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Studies on the Assessment of Storage Stability of Jamun Jam

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Abstract:
Jamun fruit which is enriched in nutritive as well as medicinal value was processed into jam. To ascertain their storage stability, the jam was packed in glass, plastic and polypacks. The products were kept at room temperature and evaluated nutritionally, microbiologically and organoleptically for a period of six months to find out its storage stability. The evaluation was carried out after every 30 days. The results showed that pH and ascorbic acid values decreased along with the storage while the acidity and sugars increased. TSS was found to decrease somewhat while in some it remained constant. Microbial count was higher with proceeding months, but it was at a safe consumption level during the period. The overall acceptability of the products was also good and could be accepted within six months.

Keywords: *Jamun, storage, organoleptic evaluation, nutritional evaluation, medicinal fruit, value-added*

1. Introduction

Jamun botanically called as *Syzygiumcumini*L. (Syn: *Eugenia jambolana*,*Syzygiumjambolanum*) belong to the family *Myrtaceae*. The tree is originated from Indonesia and India; now grows abundantly in Southern Asia. Jamun falls in underutilizing fruit species which are neither cultivated in an organized farming system, nor processed by established commercial processing methods. Jamun has almost an exotic flavor and are known for their nutritional and therapeutic values. Jamun fruits, although produced in considerable quantities and consumed, but seldom processed. There is a great scope of the processed products not only because of their exotic flavor, but also due to their nutraceutical importance (Kannan and Thiruman) in 2004. Thus, processing of jamun fruit into value-added products result in a wide variety of exotically flavored products with better nutritional and sensory qualities may unveil new market for export. Therefore, development, standardization and popularization of value-added products from jamun fruit is essential.

2. Materials and Methods

About 60 Kg jamun fruit was procured from *Sulah* village of district Kangra (H.P.). Fresh and ripe fruits were selected for the study. The fruit was steamed for a minute and then the seeds were removed manually. To the obtained pulp, 50 per cent of water was added as standardized by Khurdiya and Roy (1985).

The method for the preparation of jam was standardizedby taking three levels as 45 parts of fruit with 55 parts of sugar by using factorial method which came out to be 50 parts fruit with 50 parts sugar and 55 parts fruit and 45 parts of sugar and offered to the panel of judges. The best scores were obtained organoleptic for the samples prepared through factorial method, i.e. Fruit and sugar in the proportion of 50:50. This proportion was further used for the preparation of jam and to further assess the storage stability packed in glass jars (P_1), plastic jar (P_2) and polythene bag (P_3). The samples were kept for 6 months storage period and evaluated in subjectively, objectively as well as microbiologically after a span of 30 days.

The products were evaluated for TSS using refract meter, pH with pHmeter, acidity, sugars, vitamin C by Ranganna (1995), organoleptic evaluation by Gould (1978) and microbiologically by the plate count method. The detailed process of making jam is described in

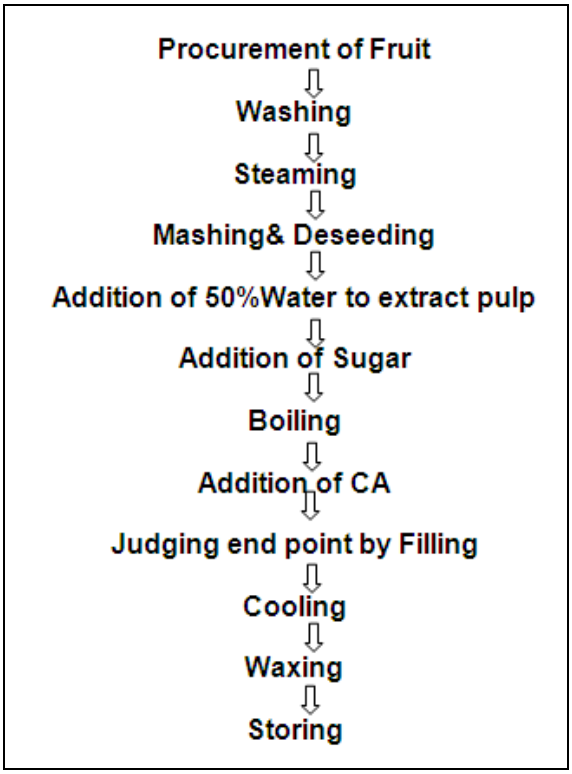

Figure 1: Unit operations for the preparation of Jam

Jamun Jam packed in different Packing materials

Jamun Fruit

Figure 2

3. Results and Discussion

Jamun jam was evaluated for different nutritional, microbial and organoleptic parameters on the day of processing and the results are presented in Table 1. The jam was packed with different types of packing materials to assess the storage stability and also the influence of packing material. After an incremental interval of 30 days, the samples were evaluated for nutritional, microbial and organoleptic parameters till 6 months.

3.1. Nutritional and Microbial parameters of Jam on the day of processing and during storage

3.1.1. TSS (^{0} Brix)

The data presented in the Table (1) demonstrates the storage life of jam kept in glass jar(P_1), plastic jar (P_2) and polythene bag(P_3). As is evident from the data that the TSS increase was higher in glass bottles, followed by plastic and polythene pack during the storage. The increase was more in sample packed in polythene bag. The increase in TSS might be due to solubilization of solids. The same observation was also observed by Prasad and Mali (2000) with the increasing storage time. This gives credence to the present findings.

Sample	0	30	60	90	120	150	180	Mean
TSS(^{0}Brix)								
P_1	68.0	68.3	68.5	68.7	69.5	69.6	69.6	**68.90**
P_2	68.0	68.2	68.6	68.6	68.5	69.1	69.6	**68.70**
P_3	68.0	68.3	69.0	69.3	69.7	69.0	70.0	**69.04**
pH								
P_1	3.60	3.39	3.16	3.40	2.88	2.95	2.96	**3.19**
P_2	3.60	3.42	3.24	3.10	2.31	2.10	2.12	**2.84**
P_3	3.60	3.36	3.20	3.00	2.25	2.17	2.19	**2.82**
Acidity (%)								
P_1	1.33	0.51	1.15	0.81	1.28	1.83	1.90	**1.26**
P_2	1.33	0.90	1.67	1.24	2.26	2.48	2.05	**1.70**
P_3	1.34	1.28	1.74	1.78	2.18	2.99	3.12	**2.06**
Vitamin C (mg/100g)								
P_1	12.26	9.33	9.04	8.99	7.53	6.95	7.20	**8.76**
P_2		10.27	8.60	7.53	6.44	5.13	5.06	**7.90**
P_3		11.20	8.13	6.80	5.12	4.67	4.57	**7.54**
Total sugars (%)								
P1	59.90	60.32	60.44	62.50		62.56	62.71	63.16 **61.66**
P2		59.24	59.37	60.50		60.82	60.88	61.16 **60.27**
P3		60.80	59.84	60.69		60.86	61.40	61.78 **60.75**
Reducing sugars (%)								
P1	24.95	23.42	24.45	26.79		28.81	29.24	30.75 **26.92**
P2		25.78	24.74	26.44		26.62	28.27	29.88 **26.67**
P3		25.02	25.79	26.60		28.55	28.86	29.37 **27.02**
Non-reducing sugars (%)								
P1	33.20	35.06	34.20	33.93		32.06	31.80	30.79 **33.01**
P2		31.79	32.90	32.36		30.59	30.98	29.72 **31.65**
P3		33.99	32.35	32.39		30.69	30.91	30.79 **32.12**
Microbial count								
P1	--	<1	<10	<10		<15	<20	<30
P2	--	<1	<10	<15		<15	<20	<30
P3	--	<1	<10	<15		<20	<30	<40

Table 1: Nutritional and microbiological evaluation of Jamun Jam

3.1.2. pH

The information with respect to pH content in jam on the day of processing and after subsequent storage intervals has been summarized in the same table. The pH values were found to decrease with the increased period of storage. The initial pH was 3.60 that decreased to 2.19, 2.12 and 2.96 in glass, plastic and poly bag. The decrease in pH might be due to the breakdown of organic acids. A similar observation was also made by Kalra and Revanthi in 1981 when guava pulp was stored in different packaging materials. Thus the results are in line.

3.1.3. Acidity

Data in Table 1 reflects the effect of different packing materials during storage on the acidity of jam. The initial acidity value was 1.33 per cent. A certain increase in the value was observed in all the three packs. In glass pack, the values ranged from 1.33-2.48 per cent; in plastic jars, the value increased from 1.33-3.12 and in polythene ranged from 1.33-1.90 per cent. The increase was higher in plastic packaging giving the mean value of 2.06, followed by 1.70 in glass pack and 1.26 percent in polypack. Pronounced oxidative changes might have been responsible for the increased acidity in polypack samples. Similar results are also reported by Ghai (2002) and Sood (2000).

3.1.4. Ascorbic Acid

The data pertaining to the effect of storage on ascorbic acid in jam is shown in Table 1. The initial vitamin C noted in jam was 12.26 mg/100g which decreased to 8.76, 7.90 and 7.54 mg/100g in the three packs, respectively. The loss of vitamin C due to oxidation to light was higher in jam packed in polythene followed by that in plastic and glass. With respect to storage the losses found to increase. The increasing stability is due to an increase in oxidation and breakdown of ascorbic acid to dehydro ascorbic acid. Same was observed by some investigators (Ghai, 2000 and Sood, 2000) in their independent work.

3.1.5. Sugars

The data pertaining to effect of storage intervals on total, reducing and non-reducing sugars in jamun jam is presented in Table 1. Slight increases in the value of total sugars were noted. At the sixth month, the value was noted as 63.16, 61.16 and 61.78 per cent in the glass pack, plastic pack and poly pack, respectively. The increase was noted to be higher in glass pack with the mean value of 61.66 percent, followed by polythene (60.75) and plastic pack (60.27). Moreover, some crystallization was also observed during the fourth month in the samples packed in polythene. An increasing trend in the reducing sugars was also recorded.

The increase was higher in the samples kept in polythene bags with the mean value of 27.02 per cent, followed by a glass pack (26.92 %) and plastic pack (26.67 %). This might be due to the breakdown of non-reducing sugars during storage. The same was already reported by Kumari in 1998, Lee and Nagy in 1998 and Sood in2000. This gives credence to the present findings.

Whereas, the percentage of non-reducing sugars was higher than the reducing sugars. But unlike the total and reducing sugars, they decreased with the storage period. The retention was maximum in glass pack (33.01), than polythene (32.12) and plastic (31.65 per cent) pack. The initial value obtained was 33.20 percent. From the first month of storage, the values decreased from 35.06-30.79; 31.79-29.72 and 33.99-30.79 per cent, respectively. Shah (1982) also reported the same.

3.2. Microbial Evaluation

The microbiological status of the product was presented in Table 1. Jam stored in all the three packs was found to be microbiologically safe during the storage period.

Pathogenic organisms were found to be absent. This is possibly due to the very nature of the environment (low water activity) which is not favouable to the microbial growth . High acidic conditions and sugar content also checked the microbial load. The obsrvations of Barwal(1995),Kumari(1998) and Vaidya(2002) confirm the present findings.

Days	**0**	**30**	**60**	**90**	**120**	**150**	**180**	**Mean**
Color								
P_1	8.09	8.36	8.40	8.00	8.00	8.00	8.07	**8.13**
P_2	8.09	8.51	8.50	8.00	7.86	7.90	7.73	**8.080**
P_3	8.09	8.57	8.50	7.88	7.00	6.50	5.76	**7.47**
Texture								
P_1	7.17	8.00	7.60	7.75	7.50	7.56	7.63	**7.59**
P_2	7.17	8.13	7.70	7.50	7.07	7.26	7.36	**7.46**
P_3	7.17	7.88	7.80	7.75	6.00	5.77	5.61	**6.85**
Taste								
P_1	7.50	7.88	8.00	7.88	7.50	7.53	7.54	**7.69**
P_2	7.50	8.07	7.60	7.88	7.14	7.22	7.22	**7.52**
P_3	7.50	7.88	7.50	7.75	6.15	6.10	6.00	**6.98**
Overall acceptability								
P_1	7.59	8.08	8.00	7.88	7.67	7.81	7.75	**7.83**
P_2	7.59	8.24	7.94	7.79	7.36	7.46	7.43	**7.69**
P_3	7.59	8.11	7.90	7.79	6.39	6.12	5.79	**7.10**

Table 2: Organoleptic evaluation of Jamun Jam

3.3. Organoleptic Evaluation

Since the consumers' acceptability is must before the launching of any new product in the market .For the reason, jamun jam was offered to a panel of judges to seek their opinion. The samples were evaluated not only on the day of processing but consumers' acceptability was also assessed during subsequent storage period.The data in Table (2) represents the organoleptic scores obtained by the jam kept in three different packs.

3.3.1. Colour

Colour of the product is the first clue its identity and often a prediction of the degree of satisfaction or pleasure to be derived while eating it. As is evident from the table, thecolour scores were higher for the jam kept in glass jar with the mean value of 8.13, followed by plastic pack (8.08) and least in polythene (7.47). This might be due to light or crystallization observed in polypacks.

3.3.2. Texture

Texture is also another important criteria for judging the acceptability of the product.The same table reveals the scores for texture of jam. Texture scoresthus obtained also had the same trend. Maximum mean value was obtained in glass pack (7.59) as compared to plastic pack (7.46) and polypack (6.85).

3.3.3. Taste

Mean scores for taste were also good for glass pack and plastic pack scoring 7.69 and 7.52. However, that stored in polypack scored 6.89. Crystallization occurring in polypacks decreased its acceptability. Whereas, jam stored in glass and plastic jars was acceptable even after six months of storage.

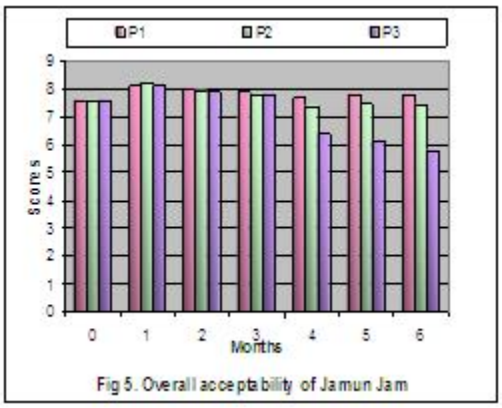

Figure 3

Therefore, the overall acceptability scores as shown also in Fig 3, obtained the mean values of 7.83 (glass), 7.69 (plastic) and 7.10 (polythene). The scores obtained fall into the category of 'Good'.

4. Conclusion

According to the aforesaid results and discussion, it is clear that the products prepared from jamun have a good nutritive value along with storage life. The products prepared are also acceptable up to the storage period of six months. Therefore, the products prepared from such local and medicinal fruit will be beneficial in all the ways for the farmers providing job opportunities as well as to the health conscious subjects with variety.

5. References

1. Barwal,V.S.1995.Use of sugar substitutes for he development of dietetic apple preserve.PhD.Thesis,CSKHPKV,Palampur
2. Ghai, Sumedha.2002.Study on nutritional and organoleptic changes during preparation and preservation of carrot products. MSc Thesis, PAU, Ludhiana
3. Gould W A (1978) Food quality assurance. The AVI Publishing Company Inc. Westport, Connecticut.
4. Kalra, S.K.and Revathi,C.1981.Storage studies on guava pulp. Indian Food Packer 35:29-33
5. Kannan S and Thiruman A S (2004) Studies on storage life of Jamun (*Syzigiumcuminii* Rom) fruit products. Journal of Food Science and Technology 41 (2):186-188.
6. Khurdiya D S and Roy S K (1985) Processing of jamun fruit (*Syzigiumcuminii*) into ready-to-serve beverage. Journal of Food Science and Technology 22(1):27-30.
7. Kumari,A 1998.The Quantitative and Qualitative parameters associated with the honey based fruit nectar. PhD, Thesis, CSKHPKV, Palampur
8. Prasad RN and Mali DC.2000. Changes in physic-chemical characteristics of pomegranate squash during storage. Indian Journal of Horticulture.57(1):18-20
9. Ranganna S (1995) Handbook of Analysis and Quality control for fruit and vegetable products. 3rd Edition
10. Shah, G.S.1982.Processing culled applesinto some commercially impotant fruit products.MScTheisi,PAU,Ludhiana.
11. Sood, Sangita.2000.Development of IMM foods with intent to enhance shelf-life and nutrient bio-availability.PhD Thesis ,CSKHPKV,Palampur
12. Lee,M.S. and Nagy,S. 1988. Quality changes and NEB in grape fruit during storage,Journal of Food Science 53:168-172
13. Vaidya, Devina.2002.Qualty valuation of Kiwi fruit Cultivars for processing suitability. PhD Thesis.CSKHPKV, Palampur