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PHYSICO-CHEMICAL CHARACTERS AND SENSORY EVALUATION OF JAMUN BASED BLENDED SQUASH BEVERAGES DURING STORAGE

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Abstract

A post harvest study was conducted at Horticultural College and Research Institute, Venkataramannagudem in order to find out best proportion of jamun based blends with mango, grapes and pineapple to preserve in the form of squash beverages. The blended squash beverages of jamun with mango, pineapple and grapes were analysed for phsico-chemical composition and sensory quality at monthly interval for four months of storage. The density, TSS, total sugars and acidity were found to have increased during the storage. The pH, anthocyanin, ascorbic acid content and the organoleptic scores for taste and flavour were decreased sturdily and significantly. Among all the treatments the highest overall acceptability was achieved by the squash prepared from 75% jamun juice blended with 25% grape juice with having 1.186 g cm^{-3} of density, 4.35 of pH, 46.37 °B of TSS, 37.62% of total sugars, 0.92% of acidity and 17.58 mg/100 ml of ascorbic acid content. The various physico-chemical and sensory parameters obtained during the course of investigation and the data obtained along with relevant discussion are presented in the full text of this paper.

Key words : Jamun, pH, squash, anthocyanin.

Introduction

Jamun (*Syzygium cumini* L.) is an evergreen tropical tree belonging to the family Myrtaceae. The tree is a fairly fast growing species and can reach a height up to 30 m and live for more than 100 years. It is either found wild or cultivated by planting the grafts. The jamun tree is useful in several ways. The wood is strong, water resistant and is used in making railway sleepers, cheap furniture and village dwellings though it is relatively hard to work on. The leaves and bark are used to control blood pressure and gingivitis (Joshi, 2001). The fruit, its juice and seed contain a metabolite called 'jamboline', which is believed to check the pathological conversion of starch into sugar in case of increased production of glucose. Besides, jamun fruit is an effective food remedy for bleeding piles and correcting liver disorders. Since the fruit is a very rich source of anthocyanin, it imparts anti-oxidant properties too.

In addition, the ripe berries form a good source for vitamins, minerals, pectin and ascorbic acid. It is used as an effective therapeutic medicine against diabetes, heart and liver trouble. However, jamun fruit is highly perishable; the short shelf-life of fruit has made it available only for short period, which makes its valuable properties unrealized by several people. Since, there has been an increasing demand for health promoting food products like those of jamun a clear necessity is felt to preserve the fruit in various forms. Fruits like jamun are available only during a short period of time within which it is difficult to distribute among the needy and interested people. Further, it is also suggested to have the combination of several fruits and vegetables while preparing finished products, since it will comprise maximum possible essences which otherwise may fall deficient because of the use of single fruit products. Tripathi *et al*. (1992) reported that two or more fruit juices or pulps may be blended in various proportions for the preparation of more palatable and nutritious nectar and ready-to-serve (RTS) beverages, etc. Spiced beverages in the form of fruit drinks, squashes, appetizers, health drinks, etc., are gaining importance in the market. Spiced beverages are said to have improved flavour, reduced astringency and storage stability. They are also enriched with natural antioxidant and antimicrobial properties apart from having carminative effect and aid in digestion through the stimulation of appetite (Griffin, 1992).

Materials and Methods

In the present study, the fruits were collected from the local market. Well ripe fruits were collected and washed. Diseased, withered fruits were discarded. The fruit juice was extracted as per the procedure (Srivastava and Kumar, 1994).

Preparation of blends

The fruit juices thus prepared were blended in different proportions *viz*., 75:25, 50:50, 25:75 with jamun juice as per the respective treatment combinations and the observations were recorded for different blends. The stock preparations were made at different levels as per the treatments and they were used in the preparation of squash along with pure jamun juice.

Preparation of squash

Squash was prepared by taking 25 per cent fruit juice and adjusting TSS to 40° to 55° Brix and acidity to about 1.5 percent. A 600 ppm concentration of sodium benzoate was used as preservative. It should be diluted before serving.

Storage and proximate analysis

Squash beverages were stored in pet bottles at ambient conditions. The proximate analyses of jamun based beverages were done for different parameter. The samples were kept against a white piece of paper. Colour of the samples was ascertained by visual observation. Also the optical density (O.D.) of the samples was taken for greater accuracy by using colorimeter (Mazumdar and Mazumdar, 2003). The absorbance of the clear samples was obtained at 600 nm (Wave length of minimal absorbance) in colorimeter against distilled water blank. The total soluble solids were determined by using hand refractometer and expressed in °Brix as followed by Ranganna (1986). The titrable acidity was analysed by the procedure followed by Ranganna (1986). The pH of the squash was recorded with the help of pH meter as followed by Covenin (1984). Total sugars were determined following the method described by Lane and Eyon (Ranganna, 1986). Ascorbic acid content was estimated by using 2, 6-dichloro phenol indophenol dye (Ranganna, 1986). The total anthocyanins were determined by adopting the pH differential method given by Fuleki and Francis (1968). Sensory score for taste and flavour were given by using nine points hedonic scale (Amerine *et al*., 1965).

Results and Discussion

Colour

Significant differences were observed in the colour of squash due to juice blends (table 1). But, there was no significant difference in any particular treatment over the storage period from the initial to 120 days after preparation in respect of colour.

The squash prepared from pure jamun juice (100%) ($\mathbf{T_{10}}$) along with squashes prepared from jamun + grape juice blends ($\mathbf{T_4}$, $\mathbf{T_5}$ and $\mathbf{T_6}$) showed cyanic colours. On the other hand, xanthic colours were observed in the squashes prepared from jamun + mango juice blends ($\mathbf{T_1}$, $\mathbf{T_2}$, and $\mathbf{T_3}$) and foliar colours in those prepared from jamun + pineapple juice blends ($\mathbf{T_7}$, $\mathbf{T_8}$ and $\mathbf{T_9}$).

There was a non significant difference in optical density with respect to the storage period. Among the treatments the highest OD (1.066) was noticed in the squash prepared from pure jamun juice ($\mathbf{T_{10}}$), which was followed by the squashes prepared form 75% jamun juice + 25% grape juice ($\mathbf{T_6}$) (1.065) and 75% jamun juice + 25% grape juice ($\mathbf{T_3}$) (1.065).

The differences in colour among the treatments could be due to the nature of pigments and their relative proportions contributed from the different source juice blends. Since the fruits of jamun and grapes possess cyanic colour their blends also had the same colouration. Whereas, the mixtures with mango juice and pineapple juice in various proportions were different from cyanic colour since the proportion of jamun juice was varying and its colour could have been modified by the contributory colours of the juices from mango and pineapple. This could have eventually resulted in the variation of colour of squashes prepared by sourcing them as starter juices.

pH

There were significant differences with regard to pH among the treatments, storage intervals (table 1). The average pH over all treatments was found to show significant decrease from 4.68 (initial day) to 4.14 (120 days of storage). Among the treatments, the highest pH (4.61) was noticed in the squash prepared from 25% jamun juice + 75% mango juice ($\mathbf{T_1}$) and the lowest pH (4.22) was noticed in the squash prepared from 100 % jamun juice ($\mathbf{T_{10}}$).

There was a non significant difference among the interactions in different treatments throughout the storage.

Density

There were significant differences in the density among the treatments, storage intervals and interactions between them (table 2). It was observed that the density of squashes going to increase significantly from the day of preparation (1.177 g cm^{-3}) to 120 days (1.197 g cm^{-3})

Table 1: Effect of jamun based blends and storage period on Colour and pH of squashes

Juice blends	Colour*						pH					
	Storage period (days after preparation)						Storage period (days after preparation)					
	0	30	60	90	120	Mean	0	30	60	90	120	Mean
T_1: 25% Jamun + 75% Mango	Mimosa yellow colour (1.056)	Mimosa yellow colour (1.056)	Mimosa yellow colour (1.058)	Mimosa yellow colour (1.061)	Mimosa yellow colour(1.063)	**1.060**	4.87	4.75	4.62	4.48	4.33	**4.61**
T_2: 50% Jamun + 50% Mango	Nile green (1.058)	Nile green (1.059)	Nile green (1.059)	Nile green (1.059)	Nile green (1.061)	**1.060**	4.73	4.58	4.46	4.32	4.18	**4.46**
T_3: 75% Jamun + 25% Mango	Orange colour (1.063)	Orange colour (1.063)	Orange colour (1.064)	Orange colour (1.067)	Orange colour (1.068)	**1.065**	4.65	4.51	4.38	4.23	4.07	**4.37**
T_4: 25% Jamun + 75% Grapes	Blood red colour (1.059)	Blood red colour (1.059)	Blood red colour (1.061)	Blood red colour (1.063)	Blood red colour (1.063)	**1.061**	4.82	4.67	4.53	4.48	4.37	**4.58**
T_5: 50% Jamun + 50% Grapes	Cardinal red colour (1.062)	Cardinal red colour (1.062)	Cardinal red colour (1.064)	Cardinal red colour (1.064)	Cardinal red colour (1.065)	**1.063**	4.73	4.58	4.43	4.29	4.17	**4.44**
T_6 : 75% Jamun + 25% Grapes	Cardinal red colour (1.064)	Cardinal red colour (1.064)	Cardinal red colour (1.064)	Cardinal red colour (1.065)	Cardinal red colour (1.066)	**1.065**	4.61	4.48	4.36	4.21	4.07	**4.35**
T_7: 25% Jamun + 75% Pineapple	Salmon orange colour (1.054)	Salmon orange colour (1.054)	Salmon orange colour (1.056)	Salmon orange colour (1.058)	Salmon orange colour (1.059)	**1.057**	4.68	4.55	4.43	4.27	4.13	**4.41**
T_8: 50% Jamun + 50% Pineapple	Coral colour (1.057)	Coral colour (1.057)	Coral colour (1.057)	Coral colour (1.061)	Coral colour (1.061)	**1.059**	4.65	4.53	4.40	4.24	4.10	**4.38**
T_9: 75% Jamun+ 25% Pineapple	Mandarin red (1.060)	Mandarin red (1.060)	Mandarin red (1.061)	Mandarin red (1.062)	Mandarin red (1.063)	**1.062**	4.58	4.46	4.29	4.15	4.02	**4.30**
T_{10}: 100% Jamun	Blood red (1.064)	Blood red (1.065)	Blood red (1.065)	Blood red (1.067)	Blood red (1.068)	**1.066**	4.50	4.39	4.23	4.08	3.92	**4.22**
Mean	**1.060**	**1.060**	**1.061**	**1.063**	**1.064**	**1.062**	**4.68**	**4.55**	**4.41**	**4.28**	**4.14**	**4.41**
Factor	**SEm±**			**C.D. at 5%**			**SEm±**			**C.D. at 5%**		
T	0.000			0.001			0.03			0.08		
D	-			**NS**			0.01			0.02		
T x D	0.000			0.001			0.38			**NS**		

*Figures in parantheses indicate absorbance at 600 nm in terms of OD values.

Table 2: Effect of jamun based blends and storage period on density (g cm^{-3}) and Total Soluble Solids (°Brix)of squashes.

Juice blends	Density (g cm^{-3})						Total Soluble Solids (°B)					
	Storage period (days after preparation)						Storage period (days after preparation)					
	0	30	60	90	120	Mean	0	30	60	90	120	Mean
T_1: 25% Jamun + 75% Mango	1.203	1.207	1.212	1.216	1.224	**1.212**	50.26	50.30	50.33	50.35	50.38	**50.32**
T_2: 50% Jamun + 50% Mango	1.193	1.198	1.205	1.208	1.213	**1.203**	48.50	48.50	48.60	48.60	48.63	**48.57**
T_3: 75% Jamun + 25% Mango	1.182	1.186	1.192	1.196	1.204	**1.192**	46.80	46.80	46.87	46.87	46.90	**46.85**
T_4: 25% Jamun + 75% Grapes	1.193	1.197	1.203	1.209	1.212	**1.203**	48.80	48.83	48.86	48.87	48.95	**48.86**
T_5: 50% Jamun + 50% Grapes	1.184	1.188	1.192	1.197	1.202	**1.193**	47.50	47.50	47.56	47.60	47.67	**47.57**
T_6: 75% Jamun + 25% Grapes	1.177	1.182	1.186	1.191	1.194	**1.186**	46.30	46.33	46.35	46.40	46.45	**46.37**
T_7: 25% Jamun + 75% Pineapple	1.172	1.178	1.182	1.188	1.194	**1.183**	47.30	47.30	47.37	47.40	47.46	**47.36**
T_8: 50% Jamun + 50% Pineapple	1.165	1.169	1.174	1.182	1.187	**1.175**	46.50	46.50	46.53	46.60	46.63	**46.55**
T_9: 75% Jamun+ 25% Pineapple	1.152	1.158	1.164	1.169	1.174	**1.163**	45.80	45.80	45.83	45.88	46.00	**45.86**
T_{10}: 100% Jamun	1.145	1.149	1.154	1.158	1.163	**1.154**	44.93	45.00	45.10	45.10	45.13	**45.05**
Mean	**1.177**	**1.181**	**1.186**	**1.191**	**1.197**	**1.186**	**47.27**	**47.29**	**47.34**	**47.37**	**47.42**	**47.34**
Factor	**SEm ±**			**C.D. at 5%**			**SEm ±**			**C.D. at 5%**		
T				0.001				0.003			0.10	0.27
D				0.001				0.003			0.01	0.02
T × D		0.002		0.004				0.13			0.35	

after preparation. The highest density (1.212 g cm^{-3}) was observed in the squash prepared from 25% jamun juice + 75% mango 75% ($\mathbf{T_1}$) and the lowest density (1.154 g cm^{-3}) was found in squash prepared from pure jamun juice ($\mathbf{T_{10}}$).

Total soluble solids

The differences observed in total soluble solids (TSS) among the squashes were found to be significant (table 2). The average TSS among all treatments was found to show significant increase from the day of preparation (47.27 °B) to 120 days after preparation (47.42 °B) but it was maintained without any significant difference up to 30 days of storage (47.287 °B). The highest value of TSS (50.32 °B) was found in the 25% jamun juice + 75% mango juice ($\mathbf{T_1}$), which was followed by 25% jamun juice + 75% grape juice (48.86 °B) ($\mathbf{T_4}$) and 50% jamun + 50% pineapple ($\mathbf{T_8}$). The least value (45.05 °B) was found in the squash prepared from 100% jamun juice ($\mathbf{T_{10}}$).

The relative density of the juices had positive correlation with total solids of the juices. Whatever the beverage that was higher in density was also recording higher values with respect to total soluble solids and *vice versa*. This fact was also reported by Ikegwu and Ekwa (2009). During storage as the days pass on from initial day to 120 days after preparation of a squash from different juice combinations, the density was found to increase. All the treatments increased significantly in their density from 30 days after preparation itself.

On an average, the squashes of different juice combinations showed a significant increase in TSS. Across different blends higher TSS values were exhibited by those possessing higher density indicating that the soluble solids contributed to density of such juice products. An increase in TSS content of jamun fruit products during storage might be due to conversion of polysaccharides into sugars as observed by Das (2009).

Titrable acidity

The results obtained on titrable ability (table 3) showed that there were significant differences among the treatments and the

Table 3: Effect of jamun based blends and storage period on Titrable acidity (%) and Total sugars (%) of squashes

Juice blends	Titrable acidity (%)						Total sugars (%)					
	Storage period (days after preparation)						Storage period (days after preparation)					
	0	**30**	**60**	**90**	**120**	**Mean**	**0**	**30**	**60**	**90**	**120**	**Mean**
T_1: 25% Jamun + 75% Mango	0.47	0.47	0.47	0.48	0.49	0.47	47.98	48.13	48.36	48.59	48.65	**48.34**
T_2: 50% Jamun + 50% Mango	0.65	0.65	0.66	0.66	0.67	0.66	43.53	43.61	43.74	43.82	43.92	**43.72**
T_3: 75% Jamun + 25% Mango	0.83	0.83	0.84	0.84	0.84	0.84	38.88	38.97	39.05	39.10	39.15	**39.03**
T_4: 25% Jamun + 75% Grapes	0.74	0.74	0.75	0.75	0.75	0.75	43.20	43.25	43.45	43.56	43.67	**43.43**
T_5: 50% Jamun + 50% Grapes	0.83	0.83	0.83	0.84	0.84	0.83	40.21	40.30	40.44	40.51	40.56	**40.41**
T_6: 75% Jamun + 25% Grapes	0.91	0.91	0.92	0.92	0.93	0.92	37.49	37.61	37.63	37.64	37.75	**37.62**
T_7: 25% Jamun + 75% Pineapple	0.80	0.80	0.80	0.81	0.81	0.80	36.73	36.83	36.88	36.95	37.00	**36.88**
T_8: 50% Jamun + 50% Pineapple	0.87	0.87	0.87	0.88	0.88	0.87	35.88	35.97	36.06	36.15	36.25	**36.06**
T_9: 75% Jamun+ 25% Pineapple	0.93	0.93	0.94	0.94	0.94	0.94	35.04	35.14	35.24	35.33	35.45	**35.24**
T_{10}: 100% Jamun	0.99	1.01	1.02	1.02	1.03	1.01	34.21	34.30	34.39	34.50	34.59	**34.40**
Mean	0.80	0.80	0.81	0.81	0.82	0.81	**39.31**	**39.41**	**39.52**	**39.61**	**39.70**	**39.51**
Factor	**SEm±**			**C.D. at 5%**			**SEm±**			**C.D. at 5%**		
T	0.07			0.21			0.17			0.46		
D	0.01			NS			0.05			0.14		
T x D	0.09			0.24			0.21			0.60		

interaction between juice blends. But, there were no significant differences among the storage intervals with respect to titrable acidity. The percentage of titrable acidity was maintained from the day of preparation (0.80%) to 120 days after storage (0.81%) without any significant difference. The lowest titrable acidity (0.47%) was found in the squash prepared from 25% jamun juice + 75% mango (**T_1**) and was found to be at maximum (1.01%) in squash prepared from pure jamun juice (**T_{10}**).

The increase in titrable acidity might be due to the formation of organic acids by the degradation of ascorbic acid (Sharma *et al.*, 2009). However, in any particular treatment, the increase in titrable acidity was not significant.

Total sugars

The data (table 3) revealed that there were significant differences among the treatments, storage intervals and their interactions. The percentage of total sugars increased from the day of preparation (39.31%) to 120 days after storage (39.70%).

Among different squashes, the highest value of total sugars (48.34%) was found in the squash prepared from 25% jamun juice + 75% mango juice (**T_1**). The squash prepared from the jamun juice 100% (**T_{10}**) was found to have the least quantity of total sugars (34.40%). However, the increasing trend in total sugars was observed by earlier workers and was ascribed due to inversion of sugars and hydrolysis of polysaccharides into simple sugars (Sonia *et al.,* 2010).

Ascorbic acid

There were significant differences in ascorbic acid content among the juice blending treatments, storage intervals and interactions between them (table 4). It was observed that the ascorbic acid content of squash decreased significantly from 16.98 mg/100 ml at initial day to 16.74 mg/100 ml at 120 days of storage period. The highest ascorbic acid content (17.93 mg/100 ml) was observed in the squash prepared from jamun juice 100% (**T_{10}**) which was followed by the squash from 75% jamun juice + grape juice 25% (17.58 mg/100 ml) (**T_6**). The lowest ascorbic acid content (15.51

Table 4: Effect of jamun juice blends and storage period on Ascorbic acid (mg/100 ml) and Anthocyanin content (mg/ 100 ml) of Squashes

Juice blends	Ascorbic acid (mg/100 ml)						Anthocyanin content mg/100 ml)					
	Storage period (days after preparation)						Storage period (days after preparation)					
	0	30	60	90	120	Mean	0	30	60	90	120	Mean
T_1: 25% Jamun + 75% Mango	15.63	15.58	15.51	15.43	15.41	**15.51**	12.15	11.32	10.54	9.77	8.87	**10.53**
T_2: 50% Jamun + 50% Mango	16.44	16.40	16.32	16.26	16.22	**16.33**	22.38	21.59	20.77	19.97	19.04	**20.75**
T_3: 75% Jamun + 25% Mango	17.22	17.16	17.11	17.03	16.95	**17.09**	33.47	32.67	31.87	31.81	30.93	**32.15**
T_4: 25% Jamun + 75% Grapes	17.05	17.00	16.94	16.88	16.81	**16.94**	40.97	40.16	39.33	38.52	37.58	**39.31**
T_5: 50% Jamun + 50% Grapes	17.38	17.32	17.25	17.17	17.09	**17.24**	41.16	40.33	39.57	38.75	37.86	**39.53**
T_6: 75% Jamun + 25% Grapes	17.70	17.64	17.57	17.52	17.48	**17.58**	41.98	41.17	40.34	39.56	38.64	**40.34**
T_7: 25% Jamun + 75% Pineapple	16.18	16.15	16.07	16.00	15.94	**16.07**	11.29	10.52	9.63	8.83	7.94	**9.64**
T_8: 50% Jamun + 50% Pineapple	16.79	16.72	16.68	16.60	16.53	**16.66**	21.38	20.60	19.81	18.94	18.02	**19.75**
T_9: 75% Jamun+ 25% Pineapple	17.40	17.31	17.26	17.21	17.13	**17.26**	32.85	32.02	31.22	30.44	29.59	**31.22**
T_{10}: 100% Jamun	18.04	18.00	17.93	17.88	17.80	**17.93**	42.08	41.29	40.47	39.65	38.78	**40.45**
Mean	**16.98**	**16.93**	**16.86**	**16.80**	**16.74**	**16.86**	**29.97**	**29.17**	**28.35**	**27.62**	**26.72**	**28.37**
Factor		**SEm±**		**C.D. at 5%**				**SEm±**		**C.D. at 5%**		
T		0.05		0.15				0.88		2.47		
D		0.01		0.04				0.17		0.48		
T × D		0.06		0.18				1.18		3.33		

mg/100 ml) was observed in the squash from 25% jamun juice + 75% mango juice (**T$_1$**).

Ascorbic acid content of blended jamun beverages decreased continuously during the period of storage. This reduction might be due to oxidation of ascorbic acid into dehydroascorbicacid (Kapoor and Ranote, 2015) or hydroxyl methyl furfural at room temperature, due its sensitive nature (Badal *et al.,* 2007). Degradation of ascorbic acid into other organic acids could lead to decrease in pH as it was confirmed by the results on pH in the present study.

Anthocyanin

The data regarding the anthocyanin content (table 4) were found to have significant differences due to juice blends and storage. During the storage period, the anthocyanin content was found to decrease significantly from the day of preparation (29.97 mg/100 ml) to 120 days of storage (26.72 mg/100 ml).The highest anthocyanin content (40.45 mg/100 ml) was noticed in the squash of pure jamun juice (**T$_{10}$**), which was on par with the squashes prepared from jamun juice blended with that of grapes in different proportions but significantly superior to the combination of 75% jamun juice + 25% mango (32.15 mg/100 ml) (**T$_3$**). The lowest value (9.64 mg /100 ml) was noticed for the squash prepared from 25% jamun juice + 75% pineapple (**T$_7$**).

Pure jamun juice excelled the content of anthocyanin. As the proportion of jamun juice was increasing in the juice blends, a corresponding increase in anthocyanin content was observed leading to high value of anthocyanin with maximum (75%) jamun juice proportion with all the three fruit juices *viz.,* mango, grapes and pineapple. Processing caused significant loss in anthocyanin content of jamun beverages (Sonia *et al.,* 2010)). Anthocyanin is sensitive to heat and oxidized quickly in the presence of oxygen, hence, it might have been destroyed during processing and subsequently during storage (Sharma *et al.*, 2009).

Taste

The organoleptic evaluation revealed that there were significant differences among the

Table 5: Effect of jamun juice blends and storage period on taste and flavour of squashes

Juice blends	Taste: Storage period (days after preparation) 0	30	60	90	120	Mean	Flavour: Storage period (days after preparation) 0	30	60	90	120	Mean
T_1: 25% Jamun + 75% Mango	8.09	7.87	7.73	7.46	7.25	**7.68**	7.89	7.62	7.48	7.25	7.18	**7.48**
T_2: 50% Jamun + 50% Mango	4.10	4.00	3.81	3.68	3.58	**3.83**	6.24	6.03	5.91	5.65	5.49	**5.86**
T_3: 75% Jamun + 25% Mango	6.20	5.98	5.72	5.58	5.39	**5.78**	6.34	6.14	6.01	5.77	5.59	**5.97**
T_4: 25% Jamun + 75% Grapes	6.17	5.95	5.74	5.57	5.40	**5.77**	6.35	6.04	5.92	5.68	5.47	**5.89**
T_5: 50% Jamun + 50% Grapes	8.13	7.87	7.67	7.41	7.26	**7.67**	6.23	6.07	5.91	5.65	5.48	**5.87**
T_6: 75% Jamun + 25% Grapes	9.00	8.87	8.68	8.49	8.28	**8.66**	8.14	8.05	7.67	7.48	7.46	**7.76**
T_7: 25% Jamun + 75% Pineapple	8.04	7.89	7.64	7.44	7.26	**7.65**	6.25	6.04	5.88	5.66	5.46	**5.86**
T_8: 50% Jamun + 50% Pineapple	6.20	5.95	5.74	5.58	5.39	**5.77**	4.34	4.22	4.03	3.86	3.67	**4.02**
T_9: 75% Jamun+ 25% Pineapple	8.14	7.91	7.67	7.45	7.23	**7.68**	4.38	4.25	4.05	3.92	3.68	**4.06**
T_{10}: 100% Jamun	6.23	6.04	5.83	5.64	5.46	**5.84**	6.24	6.06	5.91	5.68	5.45	**5.87**
Mean	**7.03**	**6.83**	**6.62**	**6.43**	**6.25**	**6.63**	**5.99**	**5.82**	**5.62**	**5.42**	**5.24**	**5.62**
Factor		**SEm ±**			**C.D. at 5%**			**SEm ±**			**C.D. at 5%**	
T		0.10			0.29			0.09			0.26	
D		0.04			0.12			0.04			0.12	
T × D		0.14			0.40			0.12			0.35	

treatments, storage intervals and their interactions (table 5). Significant decrease was recorded in organoleptic score with respect to the taste of different squashes. It was found to decrease from 7.03 (initial day) to 6.25 (120 days).The maximum score for taste (8.66) was obtained by the squash prepared from 75% jamun juice +25% grape juice (**T_6**) followed by the squash from 25% jamun juice + 75% mango (7.68) (**T_1**) and also with the squash from 75% jamun juice + 25% pineapple (7.68) (**T_9**) . The minimum score (3.83) was obtained by the squash prepared from 50% jamun juice + 50% mango juice (**T_2**).

Flavour

The average organoleptic score for flavour decreased significantly (table 5) from a maximum score of 5.99 (initial day) to a minimum score of 5.24 (120 days). The highest score for flavour (7.76) was obtained by the squash prepared from 75% jamun juice + 25 grape juice (**T_6**) and the lowest score (4.02) was obtained by the squash prepared from 50% jamun juice + 50% pineapple juice (**T_8**). A gradual decrease in flavour during storage might be due to heat treatment applied during processing. The loss of flavour and taste might be due to the degradation of ascorbic acid and furfural production (Kausar *et al.,* 2012). Biochemical changes occurring during the storage might have led to the formation of undesirable colours, flavours and taste, which might have affected the poor acceptability of the products which can further lead to a decrease the organoleptic score of the product (Dwivedi *et al.,* 2011).

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