

Evaluation of Physico-chemical and organoleptic quality of Papaya Cv. Taiwan and Banana Cv. Grand naine based mixed fruit bar during storage

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Absract

The experiment was conducted at Dept. of Post-Harvest Technology, Navsari Agriculture University, Navsari in the year 2012-13 and 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 (°B), 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, total sugars and ascorbic acid content of fruit bar was found decrease while acidity 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 T₄ (50:50, papaya:banana) was found higher organoleptic score with better consumer acceptability during storage.

Highlights

- Papaya Banana fruit bar (50:50) have highest organoleptic score and good physico-chemical score, it can be adopted for commercialization

Keywords: Papaya, Banana, fruit bar, storage, organoleptic evaluation

Papaya (*Carica papaya* Linn.) is an important fruit crop of tropical world and has long been known as wonder fruit of the tropics. In India, Papaya is widely cultivated in Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu, Kerala and plains of Uttar Pradesh. Now-a-days, farmers of every region having much interest in cultivation of papaya because higher fruit yield but, the main problem is its post harvest handling and marketing which needs to be standardized through systematic experimentation and it will generate

useful information on extending shelf life of fruits because they are highly perishable in nature and over ripen fruits unfit for consumption.

In the galaxy of fruit crops, banana (*Musa paradisiaca*) is the most dominating crop. Fruits and their culture have very close association with life of man and the human civilization is linked with development of fruit industry. India is the largest banana consumer and producer country in the world followed by China, contributing about 29 per cent of the total world production. In India, Tamil Nadu,



Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Madhya Pradesh and Assam are the leading banana producing states. 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. It will help to generate opportunities for self employment by starting small scale processing unit or cottage industry. 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. 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.

Therefore, 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 of six months.

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 sorted 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°C. Cane sugar was then added to adjust TSS to 30°C Brix. 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 (T₁), 20:80(T₂), 40:60(T₃), 50:50(T₄), 60:40(T₅), 80:20(T₆) and 100:0(T₇) in the treatment. All the blends were spread on stainless steel trays and put in the cabinet drier at 60±2°C for 16 h. Dried sheets of each blend were cut into

rectangular pieces of 2×5" 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 bar of all treatments were rated on description of their physical appearance, colour, taste and aroma etc.

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 (Crues 1958; Seth 1985), 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 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.

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

Treatments		Months after storage								
Papaya Pulp (%)	Banana Pulp (%)	TSS (°B)				Acidity				
		0	3	6	Mean	0	3	6	Mean	
T ₁	0	100	75.13	73.90	72.70	73.91	1.34	1.59	1.83	1.59
T ₂	20	80	74.37	73.23	72.10	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	78.70	77.43	76.30	77.48	1.21	1.47	1.74	1.47
T ₅	60	40	79.47	78.07	76.70	78.08	1.13	1.44	1.74	1.44
T ₆	80	20	82.53	81.07	79.80	81.13	1.03	1.36	1.72	1.37
T ₇	100	0	84.83	83.63	82.40	83.62	0.90	1.36	1.65	1.30
S.Em. ±			0.16	0.210	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 Pulp (%)	Banana Pulp (%)	Total Sugar (%)				Ascorbic Acid (mg/100g)				
		0	3	6	Mean	0	3	6	Mean	
T1	0	100	49.12	48.45	47.75	48.44	6.42	3.53	1.65	3.87
T2	20	80	48.86	48.11	47.38	48.12	16.14	12.19	9.14	12.49
T3	40	60	48.34	47.57	46.87	47.59	25.71	20.56	16.67	20.98
T4	50	50	47.97	47.23	46.51	47.24	31.16	25.24	20.41	25.60
T5	60	40	47.52	46.77	46.04	46.78	35.27	28.88	24.23	29.46
T6	80	20	47.34	46.60	45.88	46.61	44.85	37.77	31.78	38.13
T7	100	0	47.15	46.41	45.70	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	7.40	7.09	6.36	6.95
T ₃	40	60	7.60	7.21	6.50	7.10
T ₄	50	50	8.51	8.32	7.93	8.25
T ₅	60	40	7.90	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	-

Ascorbic Acid

There was significant decrease in the ascorbic acid content in mixed fruit bar during storage period. 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 fruit bar during storage. The rate of decrease of organoleptic 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.

Conclusion

It is concluded that banana and papaya can be suitably processed together for making mixed fruit bar. Banana and papaya based fruit bar (50:50) is most acceptable based on quality evaluation. The storability study revealed that fruit bar had good shelf life and can be kept for more than 180 days without affecting the quality attributes.

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