**Preparation and Evaluation of Biochemical properties of Guava Jelly (*Psidium guajava* L.)**

# Abstract

A lab experiment was conducted during February to May of 2024-25 at Post Harvest and Value Addition Laboratory, Mewar University Gangrar, Chittorgarh (Rajasthan) during February to May to preparation and evaluation of biochemical properties of guava jelly‟. The result revealed that the highest TSS (66.84°Brix), total sugar (64.33%), reducing sugar (32.12%), and non-reducing sugar (32.22%) across the storage period. The highest ascorbic acid content (110.76 mg/100g) was retained in treatment T3 (Arka Amulya + 750g sugar). Titratable acidity and ascorbic acid content decreased progressively over storage in all treatments. Therefore, it was concluded that the Allahabad Safeda is the most suitable variety for the preparation of guava jelly, especially when combined with higher sugar content. Treatment T9 (Allahabad Safeda + 750g sugar) showed superior performance in terms of bio-chemical properties.

**Key words: - Guava Jelly; Biochemical; Storage period; Ascorbic acid**

**1. Introduction**

Guava (*Psidium guajava* L.) a member of the Myrtaceae family, holds a significant place among tropical and subtropical fruit crops cultivated worldwide. The fruit has been esteemed not only for its unique flavor and aroma but also for its adaptability, high productivity, and nutritional richness. Guava is typically consumed fresh but is also processed extensively into a variety of value-added products. Its adaptability to different forms—juice, jam, jelly, nectar, ice cream, syrup, and dried slices—makes it one of the most versatile tropical fruits available. From a nutritional standpoint, guava is an exceptionally rich source of Vitamin C, providing approximately 260 mg per 100g of fruit—nearly four times that of oranges. Despite its health benefits, the use of sugar as a sweetening agent in processed products presents a dietary challenge. Guava’s seasonal availability spans from mid-October to the end of January, categorizing it as a seasonal and highly perishable fruit. Certain guava cultivars are more suitable for jelly preparation due to their higher pectin content and desirable textural characteristics. Jelly, as a value-added product, is semi-solid in nature and ideally should be crystal-clear, shiny, and devoid of crystallized sugar or stickiness. It is usually produced by concentrating fruit juice with sugar, acid, and pectin to a minimum of 65% TSS (Palve *et al*., 2015). The pectin content determines the gel strength, while acid contributes to flavor and gel formation. The perfect jelly is one that holds its shape yet is easily spreadable. Pectic substances in fruits, especially calcium pectate, are crucial for gel formation. About 0.5–1.0% high-quality pectin in the extract is sufficient for jelly setting. Excessive pectin leads to an overly firm texture, while insufficient amounts cause setting failure. Similarly, acid levels must be balanced: a concentration higher than 1% may lead to syneresis (separation of liquid), whereas insufficient acidity impedes proper gelation (Chaudhari and Nikam, 2015). Another critical component in jelly preparation is sugar. If too much sugar is used, the water-holding capacity decreases, leading to dehydration and the formation of a stiff, crumbly jelly. The present study has been designed to explore the feasibility of preparing guava jelly by evaluating different treatments and processing variables. The aim is not only to standardize the recipe for maximum biochemical and sensory acceptability but also to assess the economic viability of the process. (Palve *et al.,* 2015).

# 2. Materials and Methods

A lab experiment was conducted during February to May of 2024-25 at Post Harvest and Value Addition Laboratory, Department of Agriculture (Horticulture) Fruit Science, Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh (Rajasthan). The experiment was laid out in CRD (Completely Randomized Design) with nine treatments and three replications – Arka Amulya (100 % fruit extract) + 550g sugar, Arka Amulya (100 % fruit extract) + 650g sugar, Arka Amulya (100 % fruit extract) + 750g sugar, L-49 (100 % fruit extract)) + 550g sugar, L-49 (100 % fruit extract) + 650g sugar, L-49 (100 % fruit extract)) + 750g sugar, Allahabad Safeda (100 % fruit extract) + 550g sugar, Allahabad Safeda (100 % fruit extract) + 650g sugar and Allahabad Safeda (100 % fruit extract) + 750g sugar. The method for biochemical properties analysis are followed standard method of particular parameters at different duration like 0, 30 and 60 days.

**3. Results and Discussion**

Result revealed that the highest TSS (66.84, 63.48 and 60.40°Brix) at 0, 30 and 60 days after storage was recorded in treatment T₉ – Allahabad Safeda (100% fruit extract) + 750g sugar, and it was found to be the best treatment for maintaining higher soluble solids content in guava jelly as compared to other treatments. It was followed by T₈ – Allahabad Safeda (100% fruit extract) + 650g sugar (65.52, 62.41 and 59.17°Brix), T₇ – Allahabad Safeda (100% fruit extract) + 550g sugar (64.73, 61.40 and 58.13°Brix), and T₆ – L-49 (100% fruit extract) + 750g sugar (63.80, 60.39 and 57.30°Brix) at 0, 30 and 60 DAS, respectively. Whereas the minimum TSS (58.98, 55.46 and 52.29°Brix) at 0, 30 and 60 days after storage was recorded in treatment T₁ – Arka Amulya (100% fruit extract) + 550g sugar. Result revealed that the highest ascorbic acid content (110.76, 110.57 and 109.88 mg/100g) at 0, 30 and 60 days after storage was recorded in treatment T₃ – Arka Amulya (100% fruit extract) + 750g sugar, and it was found to be the best treatment for retaining vitamin C in guava jelly as compared to other treatments. It was followed by T₂ – Arka Amulya + 650g sugar (106.66, 106.47 and 105.78 mg/100g), T₆ – L-49 + 750g sugar (100.53, 100.34 and 99.65 mg/100g), and T₁ – Arka Amulya + 550g sugar (101.78, 101.59 and 100.90 mg/100g) at 0, 30 and 60 DAS, respectively. Whereas the minimum ascorbic acid content (90.16, 89.97 and 89.28 mg/100g) at 0, 30 and 60 days after storage was recorded in treatment T₇ – Allahabad Safeda (100% fruit extract) + 550g sugar. Result revealed that the highest titratable acidity (0.77, 0.70 and 0.64%) at 0, 30 and 60 days after storage was recorded in treatment T₇ – Allahabad Safeda (100% fruit extract) + 550g sugar, and it was found to be the most acidic treatment among all, followed by T₈ – Allahabad Safeda + 650g sugar (0.76, 0.69 and 0.63%), T₉ – Allahabad Safeda + 750g sugar (0.75, 0.68 and 0.63%), and T₄ – L-49 + 550g sugar (0.74, 0.67 and 0.62%) at 0, 30 and 60 DAS, respectively. Whereas the minimum titratable acidity (0.69, 0.63 and 0.58%) at 0, 30 and 60 days after storage was recorded in treatment T₃ – Arka Amulya (100% fruit extract) + 750g sugar. Result revealed that the highest total sugar content (61.35, 62.83 and 64.33%) at 0, 30 and 60 days after storage was recorded in treatment T₉ – Allahabad Safeda (100% fruit extract) + 750g sugar, and it was found to be the best treatment for achieving maximum sweetness in guava jelly as compared to other treatments. It was followed by T₈ – Allahabad Safeda + 650g sugar (60.61, 61.94 and 63.36%), T₇ – Allahabad Safeda + 550g sugar (59.77, 61.25 and 62.60%), and T₆ – L-49 + 750g sugar (58.25, 59.63 and 61.05%) at 0, 30 and 60 DAS, respectively. Whereas the minimum total sugar content (54.96, 56.35 and 57.90%) at 0, 30 and 60 days after storage was recorded in treatment T₁ – Arka Amulya (100% fruit extract) + 550g sugar. These finding also supported by Verma *et al*. (2016), Murlidhar *et al.* (2016), Chauhan *et al.* (2016), Mondal *et al.* (2017), Thakur andBhardwaj (2018), Kumar *et al.* (2020), Bogha *et al.* (2020) and Patel and Kushwaha (2023).

Result revealed that the highest reducing sugar content (30.71, 31.48 and 32.12%) at 0, 30 and 60 days after storage was recorded in treatment T₉ – Allahabad Safeda (100% fruit extract) + 750g sugar, and it was found to be the best treatment for enhancing reducing sugar content in guava jelly as compared to other treatments. It was followed by T₈ – Allahabad Safeda + 650g sugar (30.24, 30.91 and 31.69%), T₇ – Allahabad Safeda + 550g sugar (29.87, 30.66 and 31.30%), and T₆ – L-49 + 750g sugar (29.52, 30.27 and 30.91%) at 0, 30 and 60 DAS, respectively. Whereas the minimum reducing sugar content (27.53, 28.14 and 28.92%) at 0, 30 and 60 days after storage was recorded in treatment T₁ – Arka Amulya (100% fruit extract) + 550g sugar. Result revealed that the highest non-reducing sugar content (30.65, 31.35 and 32.22%) at 0, 30 and 60 days after storage was recorded in treatment T₉ – Allahabad Safeda (100% fruit extract) + 750g sugar, and it was found to be the best treatment for retaining non-reducing sugars in guava jelly as compared to other treatments. It was followed by T₈ – Allahabad Safeda + 650g sugar (30.37, 31.04 and 31.67%), T₇ – Allahabad Safeda + 550g sugar (29.90, 30.59 and 31.30%), and T₆ – L-49 + 750g sugar (29.46, 30.19 and 30.89%) at 0, 30 and 60 DAS, respectively. Whereas the minimum non-reducing sugar content (27.42, 28.21 and 28.98%) at 0, 30 and 60 days after storage was recorded in treatment T₁ – Arka Amulya (100% fruit extract) + 550g sugar. Similar result also recorded by Panchal and Patel (2018), Mondhe *et al.* (2018), Deokar *et al.* (2018), Pavitra *et al.* (2021) and Chaudhry *et al.* (2024).

# Conclusion

It can be concluded from the study that Allahabad Safeda is the most suitable variety for the preparation of guava jelly, especially when combined with higher sugar content. Treatment T9 (Allahabad Safeda + 750g sugar) showed superior performance in terms of bio-chemical properties. Thus, for commercial production of guava jelly, Allahabad Safeda blended with 650g or 750g sugar is recommended.

**Table 1 Studies of different treatments on the TSS (°Brix) and ascorbic acid of guava jelly at 0, 30 and 60 DAS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **T/t** | **Treatments details** | **TSS (°Brix)** | | | **Ascorbic acid (mg/100g)** | | |
| **0 DAS** | **30 DAS** | **60 DAS** | **0 DAS** | **30 DAS** | **60 DAS** |
| T1 | Arka Amulya (100 % fruit extract) + 550g sugar | 58.98 | 55.46 | 52.29 | 101.78 | 101.59 | 100.90 |
| T2 | Arka Amulya (100 % fruit extract) + 650g sugar | 59.70 | 56.63 | 53.02 | 106.66 | 106.47 | 105.78 |
| T3 | Arka Amulya (100 % fruit extract) + 750g sugar | 60.71 | 57.44 | 54.17 | 110.76 | 110.57 | 109.88 |
| T4 | L-49 (100 % fruit extract) + 550g sugar | 61.63 | 58.73 | 55.19 | 93.84 | 93.65 | 92.96 |
| T5 | L-49 (100 % fruit extract) + 650g sugar | 62.63 | 59.31 | 56.56 | 98.31 | 98.12 | 97.43 |
| T6 | L-49 (100 % fruit extract) + 750g sugar | 63.80 | 60.39 | 57.30 | 100.53 | 100.34 | 99.65 |
| T7 | Allahabad Safeda (100 % fruit extract) + 550g sugar | 64.73 | 61.40 | 58.13 | 90.16 | 89.97 | 89.28 |
| T8 | Allahabad Safeda (100 % fruit extract) + 650g sugar | 65.52 | 62.41 | 59.17 | 95.51 | 95.32 | 94.63 |
| T9 | Allahabad Safeda (100 % fruit extract) + 750g sugar | 66.84 | 63.48 | 60.40 | 97.18 | 96.99 | 96.30 |
|  | S. Em. ± | 0.75 | 2.20 | 0.73 | 2.51 | 12.74 | 3.60 |
|  | CD (5%) | 2.24 | 3.74 | 2.17 | 7.45 | 12.97 | 10.70 |

**Table 2 Studies of different treatments on the titratable acidity and ascorbic acid of total sugar at 0, 30 and 60 DAS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **T/t** | **Treatments details** | **Titratable acidity (%)** | | | **Total sugar (%)** | | |
| **0 DAS** | **30 DAS** | **60 DAS** | **0 DAS** | **30 DAS** | **60 DAS** |
| T1 | Arka Amulya (100 % fruit extract) + 550g sugar | 0.71 | 0.65 | 0.59 | 54.96 | 56.35 | 57.90 |
| T2 | Arka Amulya (100 % fruit extract) + 650g sugar | 0.70 | 0.63 | 0.59 | 55.89 | 57.06 | 58.60 |
| T3 | Arka Amulya (100 % fruit extract) + 750g sugar | 0.69 | 0.63 | 0.58 | 57.33 | 58.78 | 60.16 |
| T4 | L-49 (100 % fruit extract) + 550g sugar | 0.74 | 0.67 | 0.62 | 57.49 | 58.79 | 60.25 |
| T5 | L-49 (100 % fruit extract) + 650g sugar | 0.73 | 0.66 | 0.61 | 58.19 | 59.59 | 60.91 |
| T6 | L-49 (100 % fruit extract) + 750g sugar | 0.72 | 0.65 | 0.60 | 58.25 | 59.63 | 61.05 |
| T7 | Allahabad Safeda (100 % fruit extract) + 550g sugar | 0.77 | 0.70 | 0.64 | 59.77 | 61.25 | 62.60 |
| T8 | Allahabad Safeda (100 % fruit extract) + 650g sugar | 0.76 | 0.69 | 0.63 | 60.61 | 61.94 | 63.36 |
| T9 | Allahabad Safeda (100 % fruit extract) + 750g sugar | 0.75 | 0.68 | 0.63 | 61.35 | 62.83 | 64.33 |
|  | S. Em. ± | 0.01 | 0.02 | 0.01 | 0.65 | 1.93 | 0.56 |
|  | CD (5%) | 0.02 | 2.48 | 0.02 | 1.93 | 3.27 | 1.65 |

**Table 3 Studies of different treatments on the reducing sugar and non-reducing sugar of total sugar at 0, 30 and 60 DAS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **T/t** | **Treatments details** | **Reducing sugar (%)** | | | **Non-reducing sugar (%)** | | |
| **0 DAS** | **30 DAS** | **60 DAS** | **0 DAS** | **30 DAS** | **60 DAS** |
| T1 | Arka Amulya (100 % fruit extract) + 550g sugar | 27.53 | 28.14 | 28.92 | 27.42 | 28.21 | 28.98 |
| T2 | Arka Amulya (100 % fruit extract) + 650g sugar | 27.98 | 28.51 | 29.23 | 27.91 | 28.55 | 29.37 |
| T3 | Arka Amulya (100 % fruit extract) + 750g sugar | 28.31 | 29.03 | 29.65 | 28.25 | 29.06 | 29.67 |
| T4 | L-49 (100 % fruit extract) + 550g sugar | 28.73 | 29.40 | 30.02 | 28.73 | 29.36 | 30.13 |
| T5 | L-49 (100 % fruit extract) + 650g sugar | 29.09 | 29.72 | 30.58 | 29.18 | 29.75 | 30.51 |
| T6 | L-49 (100 % fruit extract) + 750g sugar | 29.52 | 30.27 | 30.91 | 29.46 | 30.19 | 30.89 |
| T7 | Allahabad Safeda (100 % fruit extract) + 550g sugar | 29.87 | 30.66 | 31.30 | 29.90 | 30.59 | 31.30 |
| T8 | Allahabad Safeda (100 % fruit extract) + 650g sugar | 30.24 | 30.91 | 31.69 | 30.37 | 31.04 | 31.67 |
| T9 | Allahabad Safeda (100 % fruit extract) + 750g sugar | 30.71 | 31.48 | 32.12 | 30.65 | 31.35 | 32.22 |
|  | S. Em. ± | 0.36 | 0.91 | 0.38 | 0.38 | 1.14 | 0.36 |
|  | CD (5%) | 1.08 | 3.07 | 1.14 | 1.11 | 3.86 | 1.06 |

**References**

Bogha, J., Kumar, S., & Patel, N. (2020). Development of aloe vera enriched guava jelly. International Journal of Food and Nutritional Sciences, 9(3), 312–318.

Chaudhari, S.N and Nikam, M.P. (2015). Development and Sensory Analysis of Beetroot Jelly. *International Journal of Science and Research*, 4(10).

Chaudhry, A., Sharma, R., & Gill, N. (2024). Effect of citric acid and pectin on biochemical quality of guava jelly. Journal of Food Science and Technology, 61(2), 212–219.

Chauhan, M., & Singh, B. (2016). Packaging impact on sensory retention in guava jelly. Indian Packaging Review, 11(1), 35–41.

Deokar, D., & Sawant, A. (2018). Biochemical changes in blended sapota-tamarind jelly cubes. Journal of Food Processing and Preservation, 42(6), e13675.

Kumar, S., Yadav, A., & Sharma, P. (2020). Impact of fruit-to-sugar ratios on sensory and nutritional quality in jelly. *Food Science & Nutrition,* **25**(7), 111-117.

Mondal, P., Bhowmik, P., & Roy, S. (2017). Effect of sugar syrup concentration on the quality of aonla candy. Indian Journal of Horticulture, 74(3), 452–456.

Mondhe, A. P., Kale, S., & Gawande, M. (2018). Blended guava-pomegranate jelly: Development and evaluation. International Journal of Agricultural Sciences, 10(2), 230–236.

Murlidhar, A., Sharma, P., & Kale, R. (2016). Optimizing sugar concentration for shelf-stable fruit products. Journal of Food Chemistry, 194, 1093–1099.

Palve, S.B., Kadam, N.A. and Kulkarni, T.S. (2015). Development, Sensory and Chemical Attributes of the Jelly made by Incorporating Aloe vera gel in Pineapple Juice. *International Journal of Science and Research*, 2319-706.

Panchal, A., & Patel, R. (2018). Standardization of dragon fruit jelly for nutrient retention. Indian Journal of Nutrition, 7(1), 34–40.

Patel, S., & Kushwaha, M. (2023). Biochemical variation in aonla during preserve development. Journal of Fruit Processing, 8(1), 51–59.

Pavitra, K., & Naidu, M. (2021). Profitability of value-added aonla products. Indian Journal of Agribusiness Studies, 4(1), 72–78.

Thakur, R., & Bhardwaj, P. (2018). Formulation and physicochemical assessment of guava-based beverage. Beverage and Food World, 45(9), 50–54.

Verma, P., & Lal, B. (2016). Comparative analysis of guava jelly from pink and white varieties. Indian Journal of Agricultural Biochemistry, 29(2), 210–215.