The Bioscan 11(3): 1707-1709, 2016 (Supplement on Agronomy)
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.com

QUALITY EVALUATION AND STORAGE STUDY OF PAPAYA CV. TAIWAN AND BANANA CV. GRAND NAINE BASED MIXED FRUIT BAR

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KEYWORDS
Papaya
Banana
Fruit Bar

Received on :
15.05.2016

Accepted on :
07.08.2016

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ABSTRACT
The experiment comprised seven treatments of fruit bar prepared from different pulp ratio of papaya cv. Taiwan and banana cv. Grand Naine *viz*., 0:100, 20:80, 40:60, 50:50, 60:40, 80:20 and 100:0 in the storage condition at room temperature in polyethylene bag was laid out in completely randomized design along with three repetitions. The physico-chemical parameters *viz*., TSS (ºBrix), acidity, total sugars (per cent), ascorbic acid (mg/100g) and organoleptic quality (9 point Hedonic) with respect to colour, texture, taste and overall acceptability were evaluated at initial and up to 6 months of storage. TSS (72.70), total sugars (45.70) and ascorbic acid (1.65) content of fruit bar was found decrease while acidity (1.65) increased during storage period of six months in all treatments. Considering the organoleptic evaluation of fruit bar with respect to colour, flavour, texture, taste and overall acceptability the treatment T_4 (50:50, papaya:banana) *i*.e. 7.93 was found higher organoleptic score with better consumer acceptability during storage

INTRODUCTION

The fruit bars have high calorific value retaining natural vitamins and minerals. Fruit bars are principally made up from fruit pulps which retain most of fruit ingredients to form a good nutritional supplement. So, the fruit bars are made from pulpy fruits or by mixing the pulps of fruits that are commercially in demand both as fresh and processed forms (guava-papaya bar Vennilla 2004). Papaya (*Carica papaya* Linn.) is a high yielding fruit but the main problem is its post harvest handling and marketing which needs to be standardized. For generate useful information on extending shelf life of fruits because they are highly perishable in nature and over ripen fruits unfit for consumption. Banana (*Musa paradisica*) is the most dominating crop. It is also a dessert fruit for millions, apart from a staple food owing to its rich and easily digestible carbohydrates with a high calorific value per fruit. For utilization of produce in the glut season, it is necessary to save it from spoilage. Hence, the development of the low cost processing technology of papaya and banana is highly required. Thus, the preparations of papaya as well as banana pulp with simple technology and its utilization in the form of pulp and fruit bar have a great scope like papaya bar (Aruna *et al*.,1999) and tomato-papaya bar (Ahmed 2004). The present investigation was proposed to standardize either papaya or banana or its combination fruit bar and to evaluate their acceptability and quality during the storage period.

MATERIALS AND METHODS

The fully matured, firm ripe and healthy papaya and banana fruits of uniform size and shape were selected from Navsari Fruit Market, Navsari. The selected fruits were free from mechanical damage, bruises and fungal or insect attack.

Preparation of Bar

Fruits were shorted and washed followed by peeling and pulping separately. Papaya – banana fruit bar was prepared by mixing the pulp in different proportion as per the treatment and then heated to 91-93 ºC. Cane sugar was then added to adjust TSS to 30 ºBrix (Ahmad *et al*., 2004).Citric acid was then added to the puree to raise the acidity to 0.6%. The blend was sulphited with 1300 ppm potassium metabisulphite (KMS) as per ratio of papaya and banana pulp *viz*., 0:100 (T_1), 20:80(T_2), 40:60(T_3), 50:50(T_4), 60:40(T_5), 80:20(T_6) and 100:0(T_7) in the treatment. All the blends were spread on stainless steel trays and put in the cabinet drier at 60 ± 2ºC for 16 h (Vennilla 2004). Dried sheets of each blend were cut into rectangular pieces of 2 x 5" size and packaged in polyethylene bags.The bags were sealed and labeled appropriately with details of treatment and stored at room temperature for six months. The experimental data were analyzed by completely randomized design (CRD) according to procedure described by Panse and Sukhatme (1967).

Physico-chemical estimations

The biochemical attributes of prepared papaya-banana fruit bar among all treatments were analyzed at 0, 3, 6 months interval storage from beginning to completion of this work. The biochemical observations *viz*. TSS by refractometer, total sugars (Lane and Eynon, 1923), ascorbic acid by (2,6-dichlorophenol indophenols-dye) titration method (Rangana,

2010) and acidity by titration method (Rangana, 2010).

Organoleptic evaluation

Organoleptic evaluation was made for evaluating the colour, texture and taste of papaya-banana fruit bar at 0, 3, 6 months by the team of panelist on a 9 point Hedonic scale (Amrine *et al.,* 1965). Professors and Ph. D. scholars were including as a judge for organoleptic evaluation of fruit bar. The bars of all treatments were rated on description of their physical appearance, colour, taste and aroma etc. Overall acceptability was considered by adding of the each member scores.

RESULTS AND DISCUSSION

The results of this research have been showed and discussed about papaya-banana fruit bar among all treatments.

Physico-chemical estimations

Total soluble solids

The TSS content of mixed fruit bar with different ratios of banana and papaya pulp decreased with advancement of storage (Table 1).The differences observed were significant among the treatments. TSS has been influenced by metabolic changes especially utilization in oxidative metabolism and with prolonged storage period, the pore space in the product decreases or increases due to fluctuations in moisture level and imbibes water. This kind of observation is also supported by Vennilla (2004) in guava-papaya fruit bar, Aruna *et al.* (1999) in papaya bar.

Acidity

The acidity content of mixed fruit bar with different ratios of banana and papaya pulp increased with storage (Table 1). Acidity of bar was influenced by different pulp ratios during storage period. The increase in acidity may be due to hydrolysis of pectin, ascorbic acid degradation or conversion of sulphur dioxide into sulphurous acid and formation of acid from sugars resulting in increased acidity content.Similar types of observations on variations in acidity were recorded by Vennilla (2004) in guava-papaya fruit bar, Aruna *et al.* (1999) in papaya bar.

Total sugars

Total sugars (%) in the papaya and banana based fruit bar exhibited gradual decrease during storage period (Table 2) which may be due to breakdown of carbohydrates. Similar types of observations were observed by Vennilla (2004) in guava-papaya fruit bar, Aruna *et al.* (1999) in papaya bar and Ahmed *et al.* (2014) in dried peach.

Ascorbic acid

There was significant decrease in the ascorbic acid content in mixed fruit bar during storage period (Table 2). Loss of ascorbic acid during storage might be due to increase in moisture level, exposure to light, air, product area exposed and length of storage period. Similar types of observations were recorded by Aruna *et al.* (1999) during storage of papaya bar, Mishra *et al.* (2015) storage of dried candy, Hemakar *et al.* (2000) during storage of mango-guava sheet and Ahmed *et al.* (2014) in storage dried peach.

Organoleptic evaluation

There was a significant decrease in organoleptic score of juice blends during storage.The rate of decrease of organoleptic

Table 1: Effect of treatments and storage period on TSS and acidity of papaya-banana fruit bar

Treatments			Months after storage							
	Papaya	Banana	TSS (°B)				Acidity			
	Pulp (%)	Pulp (%)	0	3	6	Mean	0	3	6	Mean
T_1	0	100	75.13	73.9	72.7	73.91	1.34	1.59	1.83	1.59
T_2	20	80	74.37	73.23	72.1	73.23	1.34	1.55	1.79	1.56
T_3	40	60	76.88	75.67	74.23	75.59	1.28	1.52	1.78	1.53
T_4	50	50	78.7	77.43	76.3	77.48	1.21	1.47	1.74	1.47
T_5	60	40	79.47	78.07	76.7	78.08	1.13	1.44	1.74	1.44
T_6	80	20	82.53	81.07	79.8	81.13	1.03	1.36	1.72	1.37
T_7	100	0	84.83	83.63	82.4	83.62	0.9	1.36	1.65	1.3
S.Em. ±			0.16	0.21	0.168		0.01	0.016	0.018	
C.D. at 5 %			0.48	0.64	0.51		0.03	0.05	0.06	
CV %			0.35	0.47	0.38		1.63	1.84	1.83	

Table 2: Effect of treatments and storage period on total sugar and ascorbic acid of papaya-banana fruit bar

Treatments			Months after storage							
	Papaya	Banana	Total Sugar (%)				Ascorbic Acid (mg/100g)			
	Pulp (%)	Pulp (%)	0	3	6	Mean	0	3	6	Mean
T_1	0	100	49.12	48.45	47.75	48.44	6.42	3.53	1.65	3.87
T_2	20	80	48.86	48.11	47.38	48.12	16.14	12.19	9.14	12.49
T_3	40	60	48.34	47.57	46.87	47.59	25.71	20.56	16.67	20.98
T_4	50	50	47.97	47.23	46.51	47.24	31.16	25.24	20.41	25.6
T_5	60	40	47.52	46.77	46.04	46.78	35.27	28.88	24.23	29.46
T_6	80	20	47.34	46.6	45.88	46.61	44.85	37.77	31.78	38.13
T_7	100	0	47.15	46.41	45.7	46.42	54.38	46.24	39.11	46.58
S.Em. ±			0.2	0.19	0.18		0.342	0.271	0.21	
C.D. at 5 %			0.61	0.59	0.56		1.04	0.82	0.64	
CV %			0.72	0.71	0.68		1.94	1.88	1.78	

Table 3: Effect of treatments and storage period on overall acceptability of papaya-banana fruit bar

Treatments			Overall acceptability - Months after storage			
	Papaya Pulp (%)	Banana Pulp (%)	0	3	6	Mean
T_1	0	100	7.64	7.39	6.76	7.26
T_2	20	80	7.4	7.09	6.36	6.95
T_3	40	60	7.6	7.21	6.5	7.1
T_4	50	50	8.51	8.32	7.93	8.25
T_5	60	40	7.9	7.62	7.06	7.53
T_6	80	20	8.05	7.72	7.15	7.64
T_7	100	0	8.21	7.97	7.45	7.88
S.Em. ±			0.076	0.064	0.073	-
C.D. at 5 %			0.23	0.19	0.22	-
CV %			1.67	1.45	1.81	-

score was highest in treatment papaya-banana (20:80) pulp ratio. From initiation till end highest score was observed in treatment papaya-banana (50:50) pulp ratio with highest consumer acceptance. Similar decrease during storage was observed by Narayana, *et al*. (2003) in banana fig, Ahmad *et al*. (2004) in tomato-papaya bar and Vennilla (2004) in guava-papaya fruit bar.

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