*Original Research Article*

Effect of Eco-Friendly Coatings on Shelf-Life and Post-Harvest Quality Parameters of Guava (*Psidium Guajava* L.)

.

ABSTRACT

|  |
| --- |
| **Aims:** Susceptibility of guava to post-harvest losses is high, which can be addressed by post-harvest management technologies such as application of coatings, which reduce post-harvest loss. This study investigates the effect of various coatings on shelf-life and postharvest qualities of guava stored at ambient and cold temperatures. **Study design:****Place and Duration of Study:** Department of Food Processing and Nutrition, Karnataka State Akkamahadevi Women University, Vijayapura, India, between July to August 2023.**Methodology:** Guava samples coated with castor oil, coconut oil, olive oil, refined sunflower oil, and aloe vera gel and stored at ambient (26 ±2 °C) and cold (4 ±2 °C) temperatures, while untreated samples were the control **Results:** The results showed that castor oil and aloe vera gel-coated guava samples had least amount of physiological weight reduction. Guavas treated with castor oil, aloe vera gel and olive oil showed lowest disease incidence and decay percentage in ambient and cold temperatures. The samples treated with castor oil, aloe vera gel and olive oil showed longest shelf life and highest reduction in microbial growth in ambient temperature (13 days) and cold temperature (28 days). In samples treated with castor oil, the total soluble solids (TSS) rose more slowly than in samples treated with other coatings in both ambient and cold temperatures, suggesting delayed ripening. At the end of 28-day storage period for cold-treated samples, sensory evaluation showed, guavas treated with castor oil and aloe vera gel had greatest acceptance index. The fruits stored at cold temperature showed increased shelf life irrespective of coatings.**Conclusion:** Overall, castor oil and aloe vera gel coatings were effective in preserving guava quality and increasing shelf life, making them sustainable natural postharvest preservation options. |

*Keywords: Guava, edible coating, post-harvest management, castor oil, coconut oil, olive oil, refined sunflower oil, aloe vera gel coating.*

1. INTRODUCTION

[(Guava (*Psidium guajava* L.) also known as ‘apple of tropics’ or ‘poor man’s apple’ is a highly productive, delicious and nutritious fruit grown commercially throughout the tropical and sub-tropical regions of India. It is the fourth most important fruit crop in area and production after mango, banana and citrus ([Bose and Mithra, 2001](https://arccjournals.com/journal/indian-journal-of-agricultural-research/A-6167#bose_2001)). Major guava producing countries are Pakistan, South Africa, India, Brazil, Egypt, Mexico, Venezuela and Colombia (Hassan et al., 2012). In India, guava is cultivated in an area of 265 thousand hectares with an annual production of 4054 thousand tons and a productivity of 15.3 MT per hectare. In Karnataka, guava is cultivated in an area of 7.18 thousand hectares with an annual production of 140.23 thousand MT, with a productivity of 19.52 MT per hectare ([Anon., 2018](https://arccjournals.com/journal/indian-journal-of-agricultural-research/A-6167#anonymous_2018)). Guava (*Psidium guajava L*.) is an important subtropical fruit grown widely in tropical and subtropical regions of the world. India is a major world producer of guava. With seeds that are rich in omega-3 and omega-6 polyunsaturated fatty acids, dietary fibre, riboflavin, proteins, and mineral salts, guavas are often marketed as "super-fruits" with significant nutritional value in terms of vitamins A and C. Guava's high vitamin C (ascorbic acid) content makes it an effective weapon against oxidation and free radicals, two major foes that contribute to the development of many degenerative diseases. Guavas' antioxidant property is thought to lower the risk of pancreatic, laryngeal, oesophageal, stomach, and oral malignancies. Guava's vitamin C enhances the absorption of vitamin E, which reduces LDL cholesterol oxidation and improves HDL cholesterol (good) cholesterol. Guava fibres facilitate bowel movements and aid with digestion. Guava's high vitamin A content is crucial for preserving the health and quality of the mucous membranes, teeth, skin, and eyesight. (Dattatreya, 2012). Because of their thin skin and high metabolic rate, guavas are highly susceptible to water loss, physical damage, and spoilage, severely limiting their shelf life. (Chen, 2024). This issue can be addressed by post-harvest management technologies such as application of coatings, which reduce post-harvest loss. Sridevi et al. (2018) ascertained the influence of pomegranate aril coating with aloe vera gel at different concentrations. The result suggested that pomegranate arils coated with aloe vera gel at 30% concentration were found as superior coating in minimizing the physiological loss in weight (2.53%) and decay per cent (2.98%) as compared to other concentrations (15, 45, 60 and 75 and 90%) on 16th day of storage at 4 °C temperature. Similar study was conducted to study the impact of oil coatings to enhance the quality and shelf life of guava fruit in which they used almond oil, mustard oil, grape seed oil, olive oil & coconut oil at ambient condition and cold storage. Investigation showed that shelf life extended significantly those fruits coated were with olive oil at room temperature up to 16 days and for 28 days in controlled storage and those fruits which were coated with mustard oil showed minimum physiological weight loss when comparing with other treatments. (Singh et al., 2017). Hence this present study was conducted to assess how the application of selected coatings can be effectively used to extend the shelf life of guava samples stored at ambient and cold temperatures, with the objectives to study the effect of application of selected oils and aloe vera gel coating on post-harvest quality parameters, sensory attributes, microbial growth and shelf life of guava samples.

2. Materials and methods

The present study was conducted during the period of July-August 2023 in the Department of Food Processing and Nutrition, Karnataka State Akkamahadevi Women University, Vijayapura, Karnataka, with coordinates 16.8° N latitude and 75.6° E longitude, with an average elevation of 606 meters.

**Sample collection:** Guava samples were procured from the local market of Vijayapura district, Karnataka. Samples were collected at commercial harvest, using skin colour as a maturity index. Guavas of regular shape and uniform size without any defect, green-skinned fruit at a range of maturities approaching full development, were selected. Apart from these, traits of healthiness for fruits free from disease and bruising on the skin were also taken into consideration for the selection of fruits. Selected samples were collected in cartons and brought to the laboratory. Blemished, diseased and fruits that are not uniform in size and colour were discarded. Before the application of the treatments, the fruits were thoroughly washed and dried. The selected fruits were randomly picked.

**Coating materials:** Selected guava samples were coated using coatings of different materials as per the details mentioned below:

List 1: **Details of the treatment**

|  |  |  |
| --- | --- | --- |
| **Sl. No.**  | **Code**  | **Details of the treatment** |
| 1. | AC | Control (uncoated) + Ambient temperature |
| 2. | AT1 | Castor Oil + Ambient temperature |
| 3. | AT2 | Coconut oil + Ambient temperature |
| 4. | AT3 | Olive oil + Ambient temperature |
| 5. | AT4 | Refined sunflower oil + Ambient temperature |
| 6. | AT5 | Aloe vera gel + Ambient temperature |
| 7. | CC | Control (uncoated) + Cold temperature |
| 8. | CT1 | Castor Oil + Cold temperature |
| 9. | CT2 | Coconut oil + Cold temperature |
| 10. | CT3 | Olive oil + Cold temperature |
| 11. | CT4 | Refined sunflower oil + Cold temperature |
| 12. | CT5 | Aloe vera gel + Cold temperature |

**Application of Coatings:** The coating technique employed for this study was dipping**.** The control samples were the untreated bananas

**Storage Conditions:** The temperatures throughout the study were: ambient temperature (26 ±2 °C) and cold temperature (4 ±2 °C). The total duration of storage was seven days after ripening of the guava fruits.

**Quality Parameter Evaluation:**

1. **Physical observation:**

**1.1 Fruit weight (g):** Fruits of the investigational set were weighed with a scientific weighing (accuracy 0.001mg) balance at the start of each experiment (freshly harvested, i.e., at day 0) and thereafter at regular intervals during the storage period.

**1.2 Physiological loss in weight (%):** The difference between the initial and final weight of the fruit was considered as the total weight loss and calculated as a percentage on a fresh weight basis as per the standard method of AOAC (1994). The weight loss was calculated with the following formula:

* 1. **Per cent decay (%):** Ten fruit samples of each treatment were used to study the decay percentage. Based on the number of fruits spoiled (unfit for human consumption), the percentage decay was worked out, and the spoiled fruits were removed. It was determined by using the following formula according to Ismail *et* *al*., 2010.
1. **Chemical parameters:**

**2.1 Total Soluble Solids (° Brix):** An Erma hand refractometer (range 0-32 °Brix) was used to measure the total soluble solids of pulp. A drop of homogenised pulp was used to measure the TSS, and values were expressed as °Brix.

1. **Microbial analysis to study the shelf life and decay incidence of samples:** Shelf life refers to the period for which a fruit or vegetable can be stored. The item becomes unfit for use after its shelf life. The selected fruits and vegetables were coated with the coatings of different oils, namely castor, coconut, olive, sunflower and aloe vera gel. The samples were analysed throughout the storage duration for microbial contamination.
2. **Sensory evaluation of the coated samples:** The sensory characters viz., size, shape, skin colour, texture, aroma, appearance, marketability and overall acceptability of coated fruits and vegetables during their storage life were evaluated on a four-point hedonic scale (Larmond, 1977). The information contained on the scale was 4: extremely like; 3: moderately like; 2: neither like nor dislike; 1: dislike. 10 panellists were invited to discriminate between different attributes. Sensory evaluation was completed by judges, and their observations were recorded.
3. **Statistical Analysis**: To ascertain the significance of variations among the treatments, the experimental results were statistically analysed using One-Way Analysis of Variance (ANOVA). To find significant differences between treatments, the means were compared using the Critical Difference (CD) test at a 5% level of significance (p < 0.05). Additionally, the Coefficient of Variation (CV%) was computed to evaluate the accuracy of the findings. All the statistical analysis was carried out by using MS Excel.

**Chart 1: Research Methodology Flowchart**



3. results and discussion

**Table 1. Percentage of physiological loss in weight of treated guava samples stored at ambient and cold temperatures.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Days** | **Ambient Treatments** | **Cold Treatments** |
| **AC** | **AT1** | **AT2** | **AT3** | **AT4** | **AT5** | **CC** | **CT1** | **CT2** | **CT3** | **CT4** | **CT5** |
| **Fruit weight** | **0** | 33.70 | 36.80 | 28.10 | 37.70 | 23.50 | 34.40 | 40.70 | 35.00 | 41.40 | 44.40 | 42.50 | 38.50 |
| **7** | 21.60 | 30.80 | 20.20 | 29.70 | 18.30 | 28.20 | 35.20 | 32.80 | 39.90 | 42.80 | 40.10 | 36.70 |
| **14** | 18.20 | 29.00 | 18.20 | 27.30 | 16.30 | 26.30 | 34.10 | 32.30 | 38.00 | 41.40 | 39.30 | 36.10 |
| **21** | - | - | - | - | - | - | 33.20 | 33.40 | 37.80 | 40.50 | 38.40 | 35.90 |
| **28** | - | - | - | - | - | - | 31.50 | 32.40 | 36.40 | 39.40 | 37.40 | 35.10 |
| **Physiological loss in weight (%)** | 45.99 | 21.19 | 35.23 | 27.58 | 30.63 | 23.54 | 22.60 | 7.43 | 12.08 | 11.26 | 12.00 | 8.83 |
| **mean** | 14.70 | 19.32 | 13.30 | 18.94 | 11.62 | 17.78 | 34.94 | 33.18 | 38.70 | 41.70 | 39.54 | 36.46 |
| **SD** | 14.60 | 17.87 | 12.69 | 17.71 | 10.93 | 16.50 | 3.49 | 1.11 | 1.96 | 1.96 | 1.94 | 1.28 |
| **SEM** | 32.65 | 39.96 | 28.38 | 39.61 | 24.44 | 36.91 | 7.81 | 2.47 | 4.38 | 4.38 | 4.33 | 2.85 |
| **CD at 5%** | 10.59 | 11.71 | 9.87 | 11.66 | 9.16 | 11.25 | 5.18 | 2.91 | 3.88 | 3.88 | 3.86 | 3.13 |
| **CV (%)** | 99.34 | 92.50 | 95.44 | 93.52 | 94.05 | 92.83 | 10.00 | 3.33 | 5.06 | 4.69 | 4.90 | 3.50 |
| **Significance** | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* | \* |

AC- Control (uncoated) + ambient temperature, AT1- Castor Oil + ambient temperature, AT2- Coconut oil + ambient temperature, AT3- Olive oil + ambient temperature, AT4- Refined sunflower oil + ambient temperature, AT5- Aloe vera gel + ambient temperature, CC - Control (uncoated) + cold temperature, CT1 - Castor Oil + cold temperature, CT2- Coconut oil + cold temperature, CT3 Olive oil + cold temperature, CT4- Refined sunflower oil +cold temperature, CT5 - Aloe vera gel +cold temperature.

Table 1 represents the percentage of physiological loss in weight of treated guava samples stored at ambient and cold temperatures. Among ambient treatments least PLW was seen in AT1 (castor oil), followed by AT5 (aloe vera) and AT3 (olive oil) as 21.19 per cent, 23.54 per cent, and 27.58 per cent, respectively. Maximum PLW was observed in the control sample (45. 99%). Among the cold treatments least PLW was seen in CT1 (castor oil), followed by CT5 (aloe vera) and CT3 (olive oil) as 7.43 per cent, 8.83percent, and 11.26 per cent, respectively. Maximum PLW was observed in the control sample (22.60%). An increase in PLW was observed in all the treatments with an increase in storage period, which may be because of moisture loss by evapotranspiration and reserved food material by respiration. The analysis was found to be significant among the treatments.

**Table 2. Per cent decay (%) of treated guava samples stored at ambient and cold temperatures (per 10 fruits)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatments** | **AC** | **AT1** | **AT2** | **AT3** | **AT4** | **AT5** | **CC** | **CT1** | **CT2** | **CT3** | **CT4** | **CT5** |
| **Guava** | 9 | 3 | 6 | 5 | 7 | 4 | 2 | 0 | 1 | 0 | 2 | 0 |
| 90% | 30% | 60% | 50% | 70% | 40% | 20% | 0% | 10% | 0% | 20% | 0% |

AC- Control (uncoated) + ambient temperature, AT1- Castor Oil + ambient temperature, AT2- Coconut oil + ambient temperature, AT3- Olive oil + ambient temperature, AT4- Refined sunflower oil + ambient temperature, AT5- Aloe vera gel + ambient temperature, CC - Control (uncoated) + cold temperature, CT1 - Castor Oil + cold temperature, CT2- Coconut oil + cold temperature, CT3 Olive oil + cold temperature, CT4- Refined sunflower oil +cold temperature, CT5 - Aloe vera gel +cold temperature.

Data depicted in Table 2 addresses the percentage decay of treated guava samples stored at ambient and cold temperatures. In case of treated samples stored at ambient temperature, the lowest decay percentage of 30 per cent was seen in AT1 (castor oil), which may be due to the barrier properties of castor oil-treated guava samples; the highest decay percentage of 90% was seen in AC (control). In case of treated samples stored at cold temperature, the lowest decay percentage of zero percent was seen in CT1 (castor oil) and CT5 (aloe vera) which may be due to the barrier properties of castor oil and antimicrobial properties of aloe vera gel, the highest decay percentage of twenty percent was seen in AC (control) and CT4 (refined sunflower oil).

**Table 3. Effect of treatments on TSS of treated guava samples stored at ambient and cold temperatures**

|  |  |
| --- | --- |
|  | **TSS (% brix)** |
| **Fruits/****Vegetables** | **Treatments** | **Day 0** | **Day 7** | **Day 14** | **Day 21** | **Day 28** | **Percentage increase in TSS** |
| **Guava** | **Ambient** | **AC** | 10 | 12 | 13 | - | - | 30.00 |
| **AT1** | 10 | 11 | 11 | - | - | 10.00 |
| **AT2** | 10 | 11 | 12 | - | - | 20.00 |
| **AT3** | 10 | 11 | 12 | - | - | 20.00 |
| **AT4** | 10 | 12 | 13 | - | - | 30.00 |
| **AT5** | 10 | 11 | 12 | - | - | 20.00 |
| **Cold** | **CC** | 10 | 11 | 12 | 13 | 13 | 30.00 |
| **CT1** | 10 | 10 | 11 | 11 | 11 | 10.00 |
| **CT2** | 10 | 11 | 12 | 12 | 12 | 20.00 |
| **CT3** | 10 | 11 | 11 | 12 | 12 | 20.00 |
| **CT4** | 10 | 11 | 12 | 12 | 13 | 30.00 |
| **CT5** | 10 | 11 | 11 | 12 | 12 | 30.00 |

AC- Control (uncoated) + ambient temperature, AT1- Castor Oil + ambient temperature, AT2- Coconut oil + ambient temperature, AT3- Olive oil + ambient temperature, AT4- Refined sunflower oil + ambient temperature, AT5- Aloe vera gel + ambient temperature, CC - Control (uncoated) + cold temperature, CT1 - Castor Oil + cold temperature, CT2- Coconut oil + cold temperature, CT3 Olive oil + cold temperature, CT4- Refined sunflower oil +cold temperature, CT5 - Aloe vera gel +cold temperature.

Data depicted in Table 3represent the percentage increase in TSS of treated guava samples stored at ambient and cold temperatures. Total soluble solids (TSS) is an important parameter of fruit quality. TSS value affects the taste of the fruit because it can indicate the level of sweetness of the fruit. In case of ambient temperature, there was a rise in TSS of fruits up to the 14th day of storage, but after that, the fruits got rotten at ambient temperature; hence, further readings have not been taken. The lowest TSS percentage increase was observed in AT1 (castor oil), which may be due to the high viscosity of the oil, thereby resulting in high barrier properties, and the maximum TSS percentage increase was recorded in AC (control) and AT4 (refined sunflower oil). The coating materials used for fruits, except for refined sunflower oil, showed a smaller percentage increase in total soluble solids compared to the control. The TSS content of the freshly harvested (i.e.,0 days of storage) guava fruit was 10 per cent. The increasing trend of TSS was observed in the treated as well as the untreated guava fruits. In case of samples stored in cold temperature, there was a rise in TSS of fruits up to the 28th day of storage, but after that, the fruits got rotten at ambient temperature; hence the further readings have not been taken. The lowest TSS percentage increase was observed in CT1 (castor oil), and the maximum TSS percentage increase was recorded in CC (control), CT4 (refined sunflower oil) and CT5 (aloe vera gel). The TSS content of the freshly harvested (i.e.,0 days of storage) guava fruit was 10 per cent. The increasing trend of TSS was observed in the treated as well as the untreated guava fruits.

**Table 4. Effect of treatments on microbial growth and shelf life of treated guava samples stored at ambient and cold temperatures**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total****Microbial Count** | **Treatments** | **Day 0** | **Day 4** | **Day 8** | **Day 12** | **Day 13** | **Day 14** | **Day 16** | **Day 20** | **Day 24** | **Day 26** | **Day 28** |
| **AC** | nil | nil | nil | >10 cfu | - | - | - | - | - | - | - |
| **AT1** | nil | nil | nil | nil | nil | >10 cfu | - | - | - | - | - |
| **AT2** | nil | nil | nil | nil | >10 cfu | - | - | - | - | - | - |
| **AT3** | nil | nil | nil | nil | nil | >10 cfu | - | - | - | - | - |
| **AT4** | nil | nil | nil | nil | >10 cfu | - | - | - | - | - | - |
| **AT5** | nil | nil | nil | nil | nil | >10 cfu | - | - | - | - | - |
| **CC** | nil | nil | nil | nil | nil | nil | nil | nil | nil | >10 cfu | - |
| **CT1** | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil |
| **CT2** | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil | >10 cfu |
| **CT3** | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil |
| **CT4** | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil | >10 cfu |
| **CT5** | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil | nil |

AC- Control (uncoated) + ambient temperature, AT1- Castor Oil + ambient temperature, AT2- Coconut oil + ambient temperature, AT3- Olive oil + ambient temperature, AT4- Refined sunflower oil + ambient temperature, AT5- Aloe vera gel + ambient temperature, CC - Control (uncoated) + cold temperature, CT1 - Castor Oil + cold temperature, CT2- Coconut oil + cold temperature, CT3 Olive oil + cold temperature, CT4- Refined sunflower oil +cold temperature, CT5 - Aloe vera gel +cold temperature.

Data depicted in Table No. 4represents the effect of the different coatings on the microbial growth and the shelf life of the treated guava samples stored at ambient and cold temperatures. ">10 cfu" denotes the existence of microbial growth, whereas "nil" denotes the absence of microbial growth. In case of ambient temperature, no microbial growth was detected in the AT1(castor oil), AT3 (olive oil) and AT5 (aloe vera) coated samples until the 14th day of the storage period. AT2 (coconut oil) and AT4 moderately extend the shelf life**,** delaying microbial growth untilday 12. The control (AC) deteriorated the fastest, with microbial growth appearing by day 12. In case of cold temperature, no microbial growth was detected in the CT1(castor oil), CT3 (olive oil) and CT5 (aloe vera) coated samples until the 28th day of the storage period. CT2 (coconut oil) and CT4 moderately extend the shelf life**,** delaying microbial growth untilday 27. The control (CC) deteriorated the fastest, with microbial growth appearing by day 26. Therefore, based on the study, it can be concluded that castor oil, olive oil and aloe vera gel might be the most effective treatments, preventing microbial growth entirely for 13 days and 28 days at both ambient and cold temperatures, respectively.

**Table 5. Mean sensory scores of the treated guava samples stored at ambient and cold temperatures**

|  |  |
| --- | --- |
| **Days** | **Acceptability Index (%)** |
| **Treatments** |
| **AC** | **AT1** | **AT2** | **AT3** | **AT4** | **AT5** | **CC** | **CT1** | **CT2** | **CT3** | **CT4** | **CT5** |
| **Day 0** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **Day 7** | 82.1 | 96.8 | 82.5 | 88.1 | 83.1 | 95.9 | 92.5 | 99.0 | 95.3 | 96.8 | 92.8 | 97.5 |
| **Day 14** | - | 85.9 | - | 46.8 | - | 72.1 | 80.0 | 94.0 | 80.0 | 84.6 | 79.0 | 93.7 |
| **Day 21** | - | - | - | - | - | - | 62.1 | 87.8 | 62.8 | 70.0 | 68.7 | 84.6 |
| **Day 28** | - | - | - | - | - | - | 32.5 | 86.5 | 36.5 | 41.5 | 34.3 | 83.7 |

AC- Control (uncoated) + ambient temperature, AT1- Castor Oil + ambient temperature, AT2- Coconut oil + ambient temperature, AT3- Olive oil + ambient temperature, AT4- Refined sunflower oil + ambient temperature, AT5- Aloe vera gel + ambient temperature, CC - Control (uncoated) + cold temperature, CT1 - Castor Oil + cold temperature, CT2- Coconut oil + cold temperature, CT3 Olive oil + cold temperature, CT4- Refined sunflower oil +cold temperature, CT5 - Aloe vera gel +cold temperature.

Table 5 represents mean sensory scores during the storage period of the treated guava samples in ambient and cold temperatures. On day zero, all the treated samples showed a 100 per cent acceptability index. As the days progressed, the acceptability index gradually decreased, from the first to the fourteenth day. In case of ambient temperature, the highest acceptability index was seen in AT1 (castor oil), followed by AT5 (aloe vera). As on fourteenth day the acceptability index percentage was maximum in AT1 (85.9%) followed by AT5 (72.1%) and the least was seen in AT3 (46.8%), the acceptability index of AC (control), AT2 (coconut oil) and AT4 (refined sunflower oil) were not recorded as they had already decayed and were no longer acceptable. Control showed the lowest acceptability index on all the storage days. In case of cold temperature storage, from the first to the twenty-eighth day, the highest acceptability index was seen in CT1 (castor oil), followed by CT5 (aloe vera). On the twenty-eighth day, the acceptability index percentage was maximum in CT1 (86.5%), followed by CT5 (83.7%) and the least was seen in the control (32.5%). This may be due to the surface barrier properties of castor oil and the antimicrobial properties of aloe vera gel.

4. Discussion

Among all the different coatings, the least percentage loss in weight (PLW) was observed in castor oil (AT1 and CT1) treated guava samples, followed by aloe vera gel and olive oil treated guava samples in both ambient and cold temperatures. The results corresponded to the results of Joshi and Roy (1985) in mango and Pandey *et al.* (2006) on apple.The least percentage increase in TSS was seen in castor oil (AT1 and CT1) treated guava samples in both ambient and cold temperatures. The findings of this investigation are in conformance with the earlier findings of Panwar (1980) in Ber.The lowest microbial growth and maximum shelf life were seen in guava samples treated with castor oil, aloe vera gel and olive oil in both ambient (13 days) and cold (28 days) temperatures. Considering the disease incidence and decay percentage, the lowest disease incidence and decay percentage in treated guava samples at ambient temperature was observedin castor oil (AT1), followed by aloe vera gel-treated (AT5) treated guava samples and in cold temperature, the lowest disease incidence and decay percentage was observedin castor oil (CT1), aloe vera gel-treated (CT5), and olive oil (CT3) treated guava samples which may be due to the barrier properties of castor oil and olive oil and antimicrobial properties of aloe vera gel.At the end of the storage period (14 days) guava stored at ambient temperature, samples treated with castor oil (AT1) showed the highest percentage of acceptability index followed by aloe vera (AT5) and the least was seen in olive oil treated guava sample (AT3) whereas control (AC), coconut oil (AT2) and refined sunflower oil (AT4) treated guava sample had decayed on the fourteenth day and were unfit for consumption. And at the end of the storage period (28 days) of guava stored at cold temperature, samples treated with castor oil (CT1) showed the highest percentage of acceptability index, followed by aloe vera (CT5).

Conclusion:

It can be concluded that castor oil coating and aloe vera gel coating showed better barrier properties and can be a sustainable alternative in enhancing the postharvest qualities of the guava fruits stored in ambient and cold temperatures and can be a great alternative to synthetic preservatives and toxic chemical treatments used to preserve the fruit.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

References

Bose, T. K., & Mitra, S. K. (2001). *Fruits: Tropical and subtropical* (pp. 610). Calcutta: Nava Udyog Publication.

Anonymous. (2018). *Indian horticulture database*. National Horticulture Board. [https://www.nhb.gov.in](https://www.nhb.gov.in/)

Dattatreya, M. K., Kaushik, P., & Kumar, R. (2012). Evaluation of guava products quality. *International Journal of Food Science and Nutrition Engineering, 2*(1), 7–11. <https://doi.org/10.5923/j.food.20120201.02>

Chen, N., Wei, W., Yang, Y., Chen, L., Shan, W., Chen, J., Lu, W., Kuang, J., & Wu, C. (2024). Postharvest physiology and handling of guava fruit. *Foods, 13*(5), 805. <https://doi.org/10.3390/foods13050805>

Sridevi, P., Bhaskar, V. V., Subbaramamma, P., & Sunnetha, D. R. S. (2018). Effect of aloe vera gel on the physiological, biochemical and quality parameters of pomegranate arils cv. Bhagwa. *International Journal of Current Microbiology and Applied Sciences, 7*(1), 1757–1766. <https://www.ijcmas.com/7-1-2018/P.%20Sridevi%2C%20et%20al.pdf>

Singh, H., Kachway, D. S., Kuschi, V. S., Vikas, G., Kaushal, N., & Singh, A. (2018). *Edible oil coatings prolong shelf life and improve quality of guava (Psidium guajava L.)*. International Journal of Pure and Applied Bioscience, 5, 837–843. <https://www.researchgate.net/profile/DilipSinghKachwaya/publication/318851268_Edible_OilCoatings_Prolong_Shelf_Life_and_Improve_Quality_of_Guava_Psidium_guajava_L/links/598180bd0f7e9b7b524b91b5/Edible-Oil-Coatings-Prolong-Shelf-Life-and-Improve-Quality-of-Guava-Psidium-guajava-L.pdf>

AOAC. (1994). *Official methods of analysis* (16th ed.). Association of Official Analytical Chemists.

Ismail, O. M., Abd El-Moniem, E. A. A., Abd-Allah, A. S. E., & El-Naggar, M. A. A. (2010). Influence of some post-harvest treatments on guava fruits. *Agric. Biol. JN Am*, *1*(6), 1309-1318.

LARMOND, E. 1977. *Laboratory Methods for Sensory Evaluation of Foods*. Canada Department Agric., Publ. 1637, Ottawa

Pandey, G., Verma, M. K., & Tripathi, A. N. (2006). Studies on storage behaviour of apple cultivars. *Indian Journal of Horticulture*, *63*(4), 368-371.

Hassan, I., Khurshid, W., & Iqbal, K. (2012). Factors responsible for decline in guava (*Psidium guajava*) yield. *Journal of Agricultural Research, 50*, 129–134.

Roy, S. K., & Joshi, G. D. (1985, May). An approach to integrated post-harvest handling of mango. In *II International Symposium on Mango 231* (pp. 649-661).

Panwar, J. S. (1980). Pattern of Fruit Drop in Ber (Zizyphus Mauritiana Lamk). Under Arid Condition of Haryana. *Haryana agric. UnilJ. J*, 57-59.