) score (8) and T₆ (50 ml guava and 50 ml aloe vera) score (8). Minimum score occur (5) in blended nectar prepared using T₉ (20 ml guava and 80 ml of aloe vera). The interaction of TSS, blends and storage possess significant effect on the sensory score of blended guava nectar. Similar observations were also reported earlier by Vaghashiya (2015).

CONCLUSION AND RECOMMENDATIONS

The findings summarized above indicate that guava fruits and aloe vera slips available in the market during glut season can be utilized more beneficially for preparation of blended guava nectar. The blended guava nectar can be prepared using T₄ (70 ml guava and 30 ml aloe vera) give result in color, taste, aroma and overall acceptability. The prepared guava nectar can be stored successfully for a period of three months in glass bottles after heat processing at 96±1°C for 30 min. Thus, the developed technologies can commercially be explored by food processing industry for the production of quality guava nectar blending with aloe vera. Therefore, profitable utilization of guava fruits and aloe vera slips by processing can ensure better returns to the growers and consumer at reasonable price.

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Table 1: Changes in TSS ($^{\circ}$ Brix) and acidity (%) in all the treatments during three month of storage period

Treatments	TSS ($^{\circ}$ Brix)								Acidity (%)							
	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean
T1 (100:0)	20.01	20.09	20.50	20.93	21.06	21.39	21.72	20.81	0.34	0.35	0.37	0.38	0.39	0.40	0.41	0.38
T2 (90:10)	20.01	20.08	20.48	20.92	21.05	21.38	21.71	20.80	0.31	0.33	0.35	0.36	0.37	0.38	0.39	0.36
T3 (80:20)	20.00	20.08	20.50	20.92	21.04	21.38	21.70	20.80	0.30	0.32	0.34	0.35	0.36	0.37	0.38	0.35
T4 (70:30)	19.97	20.07	20.49	20.91	21.04	21.36	21.69	20.79	0.30	0.31	0.32	0.33	0.35	0.37	0.38	0.34
T5 (60:40)	19.94	20.07	20.49	20.90	21.01	21.34	21.68	20.78	0.30	0.31	0.32	0.33	0.35	0.37	0.38	0.34
T6 (50:50)	19.92	20.06	20.42	20.89	21.00	21.30	21.64	20.75	0.29	0.30	0.31	0.32	0.33	0.35	0.35	0.32
T7 (40:60)	19.90	20.03	20.37	20.85	20.98	21.28	21.62	20.72	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.32
T8 (30:70)	19.89	20.04	20.34	20.82	20.94	21.26	21.60	20.70	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.31
T9 (20:80)	19.75	20.02	20.33	20.79	20.87	21.20	21.54	20.64	0.24	0.26	0.28	0.30	0.31	0.32	0.33	0.29
Mean	19.93	20.06	20.44	20.88	21.00	21.32	21.66	20.76	0.29	0.31	0.32	0.33	0.34	0.36	0.37	0.33
SEm (\pm)	0.19	0.02	0.02	0.02	0.02	0.33	0.66	-	0.01	0.01	0.01	0.02	0.01	0.03	0.02	-
CD	0.56	0.06	0.05	0.05	0.05	0.99	1.96	-	0.04	0.04	0.04	0.05	0.04	0.08	0.07	-

Table 2: Changes in pH and total sugars (%) in all the treatments during three month of storage period

Treatments	pH								Total sugar (%)							
	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean
T1 (100:0)	4.69	4.68	4.67	4.66	4.64	4.62	4.60	4.65	32.58	32.74	33.14	33.72	33.92	34.15	34.66	33.56
T2 (90:10)	4.68	4.67	4.66	4.65	4.63	4.62	4.60	4.64	32.44	32.70	32.94	33.42	33.84	34.09	34.54	33.43
T3 (80:20)	4.68	4.67	4.66	4.65	4.62	4.61	4.59	4.64	32.09	32.43	32.72	33.29	33.72	33.99	34.25	33.21
T4 (70:30)	4.67	4.66	4.65	4.64	4.62	4.60	4.58	4.63	31.94	32.05	32.15	32.26	32.71	33.08	33.71	32.56
T5 (60:40)	4.67	4.66	4.65	4.64	4.61	4.59	4.57	4.63	31.73	31.86	31.96	32.08	32.50	33.00	33.40	32.36
T6 (50:50)	4.66	4.65	4.63	4.62	4.60	4.59	4.57	4.62	31.67	31.74	31.86	31.98	32.33	32.70	33.26	32.22
T7 (40:60)	4.65	4.64	4.62	4.61	4.59	4.57	4.56	4.61	31.60	31.68	31.77	31.84	32.13	32.57	32.93	32.08
T8 (30:70)	4.65	4.64	4.62	4.61	4.59	4.57	4.54	4.60	31.24	31.42	31.63	31.79	32.11	32.48	32.88	31.93
T9 (20:80)	4.63	4.62	4.60	4.58	4.56	4.56	4.54	4.58	30.56	30.70	30.86	31.13	31.86	32.07	32.13	31.33
Mean	4.66	4.65	4.64	4.63	4.61	4.59	4.57	4.62	31.76	31.92	32.11	32.39	32.79	33.12	33.53	32.52
SEm (\pm)	0.02	0.01	0.01	0.02	0.02	0.01	0.01	-	0.01	0.21	0.03	0.20	0.59	0.67	0.79	-
CD	0.05	0.03	0.04	0.05	0.07	0.03	0.03	-	0.03	0.62	0.10	0.60	1.74	2.00	2.36	-

Table 3: Changes in reducing sugars (%) and ascorbic acid ($\text{mg } 100\text{g}^{-1}$) in all the treatments during three month of storage period

Treatments	Reducing sugars (%)								Ascorbic acid ($\text{mg } 100\text{g}^{-1}$)							
	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean
T1 (100:0)	28.80	31.30	32.29	34.83	35.07	35.67	35.99	33.42	49.81	44.38	41.31	39.45	38.84	38.12	37.45	41.34
T2 (90:10)	28.63	30.90	31.95	31.58	32.92	33.59	34.26	31.98	46.68	43.45	40.99	38.32	37.86	37.16	36.49	40.13
T3 (80:20)	28.31	29.80	29.80	31.35	32.15	32.81	33.48	31.10	43.68	42.77	39.39	36.56	35.87	35.14	34.48	38.27
T4 (70:30)	28.26	29.84	29.76	30.77	31.70	32.36	33.03	30.82	38.21	37.41	36.25	34.41	33.73	33.03	32.36	35.06
T5 (60:40)	25.24	27.46	28.46	29.65	30.40	31.06	31.73	29.14	34.44	34.28	33.95	32.76	32.10	31.37	30.70	32.80
T6 (50:50)	25.14	27.46	28.39	29.59	30.32	30.99	31.65	29.08	33.40	31.89	28.63	26.83	25.51	24.77	24.10	27.88
T7 (40:60)	24.23	26.77	27.78	28.42	29.45	30.12	30.45	28.17	32.41	30.76	27.61	26.44	25.18	24.50	23.16	27.15
T8 (30:70)	23.67	26.54	27.27	28.30	29.28	29.88	30.18	27.87	31.80	30.38	27.33	25.04	24.03	22.99	22.32	26.27
T9 (20:80)	23.43	26.38	27.14	28.02	29.00	29.47	29.88	27.62	30.81	29.42	26.87	24.77	23.74	22.72	22.05	25.77
Mean	26.19	28.50	29.20	30.28	31.14	31.77	32.29	29.91	37.92	36.08	33.59	31.62	30.76	29.98	29.24	32.74
SEm (\pm)	0.14	0.11	0.63	0.74	1.23	1.24	1.43	-	1.96	1.86	1.90	1.39	1.73	1.70	1.43	-
CD	0.40	0.32	1.88	2.18	3.66	3.70	4.24	-	5.81	5.52	5.64	4.12	5.14	5.05	4.25	-

Table 4: Changes in antioxidant (%TBARS) and sensory evaluation in all the treatments during three month of storage period

Treatments	%TBARS								Sensory evaluation			
	0 days	15 days	30 days	45 days	60 days	75 days	90 days	Mean	Color scores	Taste scores	Flavor scores	Overall Accept.
T1 (100:0)	342.1	345.5	346.5	352.1	356.5	359.8	372.5	353.6	6.14	7.18	7.10	5.67
T2 (90:10)	339.3	342.6	347.0	350.3	357.0	360.3	369.6	352.3	8.01	7.66	7.91	8.11
T3 (80:20)	338.3	341.6	344.0	346.6	353.3	360.0	368.6	350.4	8.08	8.02	8.12	8.18
T4 (70:30)	331.6	334.9	337.6	340.9	347.6	354.3	363.3	344.3	8.60	8.61	8.84	8.78
T5 (60:40)	325.2	328.6	331.9	335.2	341.9	348.6	356.9	338.3	8.38	8.37	8.52	8.51
T6 (50:50)	321.8	325.1	329.1	332.5	339.1	345.8	352.5	335.1	8.29	8.15	8.19	8.49
T7 (40:60)	314.2	317.6	321.9	325.2	331.9	338.6	345.9	327.9	7.32	7.46	7.32	7.23
T8 (30:70)	307.0	310.3	314.7	318.0	324.7	331.3	342.0	321.1	6.31	7.27	7.12	6.64
T9 (20:80)	299.1	303.4	310.1	313.4	320.1	326.8	333.4	315.2	5.95	7.04	6.19	5.15
Mean	324.3	327.7	331.4	334.9	341.3	347.3	356.1	337.6	7.45	7.75	7.70	7.42
SEm (\pm)	3.79	4.42	3.17	3.98	5.14	4.56	4.98	-	0.37	0.01	0.21	0.21
CD	11.26	13.13	9.43	11.82	15.27	13.56	0.01	-	1.09	0.04	0.63	0.61

**Figure 1: Guava nectar prepared with different concentration of guava and aloe vera.**