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Development and Quality Evaluation of Banana Mushroom Blended Jam

Mati Ullah Khan, Ihsan Mabood Qazi, Ishfaq Ahmed*, Shermat Ullah, Arsalan Khan and Suraiya Jamal

Department of Food Science and Technology, The University of Agriculture, Peshawar, Pakistan

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Abstract. The effect of various blends of banana (B) and mushroom (M) as well as storage time on the overall quality characteristics of jam at ambient temperature were studied for three months of storage period. All the treatments were analysed for physicochemical properties (total soluble solids (°Brix), pH, reducing sugars (%), non-reducing sugars (%), ascorbic acid (mg/100 g) and percent acidity) and sensory properties (taste, colour, texture and overall acceptability). Significant ($P < 0.05$) increase were examined in total soluble solids (67.94-69.78 °brix), percent acidity (0.71-0.87%) and reducing sugars (18.17-29.33%) during the storage period. While, significant ($P < 0.05$) reduction in pH (3.45 to 3.26), non reducing sugars (44.90-30.83%), ascorbic acid (7.81 to 5.52 mg/100 g), colour (7.34 to 4.84), taste (7.27 to 4.51), texture (7.06 to 4.60) and overall acceptability (7.17 to 4.69) were observed. Physicochemical and sensory analyses showed that jam prepared from BM_6 (400 g banana + 600 g mushroom + 1kg sugar + 2 g citric acid) was of good quality attributes among the treatments.

Keywords: banana, mushroom, jam, storage time, physicochemical properties, sensory properties

Introduction

Banana is a seedless fruit, which is valued for its sweet taste, aroma, sticky texture and high vitamin contents. It is native to tropical Southeast Asia (Frison and Sharrock, 1999). Banana is the second major fruit produced after citrus, which comprises of about 16% of the total fruit produced in the world (FAO, 2009). It is very rich source of carbohydrates, minerals (potassium and calcium) as well as vitamins (A, B_1, B_2 and C) and provides significant amount of energy (100 Cal/ 100g) to the body. It is deficient in protein, so can be fortified with other protein sources to develop a new product (Viana *et al*., 2014; Mohapatra *et al*., 2010; Yousaf *et al*., 2006). It contains antioxidants such as dopamine and also has citric acid, malic acid and ascorbic acid that enhance the flavour when mixed with fruit juices and other products, by providing a synergistic effect (Mohapatra *et al*., 2010).

Applications of various processing and preservation techniques have significantly improved the value of the fruit and make it available to the consumers even in the off season (Emaga *et al*., 2007). The carbohydrate of banana consists of resistant starches and non-starch polysaccharides, which have low digestibility or glycemic index values (Lehmann and Robin, 2007). It contain pectin that has the ability to form gel, hence utilized in the development of jams, marmalades and jellies, as well as used as a thickener, emulsifier, texturizer and sugar/fat replacer (Prasanna *et al*., 2007). The choices in the food industrial sector are diversified by substitution or fortification, thus developing new products with enhanced nutritional and functional properties. In addition, they must be affordable, practical, attractive and shelf stable (Leistner, 2011).

The world population is suffering from the shortage of food and Pakistan is also not exempted from it. More than 50% of the diet of the world population is deficient in protein. Due to the high protein content of mushroom, it can be supplemented to bridge the protein malnutrition gap (Wani *et al*., 2010; Ahmad *et al*., 2003). Mushrooms are the simple form of life known as fungus. It cannot produce its own food and depends on other living organisms as well as dead plants and organic matters; hence, it is commercially grown on agricultural wastes (Chang and Miles, 1991). It is considered as the most important food product for its significant role in nutrition and disease control. Mushroom has tremendous scope for applications in the food industry (Adeniji *et al*., 2007).

Mushroom is one of the world greatest untapped resources of nutrition in regards to its palatability and medicinal value for the future (Bahl, 1983). It has been recognized effective against cancer, hypercholesterolemia conditions, asthma, stress, hypertension, insomnia,

*Author for correspondence; E-mail: ishfak90@gmail.com

allergies, infections and diabetes (Wang *et al*., 2001; Bahl, 1983). Recently, mushroom is gaining significant importance as a vegetable meat. It is delicate, nutritious and delicious and also used as a flavour enhancer in other foods. Other than protein, it is also a very good source of folic acid, niacin, biotin, B complex, A, C and D as well as mineral i.e., potassium, phosphorus, calcium, zinc, iron, sodium and magnesium. The fat content of mushroom normally consists of linoleic acid, containing little starches and has no cholesterol; hence considered ideal for hypertensive and diabetic patients (Ahmad *et al*., 2003).

Jam is a traditional food item, commonly used as desserts, cake toppings and bread spreads. It is an intermediate moisture food, which is prepared by using fruit pulp, sugar, acid, pectin and other ingredients hence, has a very sweet taste (Baker *et al*., 2005). Mixed jams associate the characteristics of two or more fruits, allowing the achievement of a product with higher nutritional value and pleasant sensory properties, thereby creating the possibility of achieving a larger space in the consumer market (Kvikliene *et al*., 2006; Wicklund *et al*., 2005). Various ingredients give new flavours and have enhanced the storage life, which depends on high sugar content (68-72%) combined with the acidic nature of the fruit that prevent microbial spoilage. The quality characteristics of jam depends upon the raw materials, processing conditions, recipe selections, preserving methods and storage conditions (Redalen and Haffner, 2002).

As banana is deficient in protein, so has been blended with a protein rich source i.e., mushroom. This study was undertaken with the objective to develop a value added jam having health beneficial aspects, by using various blends of banana and mushrooms, as well as to study their physicochemical and sensory properties. In addition, it provides opportunity to combat the post-harvest losses of banana and mushroom, as both of them are highly perishable, thus assist in the betterment of the farmers' economy.

Materials and Methods

The research work was conducted in the laboratory of Food Science and Technology, Agriculture Research Institute (ARI) Tarnab, Peshawar. Optimally ripe banana and Oyster mushroom (*Pleurotus ostreatus*) were procured from the local market of Tarnab.

Banana mushroom mixed jam preparation. Banana and mushroom were thoroughly washed by using tap water to reduce plant soil and debris load. Clean and undamaged samples with no symptoms of visible discolouration were selected and cut into slices. The slices were dipped in warm water (80 °C) for 2 min containing citric acid to reduce microbial load and to avoid oxidation. Materials were put into the pulping machine to get pulp. The pulp was mixed in six different ratios by using the procedure as described by Awan and Rehman (1999) for jam preparation. The various blending formulations are presented in Table 1. All the batches were subjected to cooking at 104 °C for preparation of jam to reasonable TSS of 68 to 70 °Brix.

Packaging and storage of banana and mushroom blended jam. Thereafter, the hot jam samples were filled into pre-sterilised (autoclaved at 121 °C for 15 min) glass bottles, which were closed air-tight and stored at room temperature (31 °C). The jam samples were stored for 90 days and examined after 15 days interval for physicochemical and sensory properties.

Physicochemical analysis. Physicochemical properties such as total soluble solids, pH, acidity, reducing sugar, and non-reducing sugar were analyzed by the standard method of AOAC (2012).

Sensory analysis. The jam samples were examined for sensory attributes such as colour, taste, texture and overall acceptability. The analysis was performed by 10 judges using 9 point hedonic as suggested by Larmond (1977).

Statistical analysis. The data was analysed by using CRD two factorial suggested by Gomez and Gomez (1984). The mean values were separated by applying LSD test at 0.05% significant level as described by Steel and Torrie (1997).

Table 1. Blending formulation of banana and mushroom blended jam

Treatments	Banana	Mushroom	Sugar	Citric acid
		(g)		
BM_0	1000	Nil	1000	Nil
BM_1	800	200	1000	Nil
BM_2	800	200	1000	2
BM_3	600	400	1000	Nil
BM_4	600	400	1000	2
BM_5	400	600	1000	Nil
BM_6	400	600	1000	2

Results and Discussion

Physicochemical analysis. Physicochemical properties i.e., total soluble solids, pH, titratable acidity, reducing sugar and non-reducing sugar are shown in Table 2 -3.

Total soluble solids (°brix). The total soluble solids (TSS) of banana mushroom blended jam samples increased significantly ($P<0.05$) during storage (Table 2). TSS of banana mushroom blended jam samples increased gradually during storage period. The TSS of jam samples at an initial day of storage period ranged from 66.0 °brix (MB_0) to 68.1 °brix (MB_6), which gradually increased to 69.4 °brix (MB_4) to 70.8 °brix (MB_0) during three months of storage. The mean total soluble solids value was 67.94 at initial day, which increased to 69.78 at 90 day of storage. The maximum mean value for treatment was observed for BM_0 (69.19 °brix), while minimum was observed for BM_3 (68.86 °brix). The result of the present study was similar to the findings of Shakir *et al*. (2007), who observed an increase in TSS of apple pear fruit jam during storage. Likewise, Khan *et al*. (2012) reported an increase in TSS (66.5-68.8 °brix) of jam prepared from apple and apricot. However, Ehsan *et al*., (2003) observed an increase in TSS of watermelon lemon mixed jam (68.6-68.9 °brix) and apple grape fruit marmalade (70.0 to 70.8 °brix) during storage.

pH. The pH values of the jam samples at an initial day ranged from 3.46 to 3.44, which gradually decreased during storage. The mean pH value for storage noted at initial day was 3.45, which decreased to 3.26. The pH value of banana mushroom blended jam samples reduced gradually during storage. The maximum mean value of treatment was observed for BM_4 (3.39) while minimum was observed for BM_0 (3.20). Maximum % decrease was observed for BM_0 (6.94) followed by BM_1 (5.51), while minimum % decrease was observed for

Table 2. Effect of storage period on total soluble solids, pH and acidity% of banana mushroom blended jam

Variables	Storage intervals (days)	Treatments							
		BM_0	BM_1	BM_2	BM_3	BM_4	BM_5	BM_6	Means
Total soluble solide	1	68.0	67.9	68.0	68.0	67.8	67.8	68.1	67.94g
	15	68.3	68.1	68.1	68.2	68.0	68.0	68.2	68.10f
	30	68.6	68.4	68.3	68.4	68.2	68.3	68.4	68.33e
	45	69.0	68.7	68.6	68.7	68.5	68.6	68.6	68.62d
	60	69.5	69.1	68.9	69.1	68.7	69.0	68.9	68.95c
	75	70.1	69.5	69.3	69.5	69.0	69.4	69.2	69.32b
	90	70.8	70.1	69.8	70.1	69.4	69.8	69.5	69.78a
	% Increase	3.95	3.14	2.58	3.00	2.31	2.87	2.01	
	Means	69.19a	68.83b	68.71b	68.86b	68.51c	68.70b	68.70b	
pH	1	3.46	3.45	3.44	3.43	3.46	3.44	3.44	3.45a
	15	3.43	3.43	3.42	3.41	3.44	3.42	3.43	3.43a
	30	3.39	3.40	3.40	3.38	3.42	3.40	3.41	3.40ab
	45	3.35	3.37	3.38	3.35	3.40	3.37	3.39	3.37ab
	60	3.31	3.33	3.35	3.32	3.37	3.32	3.36	3.34ab
	75	2.27	3.00	3.31	3.29	3.34	3.29	3.33	3.04c
	90	3.22	3.26	3.27	3.25	3.31	3.26	3.30	3.26bc
	% Decrease	6.94	5.51	4.94	5.25	4.34	5.23	4.07	
	Means	3.20b	3.32ab	3.37a	3.35ab	3.39a	3.36ab	3.38a	
%Acidity	1	0.70	0.71	0.70	0.70	0.72	0.72	0.71	0.71f
	15	0.73	0.73	0.72	0.72	0.74	0.74	0.72	0.73e
	30	0.76	0.76	0.74	0.75	0.76	0.77	0.73	0.75d
	45	0.69	0.79	0.76	0.78	0.79	0.80	0.75	0.77d
	60	0.83	0.82	0.79	0.81	0.82	0.83	0.77	0.81c
	75	0.87	0.85	0.82	0.84	0.85	0.86	0.80	0.84b
	90	0.90	0.89	0.86	0.87	0.88	0.89	0.83	0.87a
	% Increase	22.22	20.22	18.60	19.54	18.18	19.10	14.46	-
	Means	0.78abc	0.79ab	0.77cd	0.78bc	0.79ab	0.80a	0.76d	-

Mean values followed by different letters are significantly ($P<0.05$) different from each other.

BM_6 (4.07) followed by BM_4 (4.34). The observed data is in accordance with the findings of Ehsan *et al*. (2002), who found decrease in the pH value of watermelon and lemon blended jam samples during storage. In contrast, the pH of apricot and apple jam determined by Hussain and Shakir (2010) was slightly higher than the present findings. Similarly, Ayub *et al*. (2010) and Shakir *et al*., (2007) investigated a decline in pH of the jam samples upon storage. pH is an important factor to acquire an optimum gel condition. The acidity of fruit jam increased during storage hence, reducing the pH which might occur due to the acidic compounds formations (Ayub *et al*., 2010; Hussain and Shakir, 2010).

Titratable acidity. Statistically analysed data shows that % acidity of banana mushroom blended jam samples increased significantly ($P<0.05$) among storage and treatments. The acidity of banana mushroom jam at initial day ranged from 0.70 to 0.72%, which gradually increased during storage. The mean acidity value of 0.71% was observed at initial day, which increased to 0.87% as the storage period prolonged. The maximum mean value for treatment was observed for BM_5 (0.80%), while minimum was observed for BM_6 (0.76%). Maximum % increase was observed for BM_0 (22.22), while minimum % increase was observed for BM_6 (14.46). The present findings are supported by the work of Anjum *et al*. (2000), who found an increase in the acidity of apricot jam from 0.65 to 0.70% after storage interval. Shakir *et al*. (2007) also reported increase in acidity (0.60-0.78%) in apple pear mixed jam during storage. However, Khan *et al*. (2012) analysed increase in acidity (0.68-0.86%) of strawberry jam during storage. The degradation of ascorbic acid and hydrolysis of pectin results in higher acidity of the fruit jam. Increase in TSS and sugar breakdown also resulted in the increase of acidity (Ehsan *et al*., 2002; Sogi and Singh, 2001).

Reducing sugar. The data revealed that reducing sugar of banana mushroom blended jam samples increased significantly ($P<0.05$) on storage (Table 3). The reducing sugars of banana mushroom jam at initial day from BM_0 to BM_6 were 17.7 to 18.50%, which gradually increased from 31.90 to 27.60%, respectively, throughout storage. The mean reducing sugar value of 18.17% was noted at initial day, which gradually increased to 29.33% during storage. The maximum mean value for treatment was observed for BM_0 (24.56%), while minimum was observed for BM_6 (22.53%). Maximum % increase was observed for BM_0 (44.51%), while minimum % increase was observed for BM_6 (32.97%). The present results are in agreement with the work of Anjum *et al*. *(*2000) and Riaz *et al*. (1999), who examined gradual increase in reducing sugar content of strawberry jam and apricot jam respectively, throughout storage. Ehsan *et al*. (2003) also observed increase in the reducing sugar content

Table 3. Effect of storage period on reducing sugar and non reducing sugar of banana mushroom blended jam

Variables	Storage intervals (days)	Treatments							
		BM_0	BM_1	BM_2	BM_3	BM_4	BM_5	BM_6	Means
Reducing sugar	1	17.7	18.6	17.9	18.5	18.2	17.8	18.5	18.17g
	15	20.1	20.2	19.2	20.1	19.3	19.3	19.4	19.66f
	30	22.5	22.1	20.5	21.7	20.9	20.7	20.7	21.93d
	45	24.2	23.7	22.1	23.3	22.7	22.3	22.2	22.93d
	60	26.6	26.0	24.3	25.7	24.1	24.1	23.9	24.96c
	75	28.9	28.4	26.6	27.8	25.9	25.9	25.4	26.99b
	90	31.9	32.3	27.8	30.6	27.8	28.3	27.6	29.33a
	% Increase	44.51	40.58	35.61	39.54	34.53	37.10	32.97	
	Means	24.56a	24.33a	22.63b	23.96a	22.70b	22.63b	22.53b	
Non reducing sugar	1	45.4	45.6	44.5	44.8	44.6	45.1	44.3	44.90a
	15	42.8	43.5	42.3	42.3	42.4	43.7	42.9	42.84b
	30	40.1	41.1	40.1	41.7	40.6	42.2	41.1	40.99c
	45	37.2	38.8	37.5	39.9	38.8	40.3	39.5	38.86d
	60	34.3	36.5	36.1	37.3	37.3	37.5	37.9	36.70e
	75	31.1	34.1	34.2	34.5	35.1	34.8	35.5	34.19f
	90	27.7	30.0	31.5	30.4	32.4	30.7	33.1	30.83g
	% Decrease	38.99	34.21	29.21	32.14	27.35	31.93	25.28	
	Means	36.94c	38.51ab	38.03b	38.70ab	38.74ab	39.93	39.19a	

Mean values followed by different letters are significantly ($P<0.05$) different from each other.

during storage of grape apple marmalade (16.55 to 31.36%). During storage the increase in reducing sugar may be due to the inversion of sucrose to glucose plus fructose due to high temperature and acid.

Non-reducing sugar. Influence of both, treatment and storage on non-reducing sugar of banana mushroom jam samples are shown in Table 3. Statistically analysed data showed that non-reducing sugar value of the jam samples decreased significantly ($P<0.05$) during storage. The non-reducing sugars of various samples ranged from 45.6 to 44.30% at initial day, which gradually decreased from 27.7 to 33.10% correspondingly during storage. The mean value of 44.90% was recorded for non-reducing sugar, which decreased to 30.83% during storage. The maximum mean value for treatment was observed for BM_6 (39.19%), while minimum was observed for T_0 (36.94%). Maximum % decrease was observed for BM_0 (38.99%), while minimum % decrease was observed for BM_6 (25.28%). The present findings are in accordance with the results of Shakir *et al*. (2007) and Riaz *et al.* (1999). They found decrease in non-reducing sugars content of strawberry jam (44.64-32.35%) and apple pear blended jam (44.24-17.08%), respectively, throughout the storage period. Likewise, Ehsan *et al*. (2003) observed decline in non-reducing sugar in grape apple marmalade.

Sensory analysis. The sensory properties of various jam samples including colour, taste, texture and overall acceptability are presented in Table 4.

Colour. It was examined from the observed sensory scores that colour of banana mushroom blended jam samples decreased significantly ($P<0.05$) on storage. The colour of various jam samples at initial day from BM_0 to BM_6 ranged from 7.1 to 7.6, which gradually decreased (1.6-6.0) during storage. The mean colour value for storage at initial day was 7.34, which decreased to 4.84. The maximum mean value of treatment was observed for BM_6 (6.90) while minimum was observed for BM_0 (4.89). Maximum % decrease was observed for BM_0 (77.46%), while minimum % decrease was observed for BM_6 (21.05%). Similarly, Ehsan *et al*. (2003) analysed decrease in colour from 7.8 to 6.8 during storage period of grape apple marmalade. Likewise, Khan *et al*. (2012) also observed decrease in colour of strawberry jam from 9.00 to 7.00. From consumer's point of view colour is one of the significant parameter of food products. In food industries, degradation in colour was observed during storage (Gimenez *et al*., 2001).

Taste. The taste value of banana mushroom blended jam samples decreased significantly ($P<0.05$) on storage. The taste of banana mushroom jam at initial day from BM_0 to BM_6 was 7.2 to 7.40, which gradually decreased from 1.5 to 5.5, respectively, during storage. The mean taste value of 7.27 was recorded at initial day, which decreased to 4.51 during storage. The maximum mean score for treatment was observed for BM_6 (6.60), while minimum score was observed for BM_0 (4.83). Maximum % decrease was observed for BM_0 (79.17%), while minimum % decrease was observed for BM_6 (25.68%). The results of this study were similar to that of Muhammad *et al*. (2009) who found decline in taste value from 8.60 to 5.90 in apple jam during storage. Similarly, Ehsan *et al*. (2002) analysed decrease (6.2 to 4.0) in sensory score for taste of watermelon and lemon jam during storage.

Texture. It was examined from statistically analysed data that texture value of banana mushroom blended jam samples decreased significantly ($P<0.05$) on storage. The texture of banana mushroom jam at initial day from BM_0 to BM_6 ranged from 6.9 to 7.2, which decreased gradually to 1.3 to 5.7 correspondingly during storage. The mean texture value for storage was noted at initial day (7.06), which decreased to 4.60. The maximum mean value of treatment was observed for BM_6 (6.54) while minimum was observed for BM_0 (4.76). Maximum % decrease was observed for BM_0 (75.36%) followed by BM_1 (35.71%), while minimum % decrease was observed for BM_6 (20.83%) followed by BM_4 (23.94%). Suutarinen *et al*. (2000) examined sensory properties of strawberry jam and determined gradual decrease in texture profile during storage phase. The present scores for texture are slightly lower than Ehsan *et al.* (2003), who experienced decrease in texture from 8.80 to 7.96 during storage of grape fruit apple marmalade. Decrease in sensory score (9.00 to 6.70) for apple jam texture was observed by Muhammad *et al*. (2009).

Overall acceptability. The overall acceptability value of banana mushroom blended jam samples decreased significantly ($P<0.05$) during storage period. The overall acceptability of banana mushroom jam at initial day from BM_0 to BM_6 ranged from 7.0 to 7.3, which decreased gradually to 1.8 and 5.8, respectively, throughout storage. The mean overall acceptability value of 7.17 was observed at initial day, which decreased to 4.69 during storage. The maximum mean score was observed for BM_6 (6.69), while minimum score was

Table 4. Effect of storage period on sensory properties of banana mushroom blended jam

Variables	Storage intervals (days)	Treatments							
		BM_0	BM_1	BM_2	BM_3	BM_4	BM_5	BM_6	Means
Colour	1	7.1	7.2	7.4	7.3	7.5	7.3	7.6	7.34a
	15	6.7	6.9	7.2	7.0	7.3	7.0	7.4	7.07a
	30	6.3	6.6	6.9	6.6	7.1	6.7	7.2	6.77ab
	45	5.5	6.2	6.6	6.3	6.8	6.4	7.0	6.40bc
	60	4.1	5.7	6.3	5.9	6.5	6.1	6.7	5.90cd
	75	2.9	5.3	5.9	5.5	6.2	5.7	6.4	3.41de
	90	1.6	4.8	5.5	5.0	6.8	5.2	6.0	4.84e
	% Decrease	77.46	33.33	25.68	31.51	22.67	28.77	21.05	
	Means	4.89d	6.10c	6.54abc	6.23bc	6.74ab	6.34abc	6.90a	
Taste	1	7.2	7.2	7.3	7.2	7.3	7.3	7.4	7.27a
	15	6.8	6.9	7.0	6.9	7.1	7.0	7.2	6.99ab
	30	6.1	6.5	6.7	6.6	6.9	6.7	7.0	6.64bc
	45	5.2	6.1	6.4	6.2	6.5	6.3	6.7	6.20cd
	60	4.1	5.7	6.0	5.8	6.1	5.9	6.4	5.71d
	75	2.9	5.1	5.6	5.3	5.7	5.4	6.0	5.14e
	90	1.5	4.6	5.1	4.8	5.2	4.9	5.5	4.51f
	% Decrease	79.17	36.11	30.14	33.33	28.77	32.88	25.68	
	Means	4.83c	6.01b	6.30ab	6.11ab	6.40ab	6.21ab	6.60a	
Texture	1	6.9	7.0	7.1	7.0	7.1	7.1	7.2	7.06a
	15	6.5	6.8	6.9	6.8	6.9	6.9	7.0	6.83ab
	30	5.9	6.4	6.7	6.5	6.7	6.6	6.8	6.51bc
	45	5.1	6.0	6.5	6.1	6.5	6.3	6.6	6.16cd
	60	4.2	5.5	6.2	5.7	6.2	5.9	6.4	5.73d
	75	3.0	5.0	5.8	5.2	5.9	5.4	6.1	5.20e
	90	1.7	4.5	5.3	4.7	5.4	4.9	5.7	4.60f
	% Decrease	75.36	35.71	25.35	32.86	23.94	30.99	20.83	
	Means	4.76c	5.89b	6.36ab	6.00b	6.39ab	6.16ab	6.54a	
Overall acceptability	1	7.0	7.1	7.2	7.1	7.3	7.2	7.3	7.17a
	15	6.5	6.8	7.0	6.8	7.1	7.0	7.2	6.91ag
	30	5.8	6.4	6.8	6.5	6.9	6.7	7.0	6.59bc
	45	5.1	6.0	6.5	6.1	6.7	6.3	6.8	6.21cd
	60	4.4	5.6	6.2	6.7	6.4	6.0	6.5	5.83d
	75	3.1	6.1	5.8	5.2	6.0	5.6	6.2	5.29e
	90	1.8	4.6	5.3	4.7	5.6	5.0	5.8	4.69f
	% Decrease	74.29	35.21	26.39	33.80	23.29	30.56	20.55	
	Means	4.81c	5.94b	6.40ab	6.01b	6.57a	6.26ab	6.69a	

Mean values followed by different letters are significantly ($P<0.05$) different from each other.

observed for BM_0 (4.81). Maximum % decrease was observed for BM_0 (74.29%) followed by BM_1 (35.21%), while minimum % decrease was observed for BM_6 (20.55%) followed by BM_4 (23.29%). Similarly, Ehsan *et al*. (2003) examined decrease in overall acceptability of grape apple marmalade from 8.8 to 7.96 throughout storage. During storage, Khan *et al*. (2012) also observed gradual decrease (9.0-7.0) in overall acceptability. While, Ehsan *et al*. (2002) examined decrease in overall acceptability of watermelon and lemon jam on storage.

Conclusion

The study revealed that banana and mushroom blended jam as prepared successfully showed acceptable quality attributes during storage. It was observed that storage has significant impact on the quality and stability of the banana mushroom jam. Physicochemical analysis showed that the total soluble solids, percent acidity and reducing sugar increased, while pH and non-reducing sugar decreased significantly during storage period. The sensory analysis of prepared jam samples showed

acceptable colour, taste, texture and overall acceptability, which degrades upto certain extent during storage. From the analysis it was observed that BM_6 followed by BM_4 retain acceptable quality attributes during storage. This successful attempt sums up the use of blends of banana and mushroom for jam preparation, thus increasing its market value.

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