

RESEARCH PAPER

DOI: 10.15740/HAS/IJPPT/5.2/141-144

# Process standardization and storage studies of jamun-mango bar

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Research chronicle : Received : 22.07.2014; Revised : 28.10.2014; Accepted : 14.11.2014

## SUMMARY :

The experiment was designed to investigate the influence of addition of mango pulp at various levels in preparation of jamun-mango bar and effect of different packaging materials and storage conditions on quality. Results indicated that addition of 20 per cent mango pulp can be improved the sensory quality of jamun bar with respect to taste and texture. Efforts were also made to prepare bar using different types of sugars and no significant effect on acceptability of product by changing type of sugar. The storage study revealed that moisture content was decreased continuously with storage. Maximum moisture loss was from samples stored in butter paper and minimum in samples stored in polyethylene in PET bottles. The T.S.S. was increased slightly during storage in all the packaging materials. The total sugars were found to be decreased consistently with increase in reducing sugars. The Anthocyanin pigments remained quite stable during storage of bar. These changes were quite less in samples stored in refrigerated storage as compared to ambient temperature. However, the product can be stored without any changes up to 270 days of storage.

**KEY WORDS :** Jamun bar, Storage study, Anthocyanin, Butter paper, PET bottles

**How to cite this paper :** Shere, D.M., Pawar, V.S. and Shere, P.D. (2014). Process standardization and storage studies of jamun-mango bar. *Internat. J. Proc. & Post Harvest Technol.*, 5 (2) : 141-144.

Jamun (*Syzgium cuminii* skeels) fruit is an important member of family Myrtaceae, widely grown throughout India in tropical and subtropical parts of the country. The ripe fruit has an attractive bright purple colour and excellent taste. The ripe fruit is known to have therapeutic value as it is considered to prevent diabetes and help in its control (Gopalan *et al.*, 1971 and Shrotri *et al.*, 1963). The attractive colour is due to anthocyanin pigments is a major quality attribute in jamun products (Khurdiya and Roy, 1985 and Venkateswarlu, 1952). However, the fruit is seasonal and available for short period of time for one or two months during the year and very little information is available on processing of jamun fruit. Therefore, it is necessary to utilize this fruit for making value added products over an extended period.

Bar (Thandra) is an age old traditional fruit product accepted by all age groups (Nanjundaswamy *et al.*, 1976 and Rao and Roy, 1980). Thandra is a semi moist food which can be stored safely for longer time at room temperature. Therefore, the present study was undertaken to develop bar from jamun fruit using only jamun fruit pulp or in combination with mango fruit pulps and to assess its storage stability in different packaging materials.

## EXPERIMENTAL METHODS

Fresh healthy and pulpy fruits were purchased from local market. The fruits (10kg) were washed in water, steamed for 2-3 min. and crushed with hand without damaging the seeds.

The pulp was then passed through blender to get fine pulp and packed in polyethylene pouches. The sealed pouches were stored in deep freeze at  $-18^{\circ}\text{C}$  until used for preparation of bars.

#### Treatment combinations :

Different treatment combinations of jamun pulp with mango pulp *viz.*, 100:00, 80:20, 60:40 and 40:60 were made by mixing jamun pulp with mango pulp. The total soluble solids of the mixture were raised to 22 per cent by addition of sugar and 1 per cent acidity by adding citric acid. The final mixture of pulp was spread on lubricated tray to a thickness of 1.5 cm and dried in cross flow drier at  $50\pm 5^{\circ}\text{C}$  for 4-5 h. The semi dried product was cut into long strips of 10cm x 2cm and packed into various packaging materials and stored at room temperature and refrigerated temperature and sensory evaluation was carried by composite scoring method using faculty semi-trained panel members.

The stored samples were analyzed at months interval for moisture, acidity, total and reducing sugars as per the method described by Ranganna (1995). Total soluble solids of bar was determined by hand refractometer (Erma Japan) after diluting the sample to 1:5 ratio. The total anthocyanin pigments were measured by the method of Fuleki and Francis (1968).

## EXPERIMENTAL FINDINGS AND ANALYSIS

Jamun bar with addition of mango pulp at various levels was prepared and best level was decided on the basis of composite score assigned by sensory judges (Table 1). It can be seen from table that, maximum score for colour was assigned for the bar prepared from 100 per cent jamun pulp. The score

for colour was decreased with increase in per cent of mango pulp in the bar. However, the bar prepared only from jamun pulp was fragile in texture. Therefore, jamun pulp was mixed with part of mango pulp. However, with addition of mango pulp, score for colour decreased with increase in per cent of mango pulp. The texture was improved with increase in per cent of mango pulp in the bar. However, addition of higher levels of mango pulp in the bar did not improve the score for texture also. Taste and flavour of the product was decreased with addition of the mango pulp. Taste and flavour in  $T_2$  treatment was almost equal to the 100 per cent jamun bar. Similarly sugar acid balance and other parameters were also quite good in  $T_2$  treatment. Hence, in further study product was prepared only from 80:20 jamun mango pulp.

It can be seen from Table 2 that there is no much effect of changing the type of sugar *i.e.* glucose, fructose and fructose on acceptability level of jamun bar and hence the jamun bar with addition of fructose can be prepared very well to use the product for diabetic people also as fructose is of low glycemic index which result in moderate release of insulin in blood stream relative to glucose and sucrose.

Table 3 and 4 indicate the changes in chemical constituents of jamun bar in cold storage and at room temperature packed in different packaging materials. The package materials used were butter paper, polyethylene and polyethylene in PET bottles. It can be seen from table that, moisture content was decreased with storage period continuously. It can be observed from results that the sample packed in butter paper showed higher moisture loss (6.80%, 9.70% and 11.48%) during 90,180 and 270 days of storage, respectively. The loss in moisture content was minimum in the product stored in polyethylene in PET

**Table 1 : Sensory evaluation score of Jamun-Mango bar**

Sr. No.	Treatments Jamun pulp: Mango pulp	Colour (20)	Texture (20)	Taste and flavour (20)	Sugar acid ratio (20)	Absence of defects (20)	Total score (100)
1.	$T_1$ (100:0)	17	16	19	16	16	84
2.	$T_2$ (80:20)	16.5	17	18.5	16	17	85
3.	$T_3$ (60:40)	15	18	17	15	17	82
4.	$T_4$ (40:60)	14	18	17	14	17	80
	S.E. $\pm$	0.36	0.21	0.23	0.20	0.18	0.26
	C.D. (P=0.05)	1.22	0.68	0.76	0.69	0.61	0.8
$T_1= 100:0$ (Jamun mango pulp)		$T_2= 80:20$ (Jamun mango pulp)		$T_3= 60:40$ (Jamun mango pulp)		$T_4= 40:60$ (Jamun mango pulp)	

**Table 2 : Sensory evaluation of Jamun-Mango bar with addition of various sugars**

Sr. No.	Type of sugar	Colour (20)	Texture (20)	Flavour and taste (20)	Sugar acid balance (20)	Absence of defects (20)	Total score (100)
1.	Glucose	18	16	17	18	18	87
2.	Fructose	18	17	18	18	18	89
3.	Sucrose	18	17	17	18	18	88
	S.E. $\pm$	0.25	0.14	0.07	0.20	0.5	0.15
	C.D. (P=0.05)	0.86	0.51	0.24	0.72	0.55	0.52

**Table 3: Changes in chemical constituents in Jamun-Mango bar in cold storage**

Sr. No.	Storage period (Days)	Packing material	Moisture (%)	T.S.S. (%)	Acidity (%)	Total sugars (%)	Reducing sugars (%)	Anthocyanins mg/100 g
1.	0	–	23.50	12.60	2.3	44.27	38.72	110
2.	90	BP	21.90	13.0	2.4	41.50	39.75	108
		PE	22.35	12.50	2.3	42.25	39.50	108
		PE in PET	23.00	12.50	2.3	43.75	39.90	110
		S.E. ±	0.21	0.20	0.03	0.21	0.21	0.20
		C.D. (P=0.05)	1.77	0.69	0.12	0.70	0.71	0.69
3.	180	BP	21.20	13.50	2.50	40.80	39.50	102
		PE	21.80	13.00	2.4	41.50	39.50	104
		PE in PET	22.70	13.00	2.3	42.10	39.75	106
		S.E. ±	0.24	0.19	0.04	0.20	0.07	0.21
		C.D. (P=0.05)	0.85	0.68	0.16	0.71	0.24	0.72
4.	270	BP	20.80	15.55	2.50	40.50	39.40	100
		PE	21.50	13.00	2.45	41.00	39.45	102
		PE in PET	22.20	13.00	2.40	42.10	39.60	105
		S.E. ±	0.31	0.30	0.04	0.22	0.08	0.25
		C.D. (P=0.05)	1.08	1.04	0.11	0.76	0.27	0.72

TSS of diluted sample (1:5)

**Table 4 : Changes in chemical constituents in Jamun-Mango bar at ambient temperature**

Sr. No.	Storage period (days)	Packing material	Moisture (%)	T.S.S. (%)	Acidity (%)	Total sugars (%)	Reducing sugars (%)	Anthocyanins mg/100g
1.	0	–	23.50	12.60	2.3	44.27	38.72	110
2.	90	BP	19.20	13.50	2.40	40.20	38.80	95
		PE	20.50	12.50	2.40	41.60	39.10	98
		PE in PET	21.30	12.50	2.35	42.50	39.50	100
		S.E.±	0.07	0.08	0.14	0.03	0.06	0.12
		C.D. (P=0.05)	0.26	0.27	0.49	0.13	0.21	0.41
3.	180	BP	18.00	14.00	2.50	40.00	38.50	90
		PE	20.00	13.50	2.40	41.20	39.00	95
		PE in PET	21.10	12.50	2.35	42.00	39.10	97
		S.E.±	0.23	0.08	0.07	0.05	0.07	0.18
		C.D. (P=0.05)	0.81	0.28	0.26	0.19	0.27	0.62
4.	270	BP	18.00	14.00	2.50	40.00	38.50	85
		PE	19.50	13.50	2.40	41.15	39.00	92
		PE in PET	21.00	12.50	2.30	42.00	39.10	95
		S.E.±	0.23	0.08	0.06	0.05	0.07	0.16
		C.D. (P=0.05)	0.82	0.28	0.25	0.18	0.27	0.59

TSS of diluted sample (1:5)

**Table 5: Sensory score of Jamun-Mango bar after 270 days of storage**

Sr. No.	Storage conditions	Colour (20)	Texture (20)	Taste and flavour (20)	Sugar acid ratio (20)	Absence of defects (20)	Total score (100)
1.	Refrigerated storage	17	18	18	17	17	87
2.	Ambient temperature	16	17	18	17	16	84

bottles. There was only (5.53%) at the end of 270 days of storage. This may be attributed to higher water vapor permeability through butter paper. Changes in moisture content were higher in samples stored at ambient temperature. The similar trend in loss of moisture during storage was also observed in papaya bar during storage (Rao and Roy, 1980a).

The TSS of bar samples was slightly increased in all the packaging materials. Changes were more pronounced at ambient temperature as compared to cold storage. This may be due to loss of moisture during storage resulting in the concentration of the product (Nanjundaswamy *et al.*, 1976, Rao and Roy, 1980b, Mir and Nath, 1993). Acidity of the product remained either constant or slight increase during storage.

The total sugars were found to decrease during storage consistently with increase in reducing sugars. The percentage loss of total sugars was high in samples stored in butter paper than polyethylene and polyethylene stored in PET bottles. Similar pattern of decreasing trend in total sugar was reported by Doryappa Gowda *et al.* (1995) in mango bar and Manimegalai *et al.* (2001) in processing and preservation of jackfruit bar.

It is interesting to note that anthocyanins were quite stable

during storage of bar. There was a slight decrease in anthocyanin content from 110mg /100 g to 108, 102 and 100 mg/100 g during 90, 180 and 270 days of cold storage, respectively. However, loss in anthocyanin content was of higher magnitude in samples stored at ambient temperature. This clearly indicated that losses in anthocyanins were more at room temperature. The anthocyanin pigments were found to be destroyed at room temperature storage in jamun juice and nector (Khurdiya and Roy, 1985).

Finally both the products were again evaluated by sensory evaluation after 270 days of storage. It can be seen from Table 5 that both products were quite acceptable without any defect. However, the sensory score was slightly higher in product stored in cold storage. This may be due to higher anthocyanin content in product at cold storage.

#### Conclusion :

Highly acceptable product from jamun can be prepared and stored either at cold storage or ambient temperature in the form of bars and jamun taste in its natural form can be made available through out year to the consumer.

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