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Processing and evaluation of Avocado (*Persea americana* Mill.) syrup blended with sapota and aloe

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Abstract

Avocado (*Persea americana* Mill.) is one of the most nutritive fruit which is rich in fat (26.40 g) but low in carbohydrate content can be recommended as high energy food for diabetic patients. But research on value addition of avocado fruit is very scanty so research was carried out to prepare and evaluate the blended avocado syrup with sapota and aloe. The product was subjected to chemical analysis at an interval of 30 days during the storage period of four months. The chemical parameters *viz.*, TSS, PH, total and reducing sugars increased whereas, the acidity and non-reducing sugar content decreased throughout the storage period product was free from microbial spoilage because of the addition of sodium benzoate (600 ppm) as a preservative during storage. Sensory evaluation data revealed that the blended avocado syrup with a composition of 25 percent juice, 65⁰B TSS scored the highest score for overall acceptability both before and after storage evaluations.

Keywords: Processing, avocado, sapota, aloe, blended syrup, nutritious

Introduction

Avocado (*Persea americana* mill) is a subtropical and highly nutritious fruit which is also known by the name butter fruit. 100g of edible portion of fruit consists of fat (26.40g), protein (1.70 g), vitamin A (0.04 mg), vitamin B (0.21 mg), vitamin C (14 mg) and minerals like potassium (460 mg), phosphorous (29 mg), calcium (29 mg), magnesium (22 mg) but low in carbohydrate (5.10 g) and can be recommended as a high energy food for diabetic patients. Sapota fruit which is mainly consumed as a fresh fruit is a good source of fat, fiber and minerals. Aloe leaf contains a semisolid gel which is a rich source of vitamins, minerals, amino acid and sterols *etc.*, Because of its immense health benefits it is used as a nutraceutical in the form of juice, emulsion and syrup. In order to utilize the enormous nutritional and medicinal properties of these fruits along with aloe leaf present investigation was carried out to develop and evaluate the avocado syrup blended with sapota and aloe in terms of various chemical parameters and sensory evaluation.

Materials and Methods

The research was carried out at the under graduate processing laboratory at the Division of Horticulture, Gandhi Krishi Vignana Kendra, University of Agricultural Sciences, Bengaluru. The avocado and sapota fruits were procured from local vendors in Sahakaranagar, Bengaluru and aloe leaves were obtained from Sanjivini Vatika of the Division of Horticulture.

For the extraction of juice from avocado and sapota fruits, the fruits were washed, cut into two halves and the pulp was scooped out from the fruits manually after removing the seeds and the pulp was blended in a wearing blender with equal amount of water (1:1 w/v) and the juice was filtered in muslin cloth.

For extraction of aloe juice, the leaves were washed cut transversely and the yellow juice was allowed to drip down and the traces of it were removed by wiping with a cloth. The leaves were washed thoroughly again and the upper thorn tips, rind and lower epidermal layers were removed with the help of stainless steel knife. The leaves were given transverse cut and the pulp/gel was extracted by scooping with the help of a stainless steel knife and was blended in a wearing blender with equal amount of water and the juice was filtered in muslin cloth.

Blended avocado juice with sapota and aloe was prepared in the ratio of 50:30:20. The recipes for avocado syrup was prepared with 25 & 30 percent blended juice and TSS 60⁰B and 65⁰B with 1.5 percent acidity.

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Preparation of blended avocado nectar and chemical Analysis

The syrup was prepared by using blended juice of avocado, sapota and aloe in the ratio of 50: 30: 20. Sugar syrups having TSS of 60⁰B and 65⁰B were prepared by dissolving sucrose in warm water and the required amount of blended juice was added to two sets of these sugar solutions as per the requirement. As the TSS values were dropped due to the addition of juice, TSS values were readjusted by addition of sucrose while, acidity was adjusted by adding citric acid. Sodium benzoate (600 ppm) was added as a preservative to the product. Then the final product was filtered with muslin cloth and was filled into pre-sterilized glass bottles of 200 ml capacity each. The bottles were corked using leg operated crown corking machine. The sealed bottles were then kept in boiling water for half an hour for pasteurization and were stored at room temperature.

The TSS was analyzed by using Erma-hand refractometer, titratable acidity and sugars were estimated by using the method described by Ranganna (1997) [5]. Organoleptic evaluation of the product was done by a panel members of 5 judges by hedonic rating scale (Amerine *et al.*, 1965) [1].

Results and Discussion

The samples of avocado blended syrup were analyzed for changes in their chemical constituents at an interval of 30 days interval during 120 days of storage. The maximum

increment (65⁰B to 67.03⁰B) in TSS was noticed in the treatment D₁T₂ (25% juice and 65⁰B TSS) while, the minimum increment (60⁰B to 61.33⁰B) was recorded in D₁T₁ (25% juice and 60⁰B TSS) during the storage period. This might be due to the increase in total sugars by inversion of polysaccharides like starch and cellulose into simpler soluble molecules in the presence of organic acids and also due to the inversion of added sucrose into simpler soluble substances in the course of time. Similar results were obtained by Ramajayam and Jaganath (2001) [4] in kokum blended simarouba squash.

The blended avocado syrup exhibited an increasing trend in pH during storage (Table 1). A corresponding decrease in acidity of these products during storage could be the reason for the change in pH. The maximum (3.15) increase in pH during the initial period was found in case of treatment D₁T₂ (25% juice, 65⁰B TSS) which increased to 3.28 at the end of the storage period and the treatment D₁T₁ (25% juice, 60⁰B TSS) has shown the minimum (3.04 to 3.17) increase in pH during the storage period. Similar observations for changes in pH were made by Cabrera *et al.* (2009) in Campbell grape juice.

During 120 days of storage, the acidity of the product showed a gradual decreasing trend (Table 1). However, no significant results were obtained for various levels of juice concentrations, TSS and interaction effects throughout the storage period of 120 days.

Table 1: Changes in TSS, PH and acidity of avocado syrup blended with sapota and aloe when fresh and at the end of 120 days of storage.

Treatments	TSS(B)		PH		Acidity (%)	
Storage period (Days)						
	Fresh	120	Fresh	120	Fresh	120
D ₁ T ₁	60.00	61.33	3.04	3.17	1.50	1.21
D ₁ T ₂	65.00	67.03	3.15	3.28	1.50	1.30
D ₂ T ₁	60.00	61.63	3.06	3.22	1.50	1.23
D ₂ T ₂	65.00	66.93	3.12	3.25	1.50	1.18
F-Test	NS	*	*	*	NS	NS
SEM +	0.11	0.05	0.01	0.003	0.08	0.03
CD 5%	-	0.15	0.03	0.009		-

Significant at 5 percent, NS = No Significant

D₁T₁: 25% juice and 60⁰B TSS,

D₁T₂: 25% juice and 65⁰B TSS,

D₂T₁: 30% juice and 60⁰B TSS,

D₂T₂: 30% juice and 65⁰B TSS.

The concentration of total sugar of the blended syrup samples increased gradually during the storage (Table 2). The treatment D₁T₂ (25% blended juice and 65⁰B TSS) recorded the maximum (7.14%) total sugar content initially in the fresh product whereas, the treatment D₂T₂ (30% blended juice and 65⁰B TSS) showed the maximum (12.57%) TSS value at the end of the storage period. The minimum (5.50% to 9.61%) increase in total sugar content was observed in the treatment D₁T₁ (30% blended juice and 60⁰B TSS) throughout the storage period. These results are in confirmation with the earlier reports of Garg *et al.* (2008) [3] in blended juices of aonla, apple and ginger.

The reducing sugar content of the blended syrup showed an increasing trend throughout the storage period (Table-2). The maximum (2.42%) reducing sugar content in the fresh product was found to be in treatment D₂T₂ (30% juice, 65⁰B) which increased to 8.59 at the end of 120 days while, the minimum increase (2.01% to 6.38%) was found in the treatment D₂T₁ (30% juice, 60⁰B). This could be due to the inversion of non-reducing sugars to reducing sugars caused by acids present in the products. Similar results were recorded by Vijay Jain *et al.* (2006) [6] in aonla squash. Initially the maximum reduction (3.42%) in non-reducing sugar content was noticed in the treatment D₁T₁ (25 percent juice and 60⁰B TSS) which decreased to 3.18 percent at the end of the storage period.

Table 2: Changes on total, reducing and non-reducing sugar of avocado syrup blended with sapota and also when fresh and at the end of 120 days of storage.

Treatments	Total Sugars		Reducing Sugars		Non Reducing Sugars	
	Storage period (Days)					
	Fresh	120	Fresh	120	Fresh	120
D1T1	5.50	9.61	2.08	6.43	3.42	3.18
D1T2	7.14	11.01	2.35	6.69	4.79	4.32
D2T1	6.09	10.00	2.01	6.38	4.08	3.63
D2T2	6.90	12.57	2.42	8.59	4.48	3.98
F-Test	*	*	*	*	*	*
SEM +	0.04	0.01	0.01	0.01	0.03	0.006
CD 5%	0.17	0.03		0.05	0.03	0.05

Significant at 5 percent, NS = No Significant

D₁T₁: 25% juice and 60⁰B TSS,

D₁T₂: 25% juice and 65⁰B TSS,

D₂T₁: 30% juice and 60⁰B TSS,

D₂T₂: 30% juice and 65⁰B TSS.

The sensory evaluation data revealed that the treatment D₁T₂ (25% juice, 65⁰B TSS) obtained the highest scores for colour, taste and overall acceptability while, the treatment D₂T₂ (30%

juice, 65⁰B TSS) scored the highest score for aroma and flavour as shown in table 3 both before & after storage evaluations.

Table 3: Changes on total, reducing and non-reducing sugar of avocado nectar blended with sapota and also when fresh and at the end of 120 days of storage.

Treatments	Colour		Taste		Aroma & Flavour		Overall Acceptability	
	Fresh	120 DAYS	Fresh	120 DAYS	Fresh	120 DAYS	Fresh	120 DAYS
D1T1	3.2	3.0	3.2	3.0	3.4	3.0	3.3	3.0
D1T2	4.2	3.8	4.2	3.6	3.8	3.2	4.1	3.4
D2T1	3.4	3.2	3.4	3.2	3.6	3.2	3.5	3.1
D2T2	3.6	3.6	4.0	3.4	4.0	3.4	3.9	3.3

D₁T₁: 25% juice and 60⁰B TSS,

D₁T₂: 25% juice and 65⁰B TSS,

D₂T₁: 30% juice and 60⁰B TSS,

D₂T₂: 30% juice and 65⁰B TSS.

Conclusion

At the end of the storage period TSS, pH and total and reducing sugar contents increased gradually but, the acidity and non-reducing sugar content kept on decreasing in the blended avocado syrup. Sensory evaluation data showed that the recipe with 25 percent blended juice, 65⁰B TSS and 1.5 percent acidity obtained the highest score for overall acceptability both when fresh and at 120 days of storage period.

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