Effects of edible coatings on post-harvest shelf-life of tomato fruits.

**Abstract**

*Effect of different edible coatings on shelf life and physio-chemical parameters of tomato (Solanum lycopersicum L.) The experiment was laid out in the Completely Randomized Design with three repetitions. Each repetition was comprised of ten treatments consisting of post-harvest edible coating materials like., Aloe vera gel (10%, 20%, 30%), Beewax (3 %, 6%, 9%), guar gum (1.0 %, 1.5%, 2%) and control (without coating) were used for induced the shelf life of tomato. different physical parameters (shelf-life of tomato fruit, weight loss in fruit, spoilage of the fruit, fruit firmness and sensory quality evaluation (viz., colour, texture, flavour, taste and overall acceptability of tomato fruit were evaluated on the fruit samples. The results found that the tomato fruits coated with 30% aloe vera gel* (T4) *exhibited minimum weight loss and spoilage percentages, maximum firmness and shelf life while the control showed maximum weight loss. Similarly, the maximum sensory evaluation (colour, texture, flavour, taste and overall acceptability)* was also recorded in the *tomatofruits coated with30% aloe vera gel whereas minimum values for these parameters were found in control (*T1 *).*

**Keywords:** Tomato, edible coatings, *Aloe vera*, beewax, guar gum

**INTRODUCTION**

The Solanaceae family includes the tomato (*Solanum lycopersicum* L.), which is the second most widely cultivated horticultural crop in the world after potato. The majority of the world's temperate to tropical climate are where tomato is mostly cultivated (Arah et al., 2015). The global production of tomato in 2024 was reported 188.52 million metric tons over a harvested area of 5.365 million hectare China and India collectively contributed nearly 50% of the total production, (FAO STAT, 2024). The distinctive taste, pleasant aroma, and natural phytonutrients in tomato, which include phenolic compounds, calcium, sodium, copper, vitamin A (900 IU), vitamin C (27 mg per 100g), vitamin B complex, essential amino acids, healthy organic acids like citric, formic, and acetic acids, and carotenoids have made tomato very popular all over the world, (Asensio et al., 2019). The fruit tomato is climacteric, meaning it keeps getting riper even after being harvested (Zapata et al., 2008). However, the fruit's quality may decline and its shelf life may be shortened as a result of the post-harvest ripening process resulting in crop losses between 25 and 75%, the tropics being particularly badly affected. This fruit has limited marketability because of its high degree of perishability which leads to extensive postharvest losses. Edible coating can provide an additional protective coating on fresh fruit and can also give the same effect as modified atmosphere storage in modifying internal gas composition. The concept of using edible coating to extend the shelf life of fresh and minimally processed produce and to protect them from harmful environmental effects has been emphasized based on the need for high quality and the demand for minimal food processing and storage technologies (Tharanathan, 2003).

*Aloe vera* provides many benefits to human health. Composed mostly of polysaccharides, the gel appears to act as a natural barrier to moisture and oxygen which can speed up food deterioration. Gel appears to contain various antibiotic and antifungal compounds that can potentially delay or inhibit microorganisms that are responsible for food-borne illness in humans as well 2 as food spoilage. Recently, there has been increased interest in using *Aloe vera* gel as a functional ingredient in drinks, beverages, and ice cream and as an edible coating material for fruits and vegetables. Gel-based edible coating have been shown to prevent loss of moisture and firmness, control respiratory rate and maturation development, delay oxidative browning and reduce microorganism proliferation. Beewax coating is derived from honeycomb and is produced by honey extraction. Beewax coating dipping is a low-cost, non-hazardous, and easily accessible postharvest treatment that can help to reduce postharvest loss of tomato. Guar gum is a galactomannan-rich flour, a water-soluble polysaccharide obtained from the leguminous Indian cluster bean (*Cyamopsis tetragonoloba* L.) Taub. The backbone of this hydrocolloid is a linear chain of D-Manno pyranose units connected by β-1, 4-bonds linked to galactose residues by 1, 6- bonds forming short side branches.

**MATERIAL AND METHODS**

The present study was conducted during 2022-2023 at Post Harvest Management and Food Processing Laboratory, Department of Horticulture, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior. Climatic conditions of Gwalior is situated at 26.22 North latitude, 78.28 East longitudes and at an altitude of 197.1 m above the mean sea level. Gwalior has a subtropical climate with hot and dry summers (32.5 oC) and cool winter (7.0 oC). tomato fruits at the mature breaker stage and of uniform size were sourced from a local farm in Gwalior. The solutions of various treatments of *Aloe* *vera*, guar gum along with beeswax at different concentrations were prepared in the Department of Horticulture, R.V.S.K.V.V., Gwalior. The experiment consisted of 10 treatments viz., *Aloe vera* (10%,20% and 30%), beewax (3%, 6% and 9 %), guar gum (1%, 1.5% and 2.0%) and control.

For preparation of 10%, 20% and 30 % Aloe vera gel, 100g 200g and 300g *Aloe vera* pulp were dissolved in 1 litre distilled water respectively. For preparation of 3%, 6% and 9 % beewax solution for 30gm, 60gm and 90gm beewax were dissolved with stearic acid and tri-ethanol-amine (TEA) through emulsion in 1 litre distilled water, respectively (Muhammad et al., 2008). For preparation of 1%, 1.5% and 2.0 % Guar gum solution, 10g, 15g and 20g guar gum were dissolved with glycerol in 1 litre distilled water, respectively (Ruelas- Chacon et al., 2017).

After harvesting tomato fruits were washed under running tap water and air dried. Initial parameter, such as weight were recorded before dipping in the solutions. After that the tomato fruits were dipped in the solution for 1 minute as per treatments before being stored at 26oC temperature. The treated fruits were subjected to various physico-chemical observations on 0, 5, 10 and 15 days of storage.

**RESULTS AND DISSCUSSION**

**(A) Physico-chemical Parameters**

**Weight loss in fruit (%)**

The tomato fruits coated with edible coating maintained the loss in weight from 4.55% to 28.85% during 0th to 15th days of storage period, The *Aloe vera* gel, when being applied at 30% significantly minimized the loss in weight, as observed on 0th to 15th days of storage period. The minimum loss in weight was observed in tomato fruits coated with 30% *Aloe vera* gel i.e., 4.55% to 17.64 %, whereas maximum loss was observed in control (without coating) i.e., 6.03% to 28.85% during the same period of storage.

**Table 1: Effect of different edible coating materials on weight loss in fruit (%) of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Weight loss in fruit (%)** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 0.00 | 6.03 | 20.10 | 28.85 |
| T2 | 10% *Aloe vera* gel | 0.00 | 4.86 | 13.20 | 18.58 |
| T3 | 20% *Aloe vera* gel | 0.00 | 4.77 | 12.90 | 18.31 |
| T4 | 30 % *Aloe vera* gel | 0.00 | 4.55 | 10.15 | 17.64 |
| T5 | 3 % Beewax | 0.00 | 5.49 | 19.30 | 22.47 |
| T6 | 6% Beewax | 0.00 | 5.40 | 18.00 | 20.20 |
| T7 | 9 % Beewax | 0.00 | 5.27 | 17.55 | 19.80 |
| T8 | 1% Guar gum | 0.00 | 5.22 | 17.40 | 19.66 |
| T9 | 1.5% Guar gum | 0.00 | 5.09 | 15.95 | 19.26 |
| T10 | 2% Guar gum | 0.00 | 5.00 | 14.65 | 18.99 |
| **S.Em±** | | **0.00** | **0.06** | **0.19** | **0.24** |
| **CD at 5%** | | **NS** | **0.18** | **0.57** | **0.72** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**Spoilage of the fruit (%)**

The spoilage of the fruits (%) was minimum (0, 5.22, 8.27 and 12.85%) under treatment coated with *Aloe vera* gel at 30%, whereas maximum spoilage of the fruits (0, 33.56, 86.18 and 95.47%) was observed under control (without coating) during 0th to 15th days of storage.

**Table 2: Effect of different edible coating materials on spoilage of the fruits (%) of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Spoilage of the fruit (%)** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 0.00 | 33.56 | 86.18 | 95.47 |
| T2 | 10% *Aloe vera* gel | 0.00 | 11.93 | 33.76 | 63.02 |
| T3 | 20% *Aloe vera* gel | 0.00 | 10.73 | 23.22 | 46.73 |
| T4 | 30 % *Aloe vera* gel | 0.00 | 5.22 | 08.27 | 12.85 |
| T5 | 3 % Beewax | 0.00 | 13.35 | 38.74 | 76.38 |
| T6 | 6% Beewax | 0.00 | 12.14 | 32.40 | 50.76 |
| T7 | 9 % Beewax | 0.00 | 11.84 | 15.59 | 20.82 |
| T8 | 1% Guar gum | 0.00 | 12.74 | 31.32 | 67.17 |
| T9 | 1.5% Guar gum | 0.00 | 11.44 | 28.71 | 40.90 |
| T10 | 2% Guar gum | 0.00 | 10.23 | 14.37 | 18.29 |
| **S. Em±** | | **0.00** | **0.16** | **0.38** | **0.63** |
| **CD at 5%** | | **NS** | **0.47** | **1.14** | **1.86** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**Firmness (Kg/cm²)**

Data shows that firmness decreased in all the coating materials with the increase in storage period. It was found to have minimum reduction (28.14, 22.90 ,16.30 and 13.90 Kg/cm²) undercoated with *Aloe vera* gel at 30%, whereas maximum loss in firmness (28.14,15.13,6.10 and 1.94 Kg/cm²) was observed under control (without coating) during 0th to 15th days of storage.

**Table 3: Effect of different edible coating materials on firmness (Kg/cm²) of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Fruit firmness** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 28.14 | 15.13 | 6.10 | 1.94 |
| T2 | 10% *Aloe vera* gel | 28.14 | 22.00 | 14.55 | 13.10 |
| T3 | 20% *Aloe vera* gel | 28.14 | 22.40 | 15.00 | 13.60 |
| T4 | 30 % *Aloe vera* gel | 28.14 | 22.90 | 16.30 | 13.90 |
| T5 | 3 % Beewax | 28.14 | 17.10 | 10.15 | 6.40 |
| T6 | 6% Beewax | 28.14 | 19.70 | 10.90 | 8.30 |
| T7 | 9 % Beewax | 28.14 | 20.60 | 11.20 | 8.50 |
| T8 | 1% Guar gum | 28.14 | 20.40 | 12.65 | 8.90 |
| T9 | 1.5% Guar gum | 28.14 | 21.20 | 12.95 | 10.20 |
| T10 | 2% Guar gum | 28.14 | 21.60 | 13.40 | 10.60 |
| **S. Em±** | | **0.06** | **0.25** | **0.16** | **0.13** |
| **CD at 5%** | | **NS** | **0.75** | **0.46** | **0.38** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**Shelf life**

Among all the different edible coating material imposed, tomato fruits coated with *Aloe vera* gel at 30% recorded significantly highest shelf life of 22.1 days under storage conditions followed by *Aloe vera* gel at 20% (20.4 days), guar gum at 2.0% (19.9 days), beewax at 9 % (19.9 days), guar gum at 1.5% (18.7 days), *Aloe vera* gel at 10% (18.3 days), guar gum at 1.0 % (17.5 days), beewax at 6 % (17.3 days) and beewax at 3 % (16.4 days). However, the lowest shelf life of tomato fruits was observed in control at without coating (11.8 days).

**Table 4: Effect of different edible coating materials on shelf life (days) of tomato at different storage periods**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Treatments** | **Shelf life at room temperature (days)** |
| T1 | Control (without coating) | 11.8 |
| T2 | 10% *Aloe vera* gel | 18.3 |
| T3 | 20% *Aloe vera* gel | 20.4 |
| T4 | 30 % *Aloe vera* gel | 22.1 |
| T5 | 3 % Beewax | 16.4 |
| T6 | 6% Beewax | 17.3 |
| T7 | 9 % Beewax | 19.9 |
| T8 | 1% Guar gum | 17.5 |
| T9 | 1.5% Guar gum | 18.7 |
| T10 | 2% Guar gum | 19.9 |
| **S.Em±** | | **0.44** |
| **CD at 5%** | | **1.32** |

**S.Em –** Standard Error of means, **CD-** Critical Difference. **(B) Sensory parameters**

**Colour**

The results of the colour of all the tomato coated with different edible coating materials are presented in Table 5 The maximum colour sensory scores were recorded in T4 tomato fruits coated with *Aloe vera* gel at 30% (8.5) and T3 (8.3) on the 15th day of the storage and the minimum colour sensory score in T1 (7.0) on the 10th day of the storage.

**Table 5: Effect of different edible coating materials on the sensory score of colour of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Colour** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 8.8 | 7.8 | 7.0 | 6.2 |
| T2 | 10% *Aloe vera* gel | 8.8 | 8.5 | 8.3 | 8.0 |
| T3 | 20% *Aloe vera* gel | 8.8 | 8.6 | 8.5 | 8.3 |
| T4 | 30 % *Aloe vera* gel | 8.8 | 8.7 | 8.6 | 8.5 |
| T5 | 3 % Beewax | 8.8 | 8.0 | 7.3 | 6.6 |
| T6 | 6% Beewax | 8.8 | 8.1 | 7.4 | 6.9 |
| T7 | 9 % Beewax | 8.8 | 8.2 | 7.6 | 7.1 |
| T8 | 1% Guar gum | 8.8 | 8.3 | 7.8 | 7.3 |
| T9 | 1.5% Guar gum | 8.8 | 8.4 | 7.9 | 7.5 |
| T10 | 2% Guar gum | 8.8 | 8.4 | 8.1 | 7.8 |
| **S. Em±** | | **0.06** | **0.08** | **0.08** | **0.09** |
| **CD at 5%** | | **NS** | **0.25** | **0.24** | **0.27** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**Texture**

Table 6 depicts the sensory data of Texture in tomato coated with different edible coating materials during storage periods are shown in Table 7 Data showed that the sensory score of texture in tomato varied significantly at a 5 percent level of significance with the maximum sensory score of texture (T4) tomato coated with Aloe vera gel at 30% (8.2) and the minimum sensory score of texture in (T1) control (6.1) the 15th day of storage.

**Table 6: Effect of different edible coating materials on the sensory score of the texture of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Texture** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 8.5 | 7.6 | 6.8 | 6.1 |
| T2 | 10% *Aloe vera* gel | 8.5 | 8.2 | 8.0 | 7.8 |
| T3 | 20% *Aloe vera* gel | 8.5 | 8.3 | 8.2 | 8.0 |
| T4 | 30 % *Aloe vera* gel | 8.5 | 8.4 | 8.3 | 8.2 |
| T5 | 3 % Beewax | 8.5 | 7.7 | 7.0 | 6.4 |
| T6 | 6% Beewax | 8.5 | 7.8 | 7.2 | 6.6 |
| T7 | 9 % Beewax | 8.5 | 7.9 | 7.4 | 6.8 |
| T8 | 1% Guar gum | 8.5 | 8.0 | 7.5 | 7.1 |
| T9 | 1.5% Guar gum | 8.5 | 8.1 | 7.7 | 7.3 |
| T10 | 2% Guar gum | 8.5 | 8.2 | 7.8 | 7.5 |
| **S.Em±** | | **0.06** | **0.10** | **0.09** | **0.09** |
| **CD at 5%** | | **NS** | **0.29** | **0.27** | **0.26** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**Flavour**

the sensory data of flavour in tomato coated with different edible coating materials during storage periods.

Data showed that the sensory score of flavour in tomato varied significantly at a 5 per cent level of significance with the maximum sensory score of flavour (T4) tomato coated with *Aloe vera* gel at 30% (8.0) and the minimum sensory score of flavour in (T1) control (6.0) the 15th day of storage.

**Table 7: Effect of different edible coating materials on the sensory score of flavour of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Flavour** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 8.2 | 7.3 | 6.6 | 6.0 |
| T2 | 10% *Aloe vera* gel | 8.2 | 8.0 | 7.7 | 7.5 |
| T3 | 20% *Aloe vera* gel | 8.2 | 8.0 | 7.9 | 7.7 |
| T4 | 30 % *Aloe vera* gel | 8.2 | 8.1 | 8.0 | 8.0 |
| T5 | 3 % Beewax | 8.2 | 7.5 | 6.8 | 6.2 |
| T6 | 6% Beewax | 8.2 | 7.5 | 6.9 | 6.4 |
| T7 | 9 % Beewax | 8.2 | 7.6 | 7.1 | 6.6 |
| T8 | 1% Guar gum | 8.2 | 7.7 | 7.2 | 6.8 |
| T9 | 1.5% Guar gum | 8.2 | 7.8 | 7.4 | 7.0 |
| T10 | 2% Guar gum | 8.2 | 7.9 | 7.6 | 7.3 |
| **S.Em±** | | **0.06** | **0.09** | **0.09** | **0.09** |
| **CD at 5%** | | **NS** | **0.28** | **0.27** | **0.25** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.**Taste**

The perusal of data on the effect of different edible coating materials on sensory attributes of the taste of tomato during different storage periods is shown in Table 8. the sensory score of the taste of tomato varied significantly at a 5 percent level of significance. The highest taste score was recorded for (T4) on the 15th day of storage with 8.6 on a 9-point hedonic rating scale. Minimum sensory score of taste in (T1) control (6.8) on the 15th day of storage.

**Table 8: Effect of different edible coating materials on the sensory score of taste of tomato at different storage periods.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Treatments** | **Taste** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 8.9 | 7.9 | 7.1 | 6.5 |
| T2 | 10% *Aloe vera* gel | 8.9 | 8.6 | 8.4 | 8.1 |
| T3 | 20% *Aloe vera* gel | 8.9 | 8.7 | 8.5 | 8.4 |
| T4 | 30 % *Aloe vera* gel | 8.9 | 8.8 | 8.7 | 8.6 |
| T5 | 3 % Beewax | 8.9 | 8.1 | 7.4 | 6.7 |
| T6 | 6% Beewax | 8.9 | 8.2 | 7.5 | 6.9 |
| T7 | 9 % Beewax | 8.9 | 8.3 | 7.7 | 7.2 |
| T8 | 1% Guar gum | 8.9 | 8.4 | 7.9 | 7.4 |
| T9 | 1.5% Guar gum | 8.9 | 8.5 | 8.0 | 7.6 |
| T10 | 2% Guar gum | 8.9 | 8.5 | 8.2 | 7.9 |
| **S.Em±** | | **0.06** | **0.10** | **0.10** | **0.09** |
| **CD at 5%** | | **NS** | **0.30** | **0.29** | **0.27** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**Overall acceptability**

The perusal of data on the effect of different edible coating materials on sensory attributes of the overall acceptability of tomato during different storage periods is shown in Table 9. the sensory score of the overall acceptability of tomato varied significantly at a 5 percent level of significance. The highest overall acceptability score was recorded for T4 on the 15th day of storage with 8.1 on a 9-point hedonic rating scale. Minimum sensory score of overall acceptability in (T1) control (6.3) on the 15th day of storage.

**Table 9: Effect of different edible coating materials on the sensory score of overall acceptability of tomato at different storage periods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No.** | **Treatments** | **Overall acceptability** | | | |
| **0 Days** | **5 Days** | **10 Days** | **15 Days** |
| T1 | Control (without coating) | 8.6 | 7.7 | 6.9 | 6.3 |
| T2 | 10% *Aloe vera* gel | 8.6 | 8.3 | 8.1 | 7.9 |
| T3 | 20% *Aloe vera* gel | 8.6 | 8.4 | 8.3 | 8.1 |
| T4 | 30 % *Aloe vera* gel | 8.6 | 8.5 | 8.4 | 8.3 |
| T5 | 3 % Beewax | 8.6 | 7.8 | 7.1 | 6.5 |
| T6 | 6% Beewax | 8.6 | 7.9 | 7.3 | 6.7 |
| T7 | 9 % Beewax | 8.6 | 8.0 | 7.4 | 6.9 |
| T8 | 1% Guar gum | 8.6 | 8.1 | 7.6 | 7.1 |
| T9 | 1.5% Guar gum | 8.6 | 8.2 | 7.8 | 7.4 |
| T10 | 2% Guar gum | 8.6 | 8.3 | 7.9 | 7.6 |
| **S.Em±** | | **0.06** | **0.10** | **0.09** | **0.09** |
| **CD at 5%** | | **NS** | **0.29** | **0.27** | **0.26** |

**S.Em –** Standard Error of means, **CD-** Critical Difference.

**DISCUSSIONS**

The minimum weight loss in fruit (%) was noted in the treatment (T4) tomatofruit coated withAloe vera gel (30%) and the maximum weight loss in fruit (%) shelf-life was recorded in treatment(T1) (control). The post-harvest treatment of various edible coating materials had effect on the spoilage of the fruit (%). The minimum spoilage of the fruit (%) reduced was found with the treatment (T4) tomatofruits coated withAloe vera gel (30%) and the maximum spoilage of the fruit (%) reduced for these parameters was recorded in the treatment (T1)control, (without coating). The maximum fruit firmness and minimum reduction were found with the treatment (T4) tomatofruits coated withAloe vera gel (30%) and the maximum reduction value for these parameters was recorded in the treatment T1 control, (without coating) with minimum firmness. The maximum shelf-life was recorded in treatment *(*T4) tomatofruits coated withAloe vera gel (30%) and minimum values for these parameters were found in the treatment (T1) control, (without coating) at all the (0th, 5th, 10th and 15th days) storage periods,

The possible reason for reduced weight loss and physiological loss in weight (%) by element treatments influence is due to evaporation and transpiration processes. Coating fruits with Aloe vera significantly reduced weight loss as compared to the control. Fruit firmness of both control and coated tomato decreased gradually during storage. During the ripening process, the cell wall-modifying activity of several enzymes destroys the structural components required for cell wall strengthening and cell adhesion, altering the texture and softening the whole fruit. In similar studies, edible coatings help in extending the life of fruit or vegetable by restricting the rate of respiration and preventing moisture loss (Thirupathi *et al.,* 2006). From the results, it was concluded that the use of *Aloe vera* based edible coating leads to increased tomato shelf-life by Athmaselvi *et al.,* (2013). Tomato covered with an edible coating of guar gum significantly enhanced firmness and reducing weight loss, delayed changes in soluble-solids-content, retarded loss of total acidity, and decreased respiration rate compared with uncoated-control fruit reported by Ruelas-Chacon *et al.,* (2022). The result was supported by the findings Martinez-Romero *et al.,* (2006), Athmaselvi *et al.,* (2013), Hassanpour (2015), Goyal *et al.,* (2017) and Kator *et al.,* (2018).

The post-harvest treatment of edible coating materials influenced different sensory quality evaluations (Colour, texture, flavour, taste and overall acceptability) of tomato fruit. The maximum sensory evaluation in terms of colour, texture, flavour, taste and overall acceptability was recorded in treatment (T4) tomatofruit coated with*Aloe vera* gel (30%) and the minimum value for these parameters was found in control (without coating). Maximum colour, shelf-life was recorded in treatment (T4) tomatofruit coated with*Aloe vera* gel (30%) and the minimum colour score was noted in the treatment T1 control (without control). The post-harvest treatment of different edible coating materials had a statistically significant effect on texture. The maximum fruit texture was found with the treatment (T4) tomatofruit coated with*Aloe vera* gel (30%) and the minimum value for these parameters was recorded in the treatment (T1) (control). The post-harvest treatment of different edible coating materials had a statistically significant effect on flavour. The maximum fruit flavour was found with the treatment (T4) tomatofruit coated with *Aloe vera* gel (30%) and the minimum value for these parameters was recorded in the treatment T1 (control). The post-harvest treatment of different edible coating materials had a statistically significant effect on taste. The maximum fruit taste was found with the treatment (T4) tomatofruit coated with*Aloe vera* gel (30%) and the minimum value for these parameters was recorded in the treatment T1 (control). The post-harvest treatment of different edible coating materials had a statistically significant effect on overall acceptability. The maximum fruit overall acceptability was found with the treatment (T4) tomatofruit coated with*Aloe vera* gel at 30% and the minimum value for these parameters was recorded in the treatment T1 (control).

Tomato has distinctive sensory properties, such as a distinctive umami taste, pleasant aroma, distinctive flavour, and a range of green to red colour depending on ripeness according to Ruelas-Chacon *et al.,* (2017). The effects of edible coatings on the sensory properties of fresh whole tomato have been extensively studied by various researchers. Kumar *et al.,* (2021a) showed that a tomato skin-enhanced chitosan-pullulan composite edible coating exhibited an overall higher acceptability compared to untreated tomato when stored at ambient and cold (4°C) conditions. reported to have been achieved. Not only did this coating effectively improve the sensory properties, the shelf life of tomato extends up to 9th days at 23°C. Previously, Sucheta *et al.,* (2019) showed that tomato coated with a mixture of pectin and cornmeal had better overall flavor scores on a 9-point hedonic scale compared to uncoated samples. *Aloe vera* coated papaya fruits stored at 25°C-29°C and 82-84% relative humidity has greater retention of bright green color than the uncoated fruits, During the storage period the judging panel found that flavor was satisfactory in Aloe vera coated papaya fruits Brishti *et al.,* (2013). The result was supported by the findings of Chrysargyris *et al*., ([2016](https://ifst.onlinelibrary.wiley.com/doi/10.1111/ijfs.15407#ijfs15407-bib-0018)) and Jain *et al.,* (2017)

**CONCLUSION:**

The application of 30% *Aloe vera* gel was found to be the most effective in extending the shelf life of tomato fruits. It significantly reduced weight loss and spoilage percentage, while maintaining fruit firmness and favourable sensory attributes such as colour, texture, flavour, taste, and overall acceptability. Among the different edible coating materials tested, the 30% *Aloe vera* gel coating provided the best shelf life, extending storage up to 22 days. Postharvest application of *Aloe vera* gel at 30% not only improved the shelf life but also preserved the biochemical quality of tomatoes under room conditions, offering a better economic return compared to uncoated fruits. Treatment T4 (tomatoes coated with 30% Aloe vera gel) is recommended as the most effective option, followed by Treatment T10 (tomatoes coated with 2.0% guar gum), for enhancing shelf life and quality retention in tomatoes.

Disclaimer (Artificial intelligence)

Option 1:

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.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

**REFERENCES:**

1. Arah, I. K., Amaglo, H., Kumah, E. K. & Ofori, H. (2015). Preharvest and postharvest factors affecting the quality and shelf life of harvested tomato: a mini review. *International Journal of Agronomy*,
2. Asensio, E., Sanvicente, I., Mallor, C. & Menal-Puey, S. (2019). Spanish traditional tomato. Effects of genotype, location and agronomic conditions on the nutritional quality and evaluation of consumer preferences.
3. Athmaselvi, K. A., Sumitha, P. & Revathy, B. J. I. A. (2013). Development of Aloe vera based edible coating for tomato. *International Agrophysics*, **27**(4).
4. Athmaselvi, K. A., Sumitha, P. & Revathy, B. J. I. A. (2013). Development of Aloe vera based edible coating for tomato. *International Agrophysics*, **27**(4).
5. Brishti F H, Misir, J. and Sarker A. (2013). Effect of biopreservatives on storage life of papaya fruit (*Carica Papaya* L.). *International Journal of Food Studies* **2**:126-136.
6. Chrysargyris, A., Panayiotou, C. & Tzortzakis, N. (2016). Nitrogen and phosphorus levels affected plant growth, essential oil composition and antioxidant status of lavender plant (*Lavandula angustifolia* Mill.). *Industrial Crops and Products*, ***83***, 577-586.
7. FAO. (2022). FAO Statistics data. (2022).
8. Goyal, K., Chawla, A., Grover, P., Prakash, S. and Suneetha, V. (2017). Increasing the shelf life of tomato using *Aloe vera*. *Journal of Biospectracal* **2**:25-27.
9. Hassanpour, H. (2015). Effect of *Aloe vera* gel coating on antioxidant capacity, antioxidant enzyme activities and decay in raspberry fruit. LWT- *Food Science and Technology* **60**:495-501.
10. Jain, S., Singh, A., Ojha, A. and Upadhyay, A. (2017). Effect of pretreatment on quality characteristics of green chillies during storage. *Research Journal of Food and Nutrition*. **1**:1-9.
11. Kator, L., Hosea, Z. Y. & Ene, O. P. (2018). The Efficacy of Aloe-vera coating on postharvest shelf life and quality tomato fruits during storage. *Asian Res. J. of Agric*., **8**(4), 1-9.
12. Kumar, N., Ojha, A., Upadhyay, A., Singh, R. & Kumar, S. (2021). Effect of active chitosan-pullulan composite edible coating enrich with pomegranate peel extract on the storage quality of green bell pepper. *LWT*, *138*, 110435.
13. Martinez- Romero, D., Alburquerque, N., Valverde, J. M., Guillen, F., Castillo, S. and Valero, D. (2006). Postharvest sweet cherry quality and safety maintenance by Aloe vera treatment: a new edible coating. *Postharvest Biology and Technology* **39**:93-100.
14. Muhammad S., Jamar, A., Waheed, Z. and Aisha, I. (2008). Preparation of oil/water of paraffin and bees wax with water. *Journal of Scientific Research*, **8**(8): 2.
15. Ruelas-Chacon, X., Contreras-Esquivel, J. C., Montañez, J., Aguilera-Carbo, A. F., Reyes-Vega, M. L., Peralta Rodriguez, R. D. & Sanchez-Brambila, G. (2017). Guar gum as an edible coating for enhancing shelf-life and improving postharvest quality of roma tomato (*Solanum lycopersicum* L.). *J. of Food Quality*,
16. Ruelas-Chacon, X., Contreras-Esquivel, J. C., Montañez, J., Aguilera-Carbo, A. F., Reyes-Vega, M. L., Peralta Rodriguez, R. D. & Sanchez-Brambila, G. (2017). Guar gum as an edible coating for enhancing shelf-life and improving postharvest quality of roma tomato (*Solanum lycopersicum* L.). *J. of Food Quality*,
17. Sucheta, C., Sharma, N. and Yadav, S. K. (2019). Composite edible coatings from commercial pectin, corn flour and beetroot powder minimize post-harvest decay, reduces ripening and improves sensory liking of tomato. *International Journal of Biological Macromolecules*, **133**: 284-293.
18. Thirupathi, V., Sasikala, S. and John Kennedy, Z. (2006). Preservation of fruits and vegetables by wax coating. In: Science Tech Entrepreneur. NSTEDB, DST. Delhi 1-10 pp.
19. Zapata, P. J., Guillén, F., Martínez‐Romero, D., Castillo, S., Valero, D. & Serrano, M. (2008). Use of alginate or zein as edible coatings to delay postharvest ripening process and to maintain tomato (*Solanum lycopersicon* Mill) quality. *Journal Science Food and Agriculture*, **88**(7), 1287-1293.