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Effect of various recipes on organoleptic evaluation of custard apple jam

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Abstract

The study on the organoleptic evaluation of custard apple jam stored up to 100 days was carried out in the Post-Harvest Laboratory, Department of horticulture, JNKVV Jabalpur (M.P.) in the year 2016 - 2017. Statistical analysis and organoleptic evaluation of the data was carried out and it was observed that effect of storage of custard apple jam at room temperature up to 100 days on scores for organoleptic evaluation of custard apple jam viz Colour, Flavour, Texture, Taste and Overall acceptability from 8.59-7.53, 8.73-8.26, 7.86-7.40, 8.60-7.93 and 8.80-8.40, respectively.

Keywords: custard apple, citric acid, jam, sugar

Introduction

India is the seventh largest country in the world with a total geographical area of 328.73 million hectares and occupies the area of 67.05 Mha (NHB database 2014) under fruit crops. It ranks second in the world in fruit production with 76.42MT production and 11.4 MT/ha productivity. Custard apple (*Annona squamosa* Linn.) also known as Sitaphal belongs to the family *Annonaceae* one of the finest fruits gifted to India by Tropical America. Custard apple is considered as one of the delicious and nutritionally valuable fruit meant for table purpose. Annonas are mostly consumed as dessert fruits due to its soft, granular, juicy sugar pulp with mild flavour and slight acidity. Its fruits are considered for medicinal value, and have been found to be very useful for brain and nervous system, generally used in ice cream, certain milk products and in making jam, jelly and other products. It is considered as beneficial for cardiac disease, diabetes and cancer. The seeds contain about 30% oil which can be used in soaps and paint industry. In India, it is cultivated mainly under rainfed conditions and covers more than 42,000 ha area with an annual production of 31,500 tonnes while in Madhya Pradesh it is grown in about 265 ha area with an annual production of 1987.50 tonnes (Anonymous, 2015). It contains about 28-55% of edible portion consisting of 73.30% moisture, 1.60 protein, 0.30% fat, 0.70% mineral matter, 23.90% carbohydrates, 0.20% calcium, 0.40% phosphorus, 1.0% iron, 12.4-18.15% sugar, 0.26-0.65% acidity and with caloric value of 105 K. Cal/100g.

2. Material and Methods

The fresh, uniform sized, mature fruits of custard apple were procured during the monsoon season (2016-17) from the whole sale fruit market (mandi) and used for experimentation. The unripe, sorted diseased, damaged and off type fruits were discarded. The good quality/sorted fruits were picked up and used for the purpose of experimentation.

2.1 Experimental details

Crop	:	Custard apple
Treatment	:	Factor A - 4 level of fruit pulp ratio + 4 level of sugar Factor B - 3 level of citric acid
Total No of treatment	:	12 (4x3)
Design	:	Completely Randomized Design (CRD).

S.No.	Factor A (Pulp Ratio)	Notation
1.	70% Custard apple pulp + 30g Sugar	G1
2.	60% Custard apple pulp + 40g Sugar	G2
3.	50% Custard apple pulp + 50g Sugar	G3
4.	40% Custard apple pulp + 60g Sugar	G4

S.No.	Factor B (Sugar Level)	Notation
1.	0.75g	C1
2.	1.0g	C2
3.	1.25g	C3

Details of treatment combination

Treatment	Combinations	Custard apple pulp (%)	Papaya pulp (%)	Sugar(g)
T1	G1C1	70	30	0.75
T2	G1C2	70	30	1.0
T3	G1C3	70	30	1.25
T4	G2C1	60	40	0.75
T5	G2C2	60	40	1.0
T6	G2C3	60	40	1.25
T7	G3C1	50	50	0.75
T8	G3C2	50	50	1.0
T9	G3C3	50	50	1.25
T10	G4C1	40	60	0.75
T11	G4C2	40	60	1.0
T12	G4C3	40	60	1.25

Procedure of pulp preparation

2.2 Preparation of fruits for pulping

The fruits were washed in running tap water for removing the adhering dirt. After washing of fruits, The pulp was extracted using the following procedure.

2.3 Extraction of pulp from custard apple

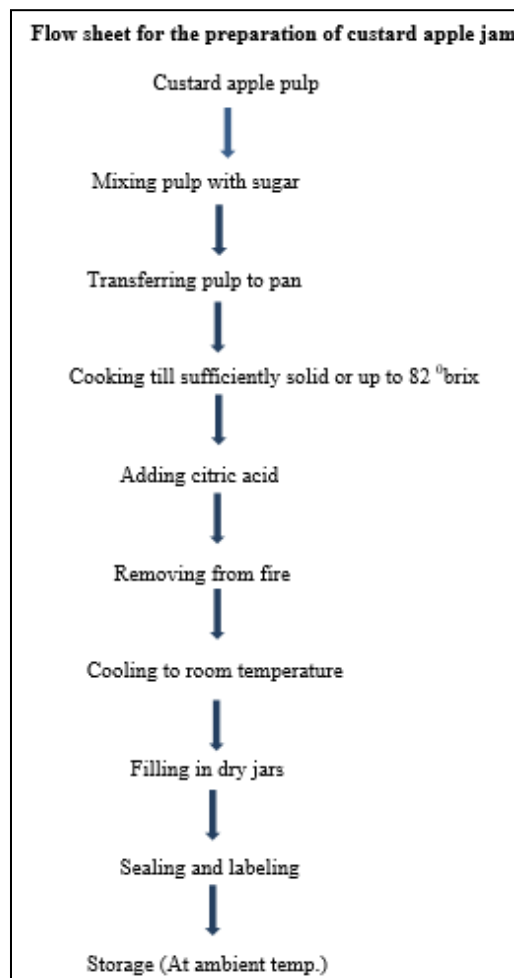
Fully ripened fruits were selected and the pulp was extracted manually under hygienic conditions. The seeds and pulp were separated from each other by rubbing the mixture on a 30 mesh sieve leaving the seeds and the covering sheath of the capillary pulp.

2.4 Pulp percent in fruit

The pulp from known weight of custard apple fruit were extracted out. The weight of both fruit pulp was recorded separately. It was done in 3 replications to minimize the experimental error. The weight of pulp in relation to weight of whole fruit was recorded.

2.5 Storage

The prepared custard apple jam was stored in dried place at ambient temperature which ranged from 18.20 °C (minimum) to 31.90 °C (maximum).



2.6 Organoleptic Evaluation

The present investigation was carried out in the Post-Harvest Laboratory, Department of Horticulture, JNKVV, and Jabalpur (M.P.) the preparation of custard apple jam was evaluated for various organoleptic characters like colour, Flavour, Texture, Taste and Overall acceptability.

3. Result and Discussion

The present investigation entitled “Standardization of recipe for development of value added products of custard apple (*Annona squamosa L.*)” was carried out to observe the effect of different blend ratio of custard apple and sugar along with citric acid etc. on preparation of custard apple jam and to find out acceptability of the products during storage.

3.1 Colour

The data presented in custard apple jam Table 3.1 clearly indicated that all treatments have slight difference in colour and colour rating value of custard apple jam and diminished gradually during storage from 0 to 100 days. Decrease of colour in custard apple jam might be due to the emphatic browning during storage. Browning of the custard apple jam could have resulted from non-enzymatic oxidation of vitamin C and enzymatic oxidation of polyphenols and caramelization of sugar. More the percentage of sugar more would be the caramelization with high darkness of Jam Similar findings were obtained by Thakre and Jain (2013) [10] in the blended nectar (50:50) of papaya and banana which was acceptable only for 15 days under ambient condition and up to 45 days under refrigerated condition and Jadhavar *et al.* (2014) [4] in papaya fruit bar. Similarly, Prasad and Mali (2006) reported that in ber jam original colour disappeared at ambient temperature after 3 months of storage. Highest colour rating value (8.59) was observed with G₂ (60% custard apple + 40% sugar).

3.2 Flavour

The aroma results from volatile substances such as esters, ketones, terpenes, aldehydes and others. The loss of these volatiles leads to a decrease in aroma detection. The mean panelist score for flavour profile of custard apple jam under storage showed a decreasing trend with increase in sugar quantity. It was also clear from the data presented in Table 3.2 that the higher custard apple percentage imparted more flavour to custard apple jam and therefore, in custard apple jam highest value (8.73) for flavour was recorded in G₁ (70% custard apple + 30% sugar) A decreasing pattern of flavour rating value was observed during storage of custard apple jam for 100 days. There are certain enzymatic, physiological or biochemical changes, which result in production of off flavour of product. Similar results were also reported by Cherian and Cherian (2003) [1] in case of blended papaya leather, Deka *et al.* (2005) [2] and Jakhar and Pathak, (2012) [5] reported that the flavour score decreased continuously during entire period of storage.

3.3 Texture

The result recording texture of custard apple jam different stages of storage has been presented in Table 3.3 In custard apple jam highest value (7.86) for texture was found in G₁ (70% custard apple + 30% sugar) The results exhibited that higher proportion of sugar in comparison to custard apple pulp was found better in improving the texture of custard apple jam. As storage period increased, a very slight change in texture of custard apple jam was observed. This might be due to absorption of moisture at the time of sensory evaluation and formation of brown pigment might be responsible for deterioration of appearance of product. Similar results were found i.e. decrease in texture by Singh *et al.* (2013) [9] in jam prepared from three mango cultivars Similar Harsimrat and Dhawan (2001) [3] reported a significant reduction in organoleptic rating in guava fruit bar.

3.4 Taste

The result recording taste of custard apple jam different stages of storage has been presented in Table 3.4 It is obvious from the data that the taste of custard apple jam was influenced by sugar, citric acid ratio and storage period. The score rating decreases continuously with the increase in quantity of sugar in jam also reduces the taste rating. This is due to higher TSS value with storage period up to 100 days. However, best result of custard apple jam for (8.60) taste were obtained from the treatment combination of G₂ (60% custard apple+ 40% sugar) and which was significantly superior in comparison to others. Increase in the amount of sugar beyond optimum amounts may, however, reduce the taste rating these requiring optimization and in this study 30g sugar was found optimum. During storage, a significant reduction in taste of custard apple jam was observed. Similar results were found by Punam *et al.* (2009) [7] who reported that organoleptic quality like taste reduced significantly with increased storage period. These findings are supported by other workers Jakhar and Pathak (2012) [5] in blended RTS of ber and jamun, Deka *et al.* (2005) [2] in mango-pineapple spiced beverages.

3.5 Overall acceptability

The result recording overall acceptability of custard apple jam different stages of storage has been presented in Table 3.5 The overall acceptability of custard apple jam dependent on colour, texture, flavour and taste rating of the product. The results obtained showed that highest score (8.80) for overall acceptability was found in G₂C₂ (60% custard apple + 40% sugar with 1.0 g citric acid) combination. During storage, it was observed that overall acceptability of custard apple jam was highest at 0 day of storage and it was slightly decreased as the days of storage were increased. Similar results were found by Singh *et al.* (2013) [9] with jam prepared from three mango cultivars. Similarly, Relekar *et al.* (2011) with value added products of sapota. Similar results were also supported by Jakhar and Pathak (2012) [5].

Table 3.1: Effect of different recipes on Colour of custard apple jam during storage

Ratio of fruit pulp+sugar (Factor A)	0 days				20 days				40 days				60 days				80 days				100 days			
	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean
	C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3	
G1	8.72	8.78	8.84	8.78	8.64	8.74	8.75	8.71	8.55	8.68	8.72	8.65	8.40	8.60	8.60	8.53	8.40	8.40	8.40	8.40	8.20	8.40	8.40	8.33
G2	8.91	8.95	9.00	8.95	8.77	8.73	8.83	8.77	8.72	8.68	8.65	8.68	8.60	8.60	8.20	8.46	8.40	8.40	8.20	8.33	8.40	8.40	8.20	8.33
G3	8.72	8.69	8.67	8.69	8.64	8.61	8.57	8.61	8.64	8.56	8.46	8.55	8.40	8.20	8.00	8.20	8.20	7.80	7.80	7.93	8.20	7.60	7.60	7.80
G4	8.63	8.59	8.55	8.59	8.52	8.49	8.45	8.49	8.40	8.36	8.32	8.36	8.20	8.00	8.00	8.06	7.80	7.80	7.60	7.73	7.60	7.60	7.40	7.53
MEAN	8.74	8.75	8.76		8.64	8.64	8.65		8.58	8.57	8.54		8.40	8.35	8.20		8.20	8.10	8.00		8.10	8.00	7.90	

Factor	A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB	
SEm±	0.026	0.022	0.045		0.034	0.030	0.059		0.051	0.044	0.088		0.053	0.046	0.091		0.033	0.029	0.058		0.033	0.029	0.058	
CD at 5% level	0.076	NS	NS		0.101	NS	NS		0.150	NS	NS		0.155	0.134	0.268		0.098	0.085	0.169		0.098	0.085	0.170	

Table 3.2: Effect of different recipes on Flavour of custard apple jam during storage

Ratio of fruit pulp+sugar (Factor A)	0 days				20 days				40 days				60 days				80 days				100 days			
	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean
	C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3	
G1	8.60	8.80	8.80	8.73	8.60	8.80	8.80	8.73	8.60	8.60	8.60	8.60	8.40	8.40	8.60	8.46	8.20	8.40	8.60	8.40	8.20	8.20	8.40	8.26
G2	8.40	8.40	8.40	8.40	8.20	8.40	8.40	8.33	8.20	8.20	8.40	8.26	8.00	8.20	8.20	8.13	7.80	8.20	8.20	8.06	7.80	7.80	8.20	7.93
G3	8.20	8.20	8.40	8.26	8.20	8.20	8.40	8.26	8.20	8.20	8.40	8.26	8.00	8.20	8.20	8.13	7.60	7.80	7.80	7.73	7.60	7.60	7.80	7.66
G4	7.60	7.80	7.80	7.73	7.60	7.80	7.80	7.73	7.60	7.80	7.80	7.73	7.40	7.60	7.60	7.53	7.20	7.40	7.40	7.33	7.20	7.40	7.40	7.33
MEAN	8.20	8.30	8.35		8.15	8.30	8.35		8.15	8.20	8.30		7.95	8.10	8.15		7.70	7.95	8.00		7.70	7.75	7.95	
Factor	A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB	
SEm±	0.037	0.032	0.065		0.037	0.032	0.065		0.044	0.038	0.076		0.042	0.036	0.073		0.037	0.032	0.065		0.033	0.029	0.058	
CD at 5% level	0.109	0.095	NS		0.109	0.095	NS		0.129	0.112	NS		0.123	0.107	NS		0.109	0.095	NS		0.098	0.085	NS	

Table 3.3: Effect of different recipes on Texture of custard apple jam during storage

Ratio of fruit pulp+sugar (Factor A)	0 days				20 days				40 days				60 days				80 days				100 days			
	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean
	C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3	
G1	7.80	7.80	8.00	7.86	7.80	7.80	7.80	7.80	7.60	7.80	7.80	7.73	7.60	7.80	7.80	7.73	7.40	7.40	7.60	7.46	7.20	7.40	7.60	7.40
G2	7.40	7.60	7.60	7.53	7.40	7.40	7.60	7.46	7.20	7.40	7.60	7.40	6.80	7.40	7.40	7.20	6.40	7.20	7.20	6.93	6.40	7.00	7.20	6.86
G3	7.20	7.40	7.40	7.33	7.20	7.40	7.40	7.33	6.80	7.20	7.20	7.06	6.60	7.00	7.20	6.93	6.60	6.80	7.00	6.80	6.40	6.80	6.80	6.66
G4	6.80	6.80	7.20	6.93	6.60	6.80	7.20	6.86	6.60	6.60	7.00	6.73	6.40	6.40	7.00	6.60	6.20	6.20	6.80	6.40	6.20	6.20	6.60	6.33
MEAN	7.30	7.40	7.55		7.25	7.35	7.50		7.10	7.25	7.35		6.90	7.15	7.30		6.65	6.90	7.15		6.55	6.85	7.05	
Factor	A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB	
SEm±	0.036	0.031	0.062		0.033	0.029	0.058		0.041	0.035	0.071		0.047	0.041	0.082		0.041	0.035	0.071		0.041	0.035	0.071	
CD at 5% level	0.106	0.092	0.183		0.098	0.085	0.169		0.120	0.104	0.208		0.138	0.120	0.240		0.120	0.104	0.208		0.120	0.104	0.208	

Table 3.4: Effect of different recipes on Taste of custard apple jam during storage

Ratio of fruit pulp + sugar (Factor A)	0 days				20 days				40 days				60 days				80 days				100 days			
	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean
	C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3	
G1	7.80	7.60	7.40	7.60	7.80	7.60	7.20	7.5	7.60	7.40	7.20	7.40	7.60	7.20	7.20	7.33	7.40	7.20	7.00	7.20	7.40	7.00	6.80	7.06
G2	8.60	8.80	8.40	8.60	8.60	8.60	8.20	8.46	8.60	8.60	8.00	8.40	8.40	8.60	8.00	8.33	8.20	8.40	7.80	8.13	8.00	8.20	7.60	7.93
G3	7.80	8.40	8.40	8.20	7.80	8.40	8.20	8.13	7.80	8.40	8.20	8.13	7.60	8.20	7.80	7.86	7.60	8.20	7.60	7.80	7.40	8.00	7.40	7.60
G4	7.40	7.20	7.20	7.26	7.40	7.20	7.00	7.20	7.40	7.20	6.80	7.13	7.20	7.20	6.60	7.00	7.00	6.80	6.40	6.73	7.00	6.40	6.20	6.53
MEAN	7.90	8.00	7.85		7.90	7.95	7.65		7.85	7.90	7.55		7.70	7.80	7.40		7.55	7.65	7.20		7.45	7.40	7.00	
Factor	A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB	
SEm±	0.037	0.032	0.065		0.047	0.041	0.082		0.043	0.037	0.075		0.040	0.034	0.069		0.047	0.041	0.082		0.051	0.044	0.088	
CD at 5% level	0.109	0.095	0.190		0.138	0.120	0.240		0.126	0.109	0.219		0.117	0.101	0.202		0.138	0.120	0.240		0.150	0.129	0.259	

Table 3.5: Effect of different recipes on Overall acceptability of custard apple jam during storage

Ratio of fruit pulp + sugar (Factor A)	0 days				20 days				40 days				60 days				80 days				100 days			
	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean	Citric acid (Factor B)			Mean
	C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3		C1	C2	C3	
G1	8.40	8.60	8.00	8.40	8.40	8.60	8.00	8.33	8.20	8.60	8.00	8.26	8.20	8.40	7.80	8.13	8.00	8.20	7.60	7.93	7.80	8.00	7.20	7.66
G2	8.60	8.80	8.20	8.53	8.60	8.80	7.80	8.40	8.60	8.60	7.60	8.26	8.40	8.40	7.60	8.20	8.20	8.40	7.40	8.00	8.20	8.40	7.20	7.93
G3	8.20	8.60	8.00	8.26	8.00	8.40	7.80	8.06	7.80	8.20	7.60	7.86	7.60	8.00	7.40	7.66	7.40	7.80	7.20	7.46	7.20	7.20	6.80	7.06
G4	7.80	8.00	7.60	7.80	7.80	8.00	7.60	7.80	7.60	7.80	7.40	7.60	7.40	7.60	7.20	7.40	7.20	7.40	7.00	7.20	6.80	7.20	6.80	6.93
MEAN	8.25	8.50	8.00		8.20	8.45	7.80		8.05	8.30	7.65		7.90	8.15	7.50		7.70	7.95	7.30		7.50	7.70	7.00	
Factor	A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB		A	B	AB	
SEm±	0.038	0.033	0.067		0.041	0.035	0.071		0.036	0.031	0.062		0.036	0.031	0.062		0.038	0.033	0.067		0.036	0.031	0.062	
CD at 5% level	0.113	0.098	NS		0.120	0.104	0.208		0.106	0.092	0.183		0.106	0.092	0.183		0.113	0.098	0.196		0.106	0.092	0.183	

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