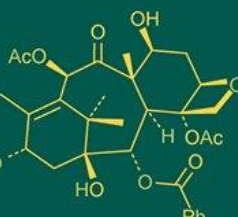
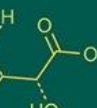
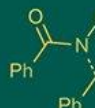


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Extension of shelf life and preservation of postharvest quality of guava (*Psidium guajava* L.) cv. Gwalior-27 using edible oil coatings

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Abstract

Guava (*Psidium guajava* L.) cv. Gwalior-27 is a highly perishable climacteric fruit that undergoes rapid deterioration after harvest, resulting in considerable postharvest losses. The present investigation was conducted to evaluate the effectiveness of different edible oil coatings in extending the shelf life and maintaining the quality of guava fruits under ambient storage conditions. The experiment was laid out in a Completely Randomized Design (CRD) with four treatments comprising sesame oil (T₁), rice bran oil (T₂), sunflower oil (T₃), and an untreated control (T₄), each replicated three times. Observations were recorded at 0, 5, 10 and 15 days of storage for fruit weight, physiological loss in weight (PLW), decay percentage, colour appearance, fruit firmness, fruit softening, total soluble solids (TSS), appearance, texture and overall acceptability. The results revealed that sesame oil (T₁) was the most effective treatment in maintaining postharvest quality. After 15 days of storage, sesame oil-coated fruits recorded the highest fruit weight (116.69g), the lowest physiological loss in weight (19.49%), zero decay (0.00%), highest colour score (6.33), maximum fruit firmness (3.44 kg cm⁻²), highest TSS (11.27 °Brix), and the highest texture and overall acceptability scores (6.33). In contrast, untreated fruits exhibited the lowest fruit weight (100.78 g), highest PLW (27.09), maximum decay (20.27%), lowest firmness (2.75 kg cm⁻²), fruit softening (4.20), lowest TSS (10.35 °Brix), and the poorest texture and overall acceptability scores (2.66). In terms of fruit quality preservation, sunflower oil came in second, followed by rice bran oil. The results show that sesame coating is an easy, affordable, and environmentally responsible postharvest treatment for prolonging the shelf life and maintaining the market quality of guava cv. Gwalior-27 in ambient storage circumstances.

Keywords: Gwalior-27, oil coating, shelf life, storage, sesame oil

Introduction

Guava (*Psidium guajava* L.) belongs to the family of Myrtaceae and is an important tropical and subtropical fruit crop. The fruit is also referred to as the "apple of the tropics" and has gained popularity as the "poor man's apple" due to its widespread availability and affordable price during the season. (Kumari *et al.*, 2020) ^[5]. In the contemporary Indian agricultural landscape, it is the fourth most important fruit crop in area and production after mango, banana and citrus (Vikash *et al.*, 2023) ^[15]. As of year 2023-2024, India continues to dominate global guava production, contributing nearly 45% of the world's total output (DA&FW, 2024). The fruit is also regarded as a nutritional powerhouse, being exceptionally rich in Vitamin C, with concentrations in superior cultivars reaching as high as 239.00 mg per 100 g, along with substantial amounts of Vitamin A, calcium and dietary fiber (Khan *et al.*, 2023) ^[4]. Post-harvest management will always play a vital role in feeding the world. According to a study conducted by Central Institute of Post-Harvest Engineering and Technology (CIPHET) guava suffers maximum post-harvest losses among all fruits and vegetables (Sengar *et al.* 2026) ^[10].

Edible oil coatings are among the post-harvest approaches that can help maintain the quality of fresh fruits. A thin edible oil coating thin protective layer on the fruit surface, reducing moisture loss, slowing respiration and delaying senescence while maintaining the physicochemical quality of fresh produce (Momin *et al.*, 2021).

The guava cultivar Gwalior-27 is an important commercial cultivar cultivated in the Gird region of Madhya Pradesh because of its superior fruit quality, high total soluble solids and suitability for both fresh consumption and processing (Kushwah *et al.*, 2021) [6].

Materials and Methods

The experiment was conducted in January 2026 at the School of Agriculture Science, Experimental Laboratory, Vikrant University, Gwalior, Madhya Pradesh, India. Fresh, healthy and uniform-sized guava (*Psidium guajava* L.) fruits of cultivar Gwalior-27 were selected for the experiment. Four treatments and three replications made up the experiment's Completely Randomized Design (CRD). The treatments included sesame oil (T₁), Rice bran oil (T₂), Sunflower oil (T₃), and control (T₄). After 0, 5, 10, and 15 days of storage, observations were recorded. Fruit weight, physiological loss in weight (PLW), decay percentage, fruit firmness, color, softening, total soluble solids (TSS), and sensory characteristics like appearance, texture, and general acceptability were all assessed.

Preparation of Oil Coating Solutions -

For this study, oil coating solutions will be prepared using different edible oils, including sesame oil, rice bran oil, and sunflower oil. These oils are pure and known for their antimicrobial, antifungal, and antioxidant properties, which are expected to help reduce post-harvest losses and extend the shelf life of guava fruits. Separate emulsions will be prepared for each oil treatment, and all glassware used will be sterilized to prevent contamination. The prepared solutions will be stored in clean, labeled containers and gently stirred before application.

Application of Edible Oil Coatings

The fruits were cleaned with tap water, let to air dry, then using the dipping approach, the respective edible oils were evenly applied to the fruit's surface throughout the experiment. Following the removal of extra oil, the samples were placed on trays and allowed to air dry for half an hour at room temperature (25 ± 2 °C, 65-70% relative humidity) before being stored.

Storage Conditions

All fruits were kept in ambient laboratory conditions for 15 days. Observations were taken at 0, 5, 10, and 15 days of storage.

Fruit Weight (g)

Fruit weight was assessed using a digital balance at every interval. Weight loss was a sign of metabolic activity and moisture loss.

Physiological loss in weight (PLW)

A digital balance was used to weigh each fruit both before storage and during each observation period. PLW was

calculated using the formula as a percentage of the original weight.

$$PLW (\%) = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

Fruit firmness (kg/cm²)

A fruit penetrometer was used to measure it at each storage interval, and the result was expressed as kg cm⁻².

Total soluble solids (TSS)

A hand refractometer was used to measure the fruit juice's total soluble solids, which were then converted to °Brix.

Decay percentage (%)

The number of fruits exhibiting obvious signs of spoiling while being stored was counted, and the result was expressed as a percentage of all the fruits in each treatment.

$$\text{Decay} (\%) = \frac{\text{Number of Decayed Fruits}}{\text{Total Number of Fruits}} \times 100$$

Sensory evaluation

A panel used a 9-point hedonic scale to evaluate color, look, texture, and general acceptability at each storage interval.

Statistical analysis

Treatment means were compared at the 5% level of significance after the experimental data were subjected to analysis of variance (ANOVA) using the Completely Randomized Design.

Results and Discussion

Physical parameters

Fruit weight (g)

Table 1's data indicates that fruit weight progressively decreased among all treatments during storage. However, compared to the untreated control, the decline was significantly less in fruits coated with oil. Sesame oil (T₁) recorded 116.69 g after 15 days, the greatest fruit weight among the treatments, followed by sunflower oil (T₃, 111.01 g) and rice bran oil (T₂, 107.17 g). The untreated fruits had lost the maximum weight by the end of storage, with only 100.78 g left. Improved fruit weight retention in coated fruits suggests that the oil coating slowed the normal ripening metabolic processes and stopped moisture loss from the fruit's surface. Fruit freshness was preserved for a longer amount of time under ambient storage settings thanks to this. Comparable observations were reported by Sengar *et al.* (2026) [10], who found that sesame oil coating reduced moisture loss and improved the storage life of guava and following sunflower oil and rice bran oil results showed that all coating treatments helped in maintaining fruit quality by slowing down deterioration, though there was a general decline in firmness and pectin content across treatments reported by Wijewardana *et al.* (2014) [16].

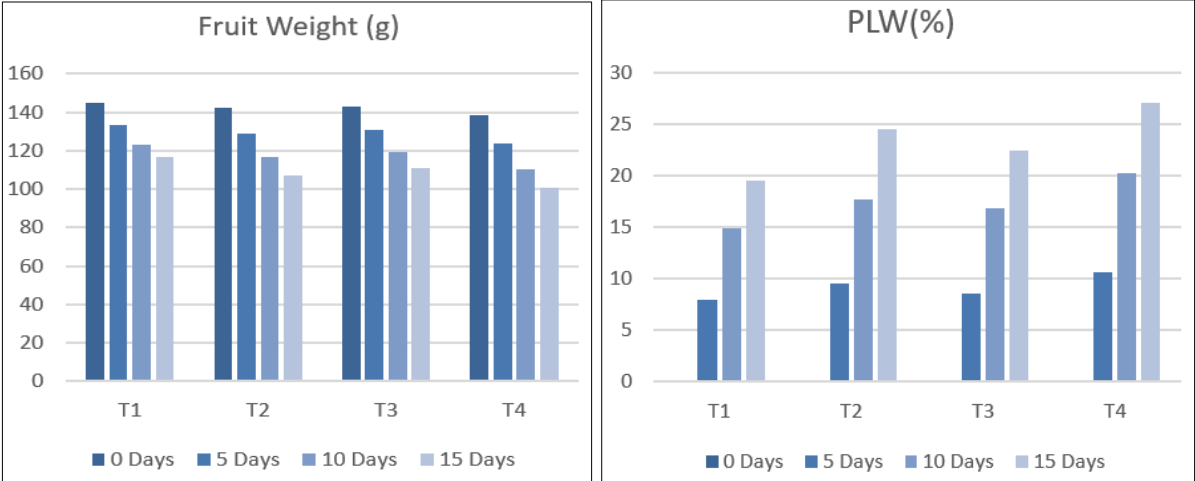
Table 1: Effect of edible oil coatings on fruit weight (g) and physiological loss in weight (%) of guava during storage

Symbol	Treatments	Fruit weight (g)				Physiological Loss in Weight (%)			
		Days after storage				Days after storage			
		0	5	10	15	0	5	10	15
T ₁	Sesame oil	144.94	133.46	123.35	116.69	0.00	7.92	14.89	19.49
T ₂	Rice bran oil	142.07	128.55	116.90	107.17	0.00	9.51	17.72	24.57
T ₃	Sunflower oil	143.16	130.81	119.03	111.01	0.00	8.62	16.85	22.46
T ₄	Control	138.22	123.54	110.12	100.78	0.00	10.62	20.33	27.09
	SEm (±)	0.14	0.19	0.23	0.26	0.00	0.09	0.32	0.15
	C.D. @ 5%	0.42	0.57	0.69	0.78	0.00	0.09	0.32	0.45

Physiological loss in weight (%)

The storage period of all treatments resulted in a progressive increase in physiological weight loss (Table 1). The application of edible oils on fruits resulted in a slower progression of PLW relative to the untreated control. Sesame oil (T₁) recorded the lowest PLW (19.49%) after 15 days of storage, followed by sunflower oil (T₃, 22.46%), and then rice bran oil (T₂), whereas the untreated control (T₄) registered the highest PLW (27.09). The reduced PLW in coated fruits signifies that edible oil coatings successfully minimized moisture evaporation and postponed postharvest decline during ambient storage. Similar observations were

reported by Parmar *et al.* (2023) [8], who found that sesame oil 100% coating significantly reduced physiological loss in weight and improved marketable fruit retention during storage. Varma *et al.* (2022) [13] also reported the lowest physiological loss in weight was noticed in fruits treated with Sunflower oil. Srivastava *et al.* (2019) [12] also reported lower physiological weight loss in chitosan-coated guava due to reduced respiration and transpiration. More recently, Murmu and Mishra (2023) [7] observed that edible vegetable oils formed an effective hydrophobic barrier, thereby reducing transpiration and maintaining postharvest quality of guava fruits.



Decay percentage (%)

The findings in Table 2 revealed that there was no evidence of degradation in any treatment during the 10-day storage duration. After 15 days, fruits that were treated with sesame oil (T₁), rice bran oil (T₂), and sunflower oil (T₃) showed no decay, in contrast to the untreated control (T₄), which had the highest decay rate of 20.27%. The complete lack of deterioration in oil-coated fruits during the storage interval clearly signifies the efficiency of edible oil coatings in retarding microbiological spoiling and upholding marketable quality in ambient environments. Similar findings were reported by Verma *et al.* (2023) [14], who observed reduced decay and improved shelf life in guava fruits treated with edible oilbased coatings. Likewise, Jillela *et al.* (2024) [3] reported that edible oil coatings significantly enhanced the shelf life and quality of guava fruits by reducing physiological losses and maintaining marketable fruit quality during storage. Furthermore, Shanta *et al.* (2023) [11] found that oil-based edible coatings effectively reduced microbial growth and quality deterioration in guava fruits, thereby extending storage life.

Colour appearance

The information displayed in Table 2 indicated that the color score of guava fruits progressively diminished as the

storage duration increased across all treatments. However, the treatments' rates of color change differed considerably. T₁ had the highest color score (8.67, 8.00, 6.33, and 6.33 at 0, 5, 10, and 15 days, respectively), indicating improved green color retention and delayed ripening during storage. Following this was T₃ (8.00, 7.33, 5.33 and 4.67) and T₂ (7.33, 6.33, 4.67 and 3.67), untreated control (T₄) recorded the lowest color scores (6.33, 5.23, 3.66, and 2.66) during the storage period, indicating a quick ripening and loss of green color. The establishment of a thin protective layer on the fruit's surface, which decreased respiration and ethylene production and postponed chlorophyll degradation and the development of yellow color, may be the reason for the greater color retention seen in coated fruits. Additionally, the edible oil coatings served as semi-permeable barriers that reduced moisture loss and slowed the metabolic processes linked to fruit ripening. When sesame oil is applied to the surface of guava fruits to extend their shelf life, the fruits seem more colorful at room temperature because it slows the deterioration of the color's chlorophyll. This is because of reduce the respiration of the fruit and also may be deduce the enzymatic activity. The close findings are Srivastava *et al.* (2019) [12] and El-Gioushy *et al.* (2022) [2].

Table 2: Effect of edible oil coatings on percent decay and colour appearance of guava during storage

Symbol	Treatments	Percent decay				Colour appearance (score)			
		Days after storage				Days after storage			
		0	5	10	15	0	5	10	15
T ₁	Sesame oil	0.00	0.00	0.00	0.00	8.67	8.00	6.33	6.33
T ₂	Rice bran oil	0.00	0.00	0.00	0.00	7.33	6.33	4.67	3.67
T ₃	Sunflower oil	0.00	0.00	0.00	0.00	8.00	7.33	5.33	4.67
T ₄	Control	0.00	0.00	15.65	20.27	6.33	5.23	3.66	2.66
SEm (±)		0.00	0.00	0.03	0.05	0.25	0.28	0.19	0.13
C.D. @ 5%		0.00	0.00	0.10	0.14	0.77	0.82	0.59	0.38

Fruit firmness (kg/cm²)

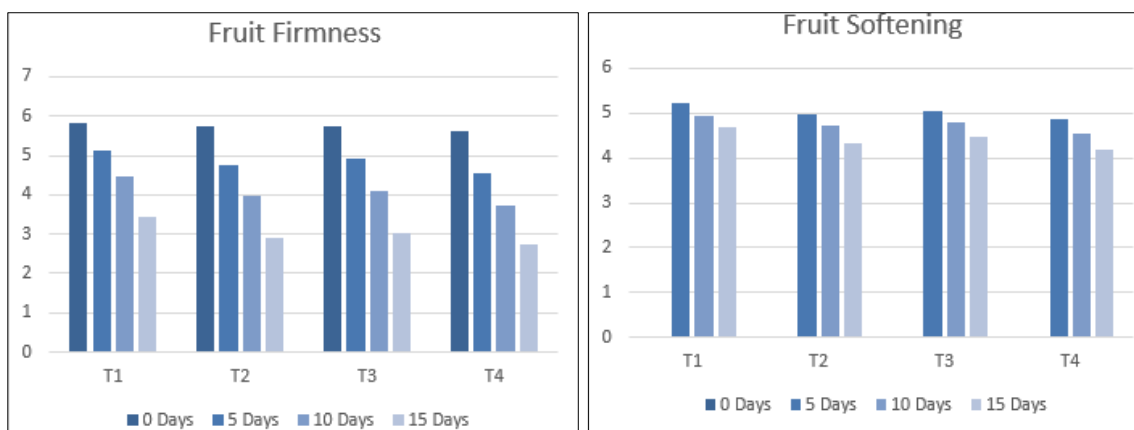
Table 3 shows that fruit firmness steadily decreased as storage progressed across all treatments. However, compared to the untreated control, the reduction was less noticeable in coated fruits. Fruits coated with sesame oil (T₁) maintained the highest hardness during storage, measuring 3.44 kg cm⁻² after 15 days. Sunflower oil (T₃; 3.03 kg cm⁻²) and rice bran oil (T₂; 2.91 kg cm⁻²) came next. At the conclusion of storage, the untreated control (T₄) showed the lowest firmness (2.75 kg cm⁻²). According to these findings, edible oil coatings successfully postponed the softening process and preserved fruit texture while it was stored at room temperature. Reduced respiration and transpiration, which slow the breakdown of cell wall components like pectin and cellulose, may be linked to the coated fruits' greater firmness retention. Edible oil coats help prolong the structural integrity of fruit tissues by postponing ripening who observed better Comparable observations were recorded by Verma *et al.* (2022) ^[14], who found that oil-coated guava fruits retained significantly higher firmness than untreated fruits throughout the storage period.

Fruit softening

During storage, fruit softness gradually increased regardless of the treatments (table 3). However, compared to the untreated control, the increase in oil-coated fruits was relatively slower. After 15 days, sesame oil (T₁) had the highest softening score (4.68), followed by sunflower oil (T₃; 4.47) and rice bran oil (T₂; 4.33). The untreated control (T₄) had the lowest value (4.20), showing rapid degradation and softening. According to the findings, edible oil coatings prolonged the preservation of a suitable texture during storage and postponed fruit softening. The slower rate of fruit softening in coated fruits may be due to delayed ripening and reduced enzymatic breakdown of pectic substances in the cell wall. The semi-permeable coating limits gas exchange, thereby reducing metabolic activity and preserving tissue firmness for a longer duration. Similar observations were reported by Wijewardana *et al.* (2014) ^[16], who found that edible coatings effectively delayed fruit softening and maintained postharvest quality of guava.

Table 3: Effect of edible oil coatings on fruit firmness (kg/cm²) and fruit softening of guava during storage

Symbol	Treatments	Fruit firmness (kg/cm ²)				Fruit Softening (score)			
		Days after storage				Days after storage			
		0	5	10	15	0	5	10	15
T ₁	Sesame oil	5.81	5.11	4.47	3.44	0.00	5.23	4.94	4.68
T ₂	Rice bran oil	5.74	4.76	3.97	2.91	0.00	4.98	4.72	4.33
T ₃	Sunflower oil	5.76	4.92	4.11	3.03	0.00	5.03	4.80	4.47
T ₄	Control	5.62	4.53	3.71	2.75	0.00	4.85	4.55	4.20
SEm (±)		0.57	0.04	0.03	0.04	0.00	0.04	0.05	0.04
C.D. @ 5%		NS	0.12	0.13	0.13	0.00	0.13	0.14	0.15



Chemical Parameter

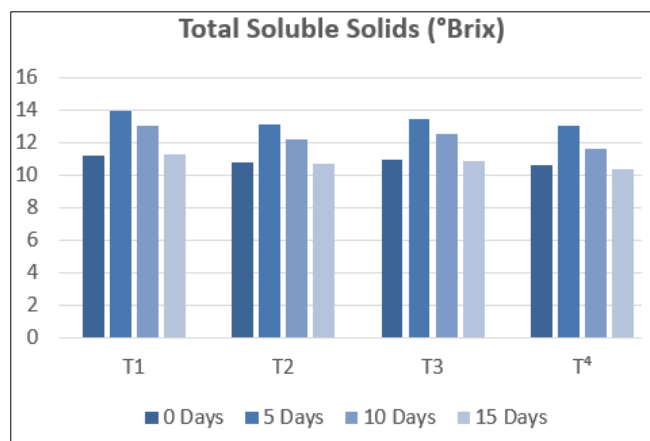
Total Soluble Solids (°Brix)

According to Table 4, guava fruits' Total Soluble Solids (TSS) of guava fruits increased until the fifth day of storage and then gradually declined until the fifteenth day in all treatments. The TSS values varied from 10.78 to 11.22 °Brix at the first stage (0 day), and the variations across treatments were statistically significant. Sesame oil (T₁) had the greatest TSS at five days (13.95 °Brix), followed by sunflower oil (T₃) (13.43 °Brix), while the control (T₄) had the lowest value (13.00 °Brix). On the 10th day, T₁ maintained the highest TSS (13.02 °Brix), followed by T₃

(12.52 °Brix), while the control had the lowest value (11.62 °Brix). This pattern was comparable to the previous one. At the 15th day of storage, T₁ had the highest TSS once more (11.27 °Brix), followed by T₃ (10.87 °Brix), while the control had the lowest value (10.35 °Brix). The conversion of complex carbohydrates into simple sugars during ripening may have contributed to the initial storage period's increase in TSS, but the subsequent fall was most likely brought on by the use of sugars in respiration. Jillela *et al.* (2024) ^[3] also reported that oil-coated guava fruits retained higher TSS and exhibited better postharvest quality during storage.

Table 4: Effect of edible oil coatings on total soluble solids (°Brix) of guava during storage

Symbol	Treatments	TSS (°Brix)			
		Days after storage			
		0	5	10	15
T ₁	Sesame oil	11.22	13.95	13.02	11.27
T ₂	Rice bran oil	10.78	13.13	12.19	10.66
T ₃	Sunflower oil	10.97	13.43	12.52	10.87
T ₄	Control	10.58	13.00	11.62	10.35
SEm (±)		0.05	0.07	0.06	0.05
C.D. @ 5%		0.15	0.21	0.18	0.15



Sensory parameters

Appearance

Table 5 shows that the formation of a thin protective film on the fruit surface by sesame oil may have helped preserve the coated fruits' overall appearance and visual quality by creating a thin protective film on their surface. This layer prevented moisture loss, shriveling, and senescence, preserving the overall visual quality during storage. Untreated fruits, ripened and deteriorated more quickly, losing their appealing aspect. Similar results were reported by Jillela *et al.* (2024) [3], who also found that edible oil coatings successfully preserved guava fruits' postharvest quality and general appearance during storage.

Table 5: Effect of edible oil coatings on appearance of guava during storage

Symbol	Treatments	Appearance			
		Days after storage			
		0	5	10	15
T ₁	Sesame oil	Slight glossy yellow	Light yellow-green with slight loss of freshness	Dull appearance with visible aging symptoms	Poor appearance with noticeable shriveling
T ₂	Rice brain oil	Attractive glossy colour	Fresh yellowish-green and smooth appearance	Good acceptable appearance with slight shrinkage	Good to fair appearance with slight deterioration
T ₃	Sunflower oil	Uniform ripe appearance	Bright attractive yellow colour with good gloss	Best appearance among treatments, still attractive and fresh-looking	Best appearance among treatments, still relatively attractive
T ₄	Control	Normal ripe colour	Dull yellow colour with slight shriveling and less freshness	Poor appearance, dull, shriveled and less marketable	Very poor appearance, shriveled and unmarketable

Texture

After 15 days of storage, sesame oil (T₁) retained the greatest texture score (6.33), followed by sunflower oil (4.67) and rice bran oil (3.67 apiece), while the control had the lowest score (2.66), according to the results shown in Table 6. Reduced moisture loss and delayed tissue breakdown may be linked to better texture retention in coated fruits, which helped maintain fruit firmness throughout storage. Verma *et al.* (2022) [14] observed similar findings, finding that by postponing ripening, edible coatings preserved superior fruit texture. Additionally, Shanta *et al.* (2023) [11] found that during storage, coated guava fruits had substantially higher texture scores than untreated fruits.

Overall acceptability

Table 6 demonstrates that fruits covered with oil maintained noticeably higher scores than the untreated control. After 15 days of storage, the results showed that sesame oil (T₁) had the greatest overall acceptability score (6.33), followed by sunflower oil (T₃) (4.67) and rice bran oil (T₂) (3.67). The control group (T₄) had the lowest score (2.66). Reduced moisture loss, delayed ripening, and greater sensory attribute preservation over the storage period may all contribute to the coated fruits' increased overall acceptability. Similar findings were reported by Patil and Kulkarni (2023) [9], who discovered that wrapped guava fruits were much more widely accepted during storage.

Table 6: Effect of edible oil coatings on texture of guava during storage

Symbol	Treatments	Texture (score)				Overall acceptability (score)			
		Days after storage				Days after storage			
		0	5	10	15	0	5	10	15
T ₁	Sesame oil	8.67	8.00	6.33	6.33	8.67	8.00	6.33	6.33
T ₂	Rice bran oil	7.67	6.33	4.67	3.67	7.33	6.33	4.67	3.67
T ₃	Sunflower oil	8.00	7.33	5.33	4.67	8.00	7.33	5.33	4.67
T ₄	Control	6.33	5.23	3.66	2.66	6.33	5.23	3.66	2.66
SEm (±)		0.27	0.29	0.23	0.12	0.25	0.28	0.20	0.08
C.D. @ 5%		0.81	0.87	0.69	0.36	0.75	0.84	0.60	0.24

Conclusion

The current study showed that under ambient conditions, edible oil coatings successfully extended the storage life and preserved the postharvest quality of guava cv. Gwalior-27. Sesame oil was the most successful treatment because it reduced physiological weight loss and degradation while preserving higher fruit weight, color, firmness, total soluble solids, and sensory quality over the course of storage. Additionally, sunflower oil performed well and came in second to sesame oil. Untreated fruits, on the other hand, shown low marketability, increased weight loss, and quick disintegration. Consequently, sesame oil coating might be suggested as a cost-effective, secure, and eco-friendly postharvest treatment to increase the market quality and shelf life of guava cv. Gwalior-27.

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