

FORMULATION AND QUALITY STANDARDIZATION OF VALUE-ADDED GUAVA (*Psidium guajava*) JAM ENRICHED WITH HERBAL EXTRACT

Shailandra Vikram Singh

Associate Professor, Department of Horticulture, Shri Durga Ji Post Graduate College, Chandeshwar, Azamgarh, Uttar Pradesh, India

Corresponding Author Email: svshortjnp@gmail.com

ABSTRACT

Fruits are rich source of essential vitamins and minerals, high in dietary fibre and provides a wide range of health boosting antioxidants such as phenols and flavonoids. Inclusion of fruits in diet can prevent a risk of heart diseases, cancer, diabetes etc. Guava fruit is a concentrated source of vitamin C, antioxidants, unsaturated fatty acids, dietary fibre etc. It is enriched with high amounts of vitamins and sufficient quantity of minerals. Jam is prepared from fruit pulp by boiling with sufficient quantity of sugar to a moderately thick consistency. There are different types of fruit jams like strawberry jam, mango jam, pineapple jam, apple jam and mixed fruit jam. Hence an attempt was made to find out the possibilities of mixing guava with Tulsi, ginger, mint leaves and lemon grass. Guava pulp was mixed with the various herbal sources in different ratio for the enhancement of guava jam. The research was carried out in February 2024 in the Postharvest Laboratory of Shri Durga Ji Post Graduate College, Chandeshwar, Azamgarh, Uttar Pradesh, India. Guava is subtropical fruit crop belong from the family Myrtaceae. Guava being a highly perishable fruit due to high production of ethylene, a ripening hormones which reduces the shelf life of guava. Keeping this in view a research was conducted to process guava in jam enriched with different herbal natural sources such as Ginger, Tulsi, Mint leaves and Lemon grass. The data was recorded at 60 days after storage and the completely randomized design was use to analyze the data. Among the various treatment applied the treatment T₈ (Guava pulp + Ginger (1.5%)) was found having the maximum TSS 68.39 °Brix, Acidity % 20.87 %, Reducing sugar 22.62%, Non reducing sugar 40.59%, Total sugar 63.21%, and pH 3.96. This research will increase small to medium entrepreneurs to come over in processing industry and will have a great opportunity to grow in processing industry as only 2% of fruits and vegetables are processed in India.

Keywords

Guava, Jam, Tulsi, Ginger, Mint leaves, Lemon grass.

1. INTRODUCTION

Fruits and vegetables serve as essential sources of vitamins and minerals. Despite India being the world's second-largest producer of fruits, with an annual yield of around 45 million tonnes, the daily per capita availability of fruits remains at just 107 grams, which falls short of the recommended 120 grams. Among the various fruits grown in India, guava holds significant importance due to its wide cultivation across different regions and its rich vitamin C content. This fruit is primarily available during the rainy and winter seasons, although the quality of the rainy season harvest is generally lower.

A substantial portion of guava produce—approximately 20–25% is lost due to poor handling, transportation, and processing practices before it even reaches the consumer. These inefficiencies highlight the urgent need for cost-effective processing technologies to utilize surplus produce and minimize post-harvest losses. Additionally, around 10–15% of the total fruit production is wasted between harvesting and consumption. Of this, about 4% is lost due to poor harvesting techniques, mechanical damage, picking of unripe fruits, and improper packaging, while another 3% is attributed to inadequate transport methods and general negligence (Nida et al., 2016).

To combat these seasonal losses, guava can be transformed into a variety of value-added products such as guava juice, pulp, nectar, jam, jelly, wine, toffee, and can even be incorporated into blends with other fruit juices and pulps (Sagar and Kumar, 2007). With shifts in consumer preferences and a growing demand for nutritious and functional food products, it has become vital for producers to innovate and offer options that provide both health and nutritional benefits. Guava, with its excellent digestive properties, nutritional richness, appealing flavor, and widespread availability at reasonable prices, stands out as an ideal fruit to support nutritional security. It is commonly available year-round, except during the summer months.

Guava jam, in particular, is made by processing the edible parts of the fruit with ingredients such as water, sugar, pH regulators, gelling agents, and other additives. The mixture is heated until it reaches a desirable consistency and is then packaged for storage (Mori et al., 1998). However, during food processing and storage, bioactive compounds are prone to oxidation (Robards et al., 1999), as many of these compounds are sensitive to heat and storage conditions (Cilla et al., 2011). The antioxidant properties and overall quality of guava products can vary significantly depending on the methods and stages of processing, as well as the temperatures used.

2. MATERIALS AND METHODS

Procurement of raw material

The fresh ripe guava var. Allahabad safeda were harvested from the Horticultural Farm, of Shri Durga Ji Post Graduate College, Chandeshwar, Azamgarhand then were subjected to washing, sorting and pulping.

Pulping

Guava pulp was obtained using a fine pulper and then subjected to pasteurization at 90°C for one minute. It was preserved with the accumulation of sodium benzoate, citric acid, and potassium metabisulphite, following the method described by Durrani et al. (2010). The preserved pulp was stored in PET jars at a temperature of $6 \pm 1^\circ\text{C}$, as recommended by Jain et al. (2011), until it was used for guava jam production.

Preparation of Guava Jam

Guava jam was made using the pulp that had been prepared and chemically preserved. The jam was prepared using the following processing techniques: direct heating in an open kettle until the appropriate brix was attained, as explained by Howard et al. (2010) and Poiana et al. (2012). Nine treatments of Guava jam were prepared using different herbal plant product and were compared to control. The details of the treatments is given in Table 1.

3. Physico chemical attributes

Total soluble solids

The total soluble solid ($^\circ\text{Brix}$) was measured by using digital refractometer.

pH

The pH of herbal guava jam was measured using buffer solutions as method described in AOAC (2007).

Sugars

Reducing, non-reducing and total, sugars were determined by Lane and Eynon method as described by Ranganna (2008).

Acidity

Acidity of guava herbal jam was determined with 0.1 N NaOH solution and phenolphthalein indicator using the method of AOAC (2007).

Ascorbic acid

Ascorbic acid or vitamin C content of herbal guava jam were measured by titration with a 2,6-dichlorophenolindophenol sodium salt solution following the procedure of AOAC (2007).

Statistical Analysis

The obtained data at 60 Days of Storage were subject to statistical analysis using Completely Randomized Design (CRD) for testing significance level.

Table 1: Study of different physico-chemicals parameters of Herbal Guava Jam at 60 Days of Storage

		Total Soluble solids (°Brix)	Ascorbic acid (mg/100g)	Acidity (%)	Reducing sugar (%)	Non reducing sugar (%)	Total sugar (%)	Ph
T0	Control	67.48	29.87	0.398	16.95	30.71	47.66	3.47
T1	Guava pulp + Tulsi (1%)	67.59	30.85	0.357	17.93	32.10	50.03	3.61
T2	Guava pulp + Tulsi (1.5%)	67.63	31.23	0.321	18.36	32.14	50.50	3.65
T3	Guava pulp + Mint (1%)	67.77	30.48	0.378	18.67	32.62	51.28	3.75
T4	Guava pulp + Mint (1.5%)	68.09	31.87	0.381	20.03	29.84	49.87	3.79

T 5	Gua va pulp + Lem on gras s (1%)	68.18	30.98	0.35 1	18.96	28.89	47.85	3. 74
T 6	Gua va pulp + Lem on gras s (1.5 %)	68.01	31.21	0.38 9	18.36	35.20	53.56	3. 65
T 7	Gua va pulp + Ging er (1%)	68.32	32.51	0.36 5	21.08	39.11	60.18	3. 83
T 8	Gua va pulp + Ging er (1.5 %)	68.39	32.76	0.31 2	22.62	40.59	63.21	3. 96
	CD@ 5%	0.36	0.768	0.02 3	1.47	2.40	3.87	0. 17
	Sed.	0.17	0.389	0.01 1	0.70	30.71	31.40	0. 08
	F cal.	S	S	S	S	S	S	S

4. Results and Discussion

Results regarding the physico chemicals parameters after statistical analysis is here by presented in table 1. Physico chemicals of jam provide stability of jam. From the table it is very clear and obvious that the data pertaining to different chemicals parameters were found to be statistically significant at 60 days of storage.

Fruit and fruit products' total soluble solids (TSS) are a representation of the different chemicals that are present in them in a soluble state. The treatment T8 (Guava + ginger (1.5%)) had the highest total soluble solids, with 68 °Brix. The solubilization of jam ingredients or components during storage may also be the cause of the increase in TSS contents. Muhammad et al. (2008) observed similar results.

A food product's stability and shelf life are indicated by its acidity. The inherent organic acids found in fruits and those added during jam-making are what give jam its acidity value. The minimum acidity percentage was recorded in the treatment T8 with (0.312). The rise in acidity can be explained by the fact that the concentration of weakly-ionized acid and their salts increased during storage, resulting in increased acidity. These results are in accordance with the findings of Shakir et al. (2007) in apple jam.

Ascorbic acid or Vitamin C is being affected during cooking as it is sensitive to heat, light and high temperature which results in loss of vitamin C. the results when subjected to statistical analysis were found to be highly significant and variations of the ascorbic acid can be seen across the treatment. The maximum ascorbic acid was found in treatment T8 with 32.76 mg/100g.

The maximum sugars were found in the treatment T8. The values of Total sugar, reducing sugar and non-reducing sugars were 63.21%, 22.62 and 40.59 % respectively. The increase in TSS and total sugars would be attributed to the conversion of starch and other insoluble carbohydrates into sugars. The results found are in agreement with findings of Vidhya and Narain (2011) in wood apple jam. The rise in reducing sugars during storage can be attributed to the conversion (inversion) of non-reducing sugars such as sucrose into reducing sugars like glucose and fructose. This transformation is often facilitated by the presence of organic acids, such as citric and malic acids, especially when combined with higher storage temperatures, which accelerate the inversion process. Additionally, extended storage periods can lead to the hydrolysis of sugars, resulting in increased acidity and a corresponding drop in pH, further contributing to the accumulation of reducing sugars. These observations are consistent with the findings reported by Shakir et al. (2007)

The pH value of a food is a directly related to the free hydrogen ions in that food. The pH of jam is an important factor to obtain optimum gel condition. The maximum pH of jam was

recorded in T8 with 3.96. Change in pH is directly related to change in acidity of samples. Similar results were reported by Hussain and Shakir (2010).

5. Conclusion

On the basis of our experimental finding, it was concluded that the treatment T8 (Guava pulp + Ginger (1.5%)) was found to be best in the terms of physico chemical analysis. The standardization of value-added herbal guava (*Psidium guajava*) jam successfully demonstrates the potential to enhance both the nutritional profile and therapeutic value of a traditional fruit preserve through the integration of selected herbal extracts. This study established optimal formulation parameters that preserved the sensory attributes, physicochemical properties. The final product not only met food safety and quality standards but also offered added health benefits, making it a promising functional food option. These findings provide a foundation for further commercialization and encourage the development of similar nutraceutical products using indigenous fruits and medicinal herbs.

References

1. AOAC. 2007. Official methods of analysis. 18th ed. Gaithersburg, MD: Association of Official Analytical Chemists.
2. Howard, L. R., Castrodale, C., Brownmiller, C. and Mauromoustakos, A. 2010. Jam processing and storage effects on blueberry polyphenolics and antioxidant capacity. *Journal of Agricultural and Food Chemistry* 58(7): 4022-4029.
3. Jain, P. K., Jain, P. and Nema, P. K. 2011. Quality of guava and papaya fruit pulp as influenced by blending ratio and storage period. *American Journal of Food Technology* 6(6): 507-512.
4. Muhammad, A., Durrani, Y., Zeb, A., Ayub, M. and Ullah, J. 2008. Development of diet jam from apple grown in swat (NWFP). *Sarhad Journal of Agriculture* 24(3): 461-467
5. Nida, Kanwal, Randhawa, Muhammad Atif and Iqbal, Zafar (2016). A Review of Production, Losses and Processing Technologies of Guava. *Asian J. Agric. & Food Sci.*, 4(2) : 19.
6. Poiana, M. A., Alexa, E. and Mateescu, C. 2012. Tracking antioxidant properties and color changes in low-sugar bilberry jam as effect of processing, storage and pectin concentration. *Chemistry Central Journal* 6(4): 1-11
7. Rangana, S. 2008. Hand book of analysis and quality control for fruit and vegetable products. 2nd ed. New Delhi: Tata McGraw Hill Pub. Co. Ltd.
8. Sagar, V.R. and Suresh Kumar P. (2007). Processing of guava in the form of dehydrated slices and leather Proc. Ist IS on Guava Eds. G. Singh et al. *Acta Hort.* 735 : 579-585.
9. Shakir, I., Durrani, Y., Hussain, I., Qazi, I. M. and Zeb, A. 2007. Physicochemical analysis of apple and pear mixed fruit jam prepared from varieties grown in azad Jammu and Kashmir. *Pakistan Journal of Nutrition* 7(1): 177-180.
10. Vidhya, R. and Narain, A. 2010. Development of preserved products (jam and fruit bar) from under exploited wood apple "*Limonia acidissima*" fruits. *African Journal of Food Science and Technology* 1(2): 51-57.