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## **Studies the physico-chemical properties and sensory evaluation of jelly made from guava and carrot**

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### **Abstract**

The present study was carried out to evaluate the suitable combination of Guava and Carrot Viz. 90:10, 80:20, 70:30 and 60:40 for the development of suitable mixed fruit jelly. The prepared fruit jelly was filled in glass jar and stored at room temperature upto 6 months to determine the physico-chemical and sensory parameters. The prepared jelly was evaluated at initial stage, 3 months and 6 months. The maximum overall acceptability on 9-point Hedonic scale was ranges from 8.08 to 7.25 upto storage period of 6 months, when jelly was prepared with 80% guava extract and 20% carrot juice. The colour was also higher on 9-point Hedonic scale ranges from 8.25 to 7.42. The TSS, acidity and ascorbic acid ranges from 65.5 to 67.2° Brix, 0.63 to 0.84 % and 39.43 to 30.80 mg/100gm, respectively. Overall, there was decrease in the physico-chemical parameters only titratable acidity increases during the storage period. The sensory parameters during the storage period were also decreases during the storage period.

**Keywords:** Guava, carrot, mixed fruit jelly, sensory, TSS, acidity

### **Introduction**

Guava (G), which is crunchy and mildly sweet in taste are cultivated widely in India. The area under guava cultivation is about 0.255 million hectares, producing 4.048 million tonnes (Government of Agriculture & Farmers Welfare, GoI, 2015-16). The major production states of Guava are Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal, Chhattisgarh, etc. The popular varieties grown in India are Allahabad Safeda, Sardar, Lalit, Dhareedar, Pant Prabhat, Arka Mridula, Khaja (Bengal Safeda) etc. Sametime, hybrid varieties like Arka Amulya, Safed Jam and Kohir Safeda were also cultivated. Apart from enormous health benefits, Guava has potential to lower down the Glycaemic Index (GI) and do not raise blood sugar levels. It is the best fruit for hormonal imbalances. Diabetics and heart patients can appropriate option for such type of fruit. Guava is a rich source of pectin and ascorbic acid and have thick flesh that why it is preferred in jelly processing. It is also rich source of mineral like calcium, potassium. Carrot (C) is rich source of  $\beta$ -carotene (Vitamin A precursor) sametime, it also content other Vitamin like C, B1, B2, B3, etc. and minerals like calcium, potassium, phosphorus and sodium (Krinsky, N.I. and Johnson, E.J.; 2005) [6]. It is good source of dietary fibers and phenolic compounds (Bao, B., Chang, K.C.; 1994) [2].

Pectin is used as a gelling agent, which is responsible for gel formation in the jelly preparation (Fu, J.T. and Rao, M.A.; 2001) [5]. Citric acid is essential component in jelly preparation in balance amount. In America carrot juice was used as a colouring agent for preparation of cheese.

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Jelly is a product considered by the consumers, if its colour is slightly reddish in appearance. Here, a combination of Guava and Carrot jelly was developed and studied its quality evaluation parameter.

## Materials and Methods

Fresh and fully mature ripe guava and red colour carrot were procured from Bihar Agricultural College, Sabour, Bhagalpur. Guava and Carrot were cleaned with clean tap water to remove the field heat, soil, dust, so reduce the microbial load. Then, sorting and grading was done to remove the disease and insect's infection part to get uniform quality raw material. Guava and Carrot were stored at refrigerated temperature for further investigation. Other raw materials like sugar, citric acid, class-II preservative and glass jar were procured from the local market. Guava and carrot mixed fruit jelly were processed as per the standardized procedure (Srivastava, R.P. and Kumar, S.; 2010) [13]. The jelly was prepared from the extracted guava juice and carrot juice by adjusting its total soluble solid and acidity as per FSSAI specifications. The prepared jelly was filled into glass jar leaving a head space of 2.0 to 2.2cm. Capping was done using lug cap and then label was pasted in glass jar. Labelled glass jars were stored at room temperature upto 6 month for further study. Four different combination of mixed fruit jelly was prepared using different proportion of guava juice extract and carrot juice viz. 100:0, 90:10, 80:20 and 70:30 respectively and acceptance was evaluated by 9-point Hedonic scale using prescribed performed of sensory panel (Joshi, 2006) at initial stage, 3month and 6 month interval. Physico-chemical properties of mixed fruit jelly were also studied during the storage period. Total soluble solid (TSS) was determined using hand refractometer. Titratable acidity present in the samples were estimated through titration against 0.1 N Sodium hydroxide solution using phenolphthalein as an indicator (Ranganna, S; 2001) [9]. The ascorbic acid content in the samples was determined with the help of 3% metaphosphoric acid solution and sample was titrated against 2, 6-dichlorophenol-indophenol dye solution (AOAC, 2012) [11].

Data analysis was carried out by online software (Sheoran, O. P., CCSHAU, Hisar). Data was analysed in CRD (Completely Randomised Design) with four treatments (storage time) and each treatment replicated three times.

## Results and Discussions

### Physico-chemical Properties

The effect of different proportion of guava extracted juice and carrot juice during the storage period on TSS, acidity and ascorbic acid were determined. The TSS (°Brix) of mixed fruit jelly increased with increase in the storage periods at room temperature (Table 1) in all the treatments. It is evident that the effect of fruit juice (guava extract and carrot Juice) compositions and storage period was found significant. The significant increase ( $P < 0.05$ ) in TSS could be due to the degradation of polysaccharides during storage into soluble compounds (Singh, *et al.*, 2004; Selvamuthukumaran, *et al.*, 2007) [12, 10].

The ascorbic acid of different combinations of guava extract and carrot juice jelly was also determined during the storage period. It is clear that the ascorbic acid of jelly decreased with increase in storage periods at room temperature (Table 1). It is also evident that the effect of compositions (guava extract and carrot juice) and storage period were found significant. The decrease in ascorbic acid content in mixed fruit jelly could be due to oxidation of ascorbic acid into dehydroascorbic acid by

trapped oxygen in the glass jar (Selvamuthukumaran *et al.*, 2007) [10].

It is also evident that the titratable acidity during storage of jelly was increase gradually during the storage period (Table 1). Total pectic substances have increase the acidity in fruit products (Conn and Stumpf, 1976) [3], this might be due to degradation of pectin substances of pulp into soluble solids contributed towards an increase in acidity of the product. Another reason for slight increase in titratable acidity might be due to formation of organic acids by the degradation of the ascorbic acid as it decreased with storage period of the jelly. The similar results were reported when prepared karonda jelly (Deen and Singh, 2013) [4] and guava jelly bar Kuchi *et al.* (2014) [7].

### Sensory Evaluation

Sensory quality attributes like colour, texture, flavour, mouth feel and overall acceptability were evaluated in mixed fruit jelly. The colour for jelly ranges from 6.92-5.91, 7.90-6.43, 8.25-7.42 and 8.10-6.67 for Guava: Carrot in the ratio of 100:00, 90:10, 80:20 and 70:30, respectively. Highest colour was observed in the proportion 80:20 (G:C) jelly followed by 70:30, 90:10 and 100:00 ratio. The colour score was decreased with increase in storage period at ambient temperature. It is evident that the effect of composition of guava extract to carrot juice ratio and storage periods on colour score was significant. Similar trends were also reported by Selvamuthukumaran *et al.*, (2007) [10] and Masoodi *et al.*, (2005) [8].

Texture score was highest in the prepared jelly 80:20 (G:C) ratio other combination score lower (Table 2). Texture score was decreased with storage period in all the treatment. It is clear that the effect of composition of guava extract to carrot juice ratio and storage periods on texture score were found significant.

Flavour score was observed highest for 80:20 followed 70:30 and lowest in 90:10 (G:C) ratio of jelly. Flavour score was decreased with storage period but increased with increasing composition of guava juice in jelly. The effects of composition of guava extract to carrot juice ratio and storage periods on flavour score were found significant (Table 2).

Mouthfeel scores were decreased in all treatment during storage period (Table 2). Effect of composition of guava extract to carrot juice ratio and storage periods on mouthfeel score were found significant.

The overall acceptability was highest observed in the proportion 80:20 (G:C) jelly followed by 100:00, 70:30 and 90:10 ratio. It is evident that the effect of composition of guava extract to carrot juice ratio and storage periods on overall acceptability score were found significant at  $p < 0.05$  level of significance.

### Conclusion

From present investigation, it was concluded that mixed fruit jelly prepared with guava extract and carrot juice with the ratio of 80:20 was found better organoleptical property followed by the ratio of 70:30 and 90:10, respectively. Sametime, the colour of mixed jelly was bright red in 80:20 (G:C) combination this might be due to the presence of appropriate amount of carotene. The maximum overall acceptability score for the fresh samples prepared with the ratio of guava extract and carrot juice level 80:20 proportion was awarded as 8.08 (like very much). However, the minimum overall acceptability score of 7.25 (like moderately) was obtained to that sample which had guava

extract and carrot juice ratio of 80:20 after 90 days of storage at room temperature. The overall acceptability of mixed fruit jelly decreased with storage periods. It was concluded that

mixed fruit jelly prepared with guava extract and carrot juice ratio of 80:20 was found superior to those prepared with other proportion.

**Table 1:** Changes in physico-chemical attributes during the storage period of mixed fruit jelly

Time (Months)	TSS (°Brix)				Ascorbic Acid (mg/100g)				Acidity (%)			
	100:0	90:10	80:20	70:30	100:0	90:10	80:20	70:30	100:0	90:10	80:20	70:30
0	65.8	65.2	65.5	65.4	47.54	39.77	39.43	39.55	0.70	0.66	0.63	0.62
2	66.4	65.9	66.0	66.2	45.80	36.92	35.82	35.89	0.76	0.71	0.73	0.72
4	67.0	66.6	66.8	67.1	42.52	34.06	35.08	35.16	0.80	0.78	0.78	0.78
6	67.5	67.2	67.2	67.8	40.01	30.96	30.80	31.72	0.85	0.82	0.84	0.86
C.D. <sub>.5%</sub>			0.534				0.492				0.056	

**Table 2:** Changes in sensory attributes during the storage period of mixed fruit jelly

Time (Months)	Colour				Texture				Flavour				Mouth feel				Overall acceptability			
	100:0	90:10	80:20	70:30	100:0	90:10	80:20	70:30	100:0	90:10	80:20	70:30	100:0	90:10	80:20	70:30	100:0	90:10	80:20	70:30
0	6.92	7.9	8.25	8.10	7.38	7.54	8.08	7.48	7.12	7.42	8.08	7.90	7.80	7.63	8	7.44	7.68	7.53	8.08	7.56
2	6.43	7.43	8.00	7.67	7.16	7.26	7.83	7.23	6.83	7.23	7.92	7.63	7.26	7.32	7.67	7.23	7.28	7.23	7.83	7.27
4	6.19	7.13	7.67	7.41	6.94	6.82	7.42	7.08	6.42	7.03	7.75	7.41	7.03	6.92	7.33	7.04	7.04	6.90	7.58	7.02
6	5.91	6.43	7.42	6.67	6.69	6.64	7.08	6.81	6.11	6.82	7.42	6.92	6.76	6.70	7.17	6.76	6.72	6.65	7.25	6.80
C.D. <sub>.5%</sub>			N/A				N/A				N/A				0.414				0.338	

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