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# Effect of edible coatings on shelf life and quality of strawberry (*Fragaria* x *ananassa*) under ambient storage conditions

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**Abstract**
The present investigation entitled "Effect of edible coatings on shelf life and quality of strawberry (*Fragaria* x *ananassa*) under ambient storage conditions" was carried out at College of Horticulture, SKLTSHU, Rajendranagar, Hyderabad during the year 2021-2022. In an attempt to achieve the objective of effect of edible coatings on shelf life of strawberry (*Fragaria* x *ananassa*) the experiment was conducted in Completely Randomized Design in three replications with seven treatments consisting of edible coatings *viz*. Chitosan (0.5%, 1%), *Aloe vera* gel (50%, 100%), Guar gum (1%, 2%) and Control (without any coatings) stored at ambient temperature. Data pertaining to physical and quality parameters were analyzed daily. Fruits treated with Guar gum @ 2% recorded significantly lowest PLW (6.88%), spoilage (16.28%), highest fruit firmness (1.24 kg $cm^{-2}$), minimum TSS (6.07 °Brix), total sugars (4.65%), pH (3.51), maximum titratable acidity (0.78%), brix acid ratio (7.78) and ascorbic acid content (28.45 mg $100g^{-1}$ pulp) on 4$^{th}$ day, at the end of storage. The highest shelf life (4.33 days) was also seen in fruits treated with Guar gum @ 2% followed by Chitosan @ 1% (4.05 days). Being an early and high income giving fruit crop in India, studies on maintaining the postharvest quality of strawberry and extending its shelf life by coating technology has proven to be an effective strategy to increase area and production of strawberry in India.

**Keywords:** Strawberry, surface coatings, chitosan, *Aloe vera* gel, guar gum, edible coatings and shelf life

## Introduction
Strawberry is one of the most important soft fruits. The modern cultivated strawberry (*Fragaria x ananassa*) is a manmade hybrid crop evolved by crossing two species, *Fragaria chiloensis* and *Fragaria virginiana*. It belongs to family Rosaceae. Basically, it is an herbaceous perennial and plant grows predominantly in the temperate climate. It prefers shallow, well drained, loamy soils rich in humus. All the cultivated varieties are octaploid (2n=8x=56). The fruit is widely appreciated for its characteristic aroma, bright red colour, juicy texture and sweetness. It is an excellent source of vitamin C and flavonoids. It is a rich source of minerals and contain anti-cancerous component called ellagic acid. It is also rich source of bioactive compounds, carotene and phenolics. It is suitable for kitchen garden. Compared to other it gives early and high income per unit area (Kumar *et al*., 2012) [6]. It is consumed eiher fresh or in preserves, fruit juices, pies, ice creams, jellies, milkshakes. Strawberry aroma is widely used in many industrialized food products. In India, strawberry is mainly grown in the hilly slopes of Mahabaleshwar (Maharashtra) accounts for about 85% of total strawberry production. It is also cultivated in Himachal Pradesh, Uttar Pradesh, Maharashtra, West Bengal, Haryana, Punjab, Meghalaya and Rajasthan. Since strawberry is a non-climacteric fruit, it should be harvested near full maturity when the quality is acceptable. Hence the fruit has a relatively short shelf life even at low temperatures and extending its marketability after harvest is one of the main challenges. During storage high respiration rate, water loss is more which affects the fresh weight, firmness and appearance of the fruit as well as the market price. Major post harvest problems in strawberry include water loss, shriveling, decay and low shelf life. The term "edible or surface coatings" refers to a thin layer of substance that covers the fruit's surface and can be consumed along with the fruit as a whole. By acting as a barrier between the fruit surface and the atmosphere, the surface coatings used on fruits helps to overcome post harvest problems and increasing their shelf life. *Aloe vera*, Chitosan and Guar gum are some of the most widely used edible coatings.

## Material and Methods

The experiment was conducted at PG Laboratory, College of Horticulture, SKLTSHU, Rajendranagar, Hyderabad during the year 2021-2022. The experiment was conducted in Completely Randomized Design in three replications with seven treatments consisting of three edible coatings *viz.* $T_1$: Chitosan @ 0.5%, $T_2$: Chitosan @ 1%, $T_3$: *Aloe vera* gel @ 50%, $T_4$: *Aloe vera* gel @ 100% and $T_5$: Guar gum @ 1%, $T_6$: Guar gum @ 2%, $T_7$: Control (without edible coatings) in three replications, stored at ambient temperature. Strawberry fruits Cv. Winter dawn used for research were procured from the strawberry farm owned by Ashok kumar rupner in Pragnapur, Gajwel, Medak district, Telangana.

## Results and Discussion

### 1. Physiological loss in weight (PLW) (%)

The effect of surface coatings on physiological loss in weight of strawberry fruits stored at room temperature at different intervals is presented in the Table 1. Physiological loss in weight increased with prolongation of storage in all the treatments. Significant differences observed among all the treatments with respect to PLW. On 1st day, $T_6$- Guar gum (2%) recorded least PLW (2.20) followed by $T_2$- Chitosan (1%) (2.30) and $T_4$- *Aloe vera* gel (100%) (2.45), while highest PLW was recorded in $T_7$- Control (4.35). Similar trend was observed among the treatments with respect to PLW on 2nd and 3rd day respectively. On 4th day, except $T_6$ and $T_2$ other treatments showed the end of shelf life. The treatments $T_6$- Guar gum (2%), $T_2$- Chitosan (1%) recorded PLW 6.88 and 7.35% respectively.

Fruits treated with $T_3$ - Guar gum @ 2% showed the least physiological weight loss during storage when compared to other treatments. Coatings as a semi permeable barrier against oxygen, carbondioxide, moisture and solute movement, thereby reducing respiration, water loss and oxidation reaction rates. The results obtained in the present investigation are in close conformity with Ghosh *et al*. (2014) [4], Dutta *et al*. (2016) [3], Rahimi *et al*. (2018) [10].

### 2. Firmness (kg cm$^{-2}$)

The data on firmness of strawberry fruits treated with edible coatings is presented in the Table 2. There was a significant decrease in firmness of strawberry fruits throughout the storage at ambient conditions. On 1st day, highest firmness was recorded in $T_6$ - Guar gum (2%) (1.38) which was on par with $T_2$ - Chitosan (1%) (1.35) followed by $T_4$- *Aloe vera* gel (100%) (1.31) while lowest firmness was recorded in $T_7$ - Control (1.20). On 4th day, except $T_6$ and $T_2$ other treatments showed the end of shelf life with $T_6$- Guar gum (2%) recorded highest firmness (1.24) and $T_2$- Chitosan (1%) recorded 1.18 kg cm$^{-2}$.

From the results it was observed that highest firmness was observed with fruits treated with $T_6$- Guar gum (2%). Highest firmness may be due to low rate of respiration due to application of edible coatings which slows down the metabolic activity of fruits leading to retension of firmness in fruits. Similar trend is reported by Rahimi *et al*. (2018) [10] in strawberry, Shivani *et al*. (2022) [12] in guava.

### 3. Spoilage (%)

Spoilage per cent of strawberry fruits stored at room temperature treated with edible coatings is presented in the Table 3. Spoilage percent increases throughout the storage period, on 1st day significantly lowest spoilage percent was recorded in $T_6$- Guar gum (2%) (3.23) followed by with $T_2$- Chitosan (1%) (4.25), $T_4$- *Aloe vera gel* (100%) (4.88) and $T_5$- Guar gum (1%) (5.36) while highest spoilage per cent was recorded in $T_7$- Control (10.80). On 4th day, except $T_6$ and $T_2$ other treatments showed the end of shelf life with $T_6$- Guar gum (2%) recorded least spoilage (16.28) followed by $T_2$- Chitosan (1%) (17.65).

Due to the lack of insulating coating, the skin of the fruits got affected by the action of microbes and insect pests which cause the decay or spoilage of the fruits. Here, among all the treatments, fruits treated with $T_6$- Guar gum (2%) showed least spoilage percentage during storage compared to other treatments because this treatment made a balance between insulation and permeability. Similar results were reported by Mani *et al*. (2017) [7]. Coated fruits show least spoilage during storage compared to control, this may be due to low respiration rate and low ethylene synthesis and coating usually helps in forming a barrier between fruit surface and outer atmosphere according to Pranava and singh (2012) [8], Shivani *et al*. (2022) [12], Prashanth *et al*. (2022) [9] at room temperature.

### 4. Shelf life (days)

The data pertaining to the Shelf life of strawberry fruits treated with edible coatings is presented in the Table 4. Highest shelf life was recorded in $T_6$- Guar gum (2%) (4.33) followed by $T_2$- Chitosan (1%) (4.05), $T_4$- *Aloe vera gel* (100%) (3.85) $T_5$- Guar gum (1%) (3.51) while lowest shelf life was recorded in $T_7$- Control (3.13). The treatments $T_1$ and $T_3$ recorded 3.40 and 3.23 respectively. From the results it is revealed that the strawberry fruits had very short shelf life at room temperature due to higher respiration rate, transpiration and microbial spoilage. $T_6$- Guar gum (2%) recorded superior results in maintaining highest shelf life. Edible coatings reduce shrinkage by reducing loss of moisture, transpiration and respiration losses and there by retains freshness of fruits. The present results are in conformity with findings of Chahal and Bal (2003) [2], Ghosh *et al*. (2014) [4] in tomato, Dutta *et al*. (2016) [3] in ber, Prashanth *et al*. (2022) [9] in dragon fruit.

### 5. Total soluble solids (°Brix)

The effect of edible coatings of strawberry on total soluble solids is presented in the Table 5. The total soluble solids (TSS) content of the fruits showed an increasing trend during storage period and later declined. On 1st day of storage minimum TSS was recorded in $T_6$- Guar gum (2%) (5.71) on par with $T_2$- Chitosan (1%) (5.74) followed by $T_4$- *Aloe vera gel* (100%) (5.80) while maximum TSS was recorded in $T_7$- Control (6.15). Treatments $T_6$- Guar gum (2%) and $T_2$- Chitosan (1%) recorded TSS 6.07 and 6.13% respectively at the end of the storage period.

Total soluble solids content increases during ripening due to the activity of hydrolyzing enzyme that release sugars from insoluble polysaccharides. Fruits treated with Guar gum (2%) recorded minimum TSS %. The lower accumulation of TSS in Guar gum coated fruits during storage reduced the activity of hydrolyzing enzymes, metabolic activity, respiration rate and limited gas exchange, which could delay the nutrient decomposition (Jodhani *et al*., 2019) [5]. Similar results are reported by Ghosh *et al*. (2014) [4] in tomato.

**6. Titrable Acidity (%)**

Impact of edible coatings on titrable acidity of strawberry stored at room temperature is presented in the Table 6. The titrable acidity had decreased in all the treatments during storage. Among the treatments, significantly maximum titrable acidity (0.78%) was recorded in Guar gum (2%) followed by Chitosan (1%) (0.71%) while minimum titrable acidity in control (0.41%) at the end of storage. Reduction in the acidity of fruit may be because of the reduced conversion of organic acid in the sugars and their further utilization into the metabolic activity of the fruit (Jodhani *et al*., 2019) [5]. Fruits treated with Guar gum (2%) maintain maximum titrable acidity during storage till the end of shelf life. Similar results are reported by Ghosh *et al*. (2014) [4].

**7. Total sugars (%)**

The effect of surface edible coatings on total sugars in strawberry fruits is presented in the Table 7. An increase in total sugars was found in the fruits during storage regardless of coated and uncoated. Initially total sugars increases along with storage period and later it starts declined at the end of shelf life. On 1st day, minimum total sugars was recorded in $T_6$- Guar gum (2%) (4.49), followed by $T_2$- Chitosan (1%) (4.57), $T_5$ - Guar gum (1%) (4.63) while maximum total sugars were recorded in $T_7$ – Control (5.12). At the end of the storage period $T_6$- Guar gum (2%) recorded minimum total sugars (4.65) followed by $T_2$- Chitosan (1%) (4.71).

Edible coatings act as a gas barrier and reduce oxygen uptake by the fruit which in turn slow down respiration rate. The total sugars content increased during the storage period in all treatments. The raise in sugars may be due to conversion of starch into sugars while later the decrease was due to consumption of sugars for respiration during storage. Similar observation was reported by Ramchandra and Ashok (1997) [11] in ber, Velickova *et al*. (2013) [13] in strawberry.

**8. Ascorbic acid (mg 100g$^{-1}$ pulp)**

Ascorbic acid content of strawberry influenced by edible coatings under ambient conditions is presented in the Table 8.The ascorbic acid content had decreased with storage period regardless of the treatments and differed significantly. Among the treatments, significantly maximum ascorbic acid content (28.45 mg 100g$^{-1}$ pulp) was retained in Guar gum (2%) followed by Chitosan (1%) (26.78 mg 100g$^{-1}$ pulp) at the end of storage and minimum was recorded in $T_7$- Control (16.54%). The decrease trend of ascorbic acid may be due to increase in total soluble sugars in the fruits. Similar observation was obtained by (Rahimi *et al*., 2018) [10] in strawberry, Ghosh *et al*. (2014) [4] in tomato.

**9. pH**

The influence of surface edible coatings on pH of strawberry is presented in the Table 9. The pH of fruits increased along with the storage period. On 1st day of storage least pH was recorded in $T_6$- Guar gum (2%) (3.06), followed by $T_2$- Chitosan (1%) (3.15) while highest was recorded in $T_7$- Control (3.63). On 4th day $T_6$ - Guar gum (2%) recorded least pH (3.51) followed by $T_2$- Chitosan (1%) (3.69).

An increase in the pH of fruits could be due to the loss of organic acids and also due to various biochemical activities in the fruit. The edible coating-treated fruits showed less change in pH, which can be associated to the maintained level of organic acids due to the reduction in biochemical activities (Jodhani *et al*., 2019) [5]. Guar gum (2%) had significant effect in maintaining lower pH in strawberries. Similar observation was reported by Rahimi *et al*. (2018) [10] and Baraiya *et al*., (2012) [1].

**10. Brix acid ratio**

Effect of surface edible coatings on brix acid ratio of strawberry is presented in the Table 10. The brix acid ratio values increased with the storage period at room temperature. Among the treatments, significantly lowest brix acid ratio (7.78) was recorded in guar gum (2%) followed by chitosan (1%) (8.63) and highest brix acid ratio was observed in control (16.46) at ambient conditions.

**Table 1:** Effect of edible coatings on physiological loss in weight (%) of strawberry under ambient conditions.

| Treatments | PLW (%) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| $T_1$ : Chitosan (0.5%) | 2.66 | 4.78 | 6.75 | * |
| $T_2$ : Chitosan (1%) | 2.30 | 4.21 | 6.02 | 7.35 |
| $T_3$ : *Aloe vera* gel (50%) | 2.75 | 4.97 | 6.98 | * |
| $T_4$ : *Aloe vera* gel (100%) | 2.45 | 4.43 | 6.27 | * |
| $T_5$ : Guar gum (1%) | 2.51 | 4.66 | 6.51 | * |
| $T_6$ : Guar gum (2%) | 2.20 | 3.85 | 5.72 | 6.88 |
| $T_7$ : Control (without edible coating) | 4.35 | 8.54 | 11.85 | * |
| S.Em± | 0.01 | 0.04 | 0.07 | 0.12 |
| CD at 5% | 0.04 | 0.12 | 0.22 | 0.37 |

* End of shelf life

**Table 2:** Effect of edible coatings on firmness (kg cm$^{-2}$) of strawberry under ambient conditions.

| Treatments | Firmness (kg cm$^{-2}$) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| $T_1$ : Chitosan (0.5%) | 1.25 | 1.21 | 1.07 | * |
| $T_2$ : Chitosan (1%) | 1.35 | 1.30 | 1.25 | 1.18 |
| $T_3$ : *Aloe vera* gel (50%) | 1.23 | 1.18 | 1.03 | * |
| $T_4$ : *Aloe vera* gel (100%) | 1.31 | 1.28 | 1.12 | * |
| $T_5$ : Guar gum (1%) | 1.28 | 1.26 | 1.21 | * |
| $T_6$ : Guar gum (2%) | 1.38 | 1.32 | 1.27 | 1.24 |
| $T_7$ : Control (without edible coating) | 1.10 | 0.85 | 0.56 | * |
| S.Em± | 0.015 | 0.017 | 0.016 | 0.007 |
| CD at 5% | 0.045 | 0.051 | 0.047 | 0.022 |

* End of shelf life

**Table 3:** Effect of edible coatings on spoilage (%) of strawberry under ambient conditions.

| Treatments | Spoilage (%) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| T1 : Chitosan (0.5%) | 5.50 | 14.25 | 30.85 | * |
| T2 : Chitosan (1%) | 4.25 | 11.35 | 14.85 | 17.65 |
| T3 : *Aloe vera gel* (50%) | 5.68 | 15.17 | 34.14 | * |
| T4 : *Aloe vera gel* (100%) | 4.88 | 13.32 | 25.55 | * |
| T5 : Guar gum (1%) | 5.36 | 12.15 | 22.94 | * |
| T6 : Guar gum (2%) | 3.23 | 8.52 | 13.67 | 16.28 |
| T7 : Control (without edible coating) | 10.80 | 28.15 | 58.71 | * |
| S.Em± | 0.14 | 0.25 | 0.37 | 0.07 |
| CD at 5% | 0.43 | 0.76 | 1.12 | 0.21 |

* End of shelf life

**Table 4:** Effect of edible coatings on shelf life (days) of strawberry under ambient conditions.

| Treatments | Shelf life (days) |
|---|---|
| T1 : Chitosan (0.5%) | 3.40 |
| T2 : Chitosan (1%) | 4.05 |
| T3 : *Aloe vera gel* (50%) | 3.23 |
| T4 : *Aloe vera gel* (100%) | 3.85 |
| T5 : Guar gum (1%) | 3.51 |
| T6 : Guar gum (2%) | 4.33 |
| T7 : Control (without edible coating) | 3.13 |
| S.Em± | 0.13 |
| CD at 5% | 0.38 |

**Table 5:** Effect of edible coatings on total soluble solids (°Brix) of strawberry under ambient conditions.

| Treatments | Total soluble solids (°Brix) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| T1 : Chitosan (0.5%) | 5.93 | 6.12 | 6.45 | * |
| T2 : Chitosan (1%) | 5.74 | 5.89 | 6.18 | 6.13 |
| T3 : *Aloe vera gel* (50%) | 6.02 | 6.25 | 6.52 | * |
| T4 : *Aloe vera gel* (100%) | 5.80 | 5.96 | 6.25 | * |
| T5 : Guar gum (1%) | 5.87 | 6.05 | 6.36 | * |
| T6 : Guar gum (2%) | 5.71 | 5.85 | 6.11 | 6.07 |
| T7 : Control (without edible coating) | 6.15 | 6.41 | 6.75 | * |
| S.Em± | 0.019 | 0.016 | 0.017 | 0.009 |
| CD at 5% | 0.057 | 0.048 | 0.051 | 0.029 |

* End of shelf life

**Table 6:** Effect of edible coatings on titratable acidity (%) of strawberry under ambient conditions.

| Treatments | Titratable acidity (% ) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| T1 : Chitosan (0.5%) | 0.82 | 0.75 | 0.62 | * |
| T2 : Chitosan (1%) | 0.94 | 0.86 | 0.81 | 0.71 |
| T3 : *Aloe vera gel* (50%) | 0.76 | 0.71 | 0.56 | * |
| T4 : *Aloe vera gel* (100%) | 0.90 | 0.83 | 0.76 | * |
| T5 : Guar gum (1%) | 0.86 | 0.80 | 0.72 | * |
| T6 : Guar gum (2%) | 0.98 | 0.91 | 0.85 | 0.78 |
| T7 : Control (without edible coating) | 0.61 | 0.50 | 0.41 | * |
| S.Em± | 0.012 | 0.009 | 0.013 | 0.010 |
| CD at 5% | 0.035 | 0.028 | 0.039 | 0.030 |

* End of shelf life

**Table 7:** Effect of edible coatings on total sugars (%) of strawberry under ambient conditions.

| Treatments | Total sugars (%) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| T1 : Chitosan (0.5%) | 4.79 | 4.93 | 5.09 | * |
| T2 : Chitosan (1%) | 4.57 | 4.73 | 4.84 | 4.71 |
| T3 : *Aloe vera gel* (50%) | 4.87 | 5.01 | 5.16 | * |

| | | | | |
|---|---|---|---|---|
| $T_4$ : *Aloe vera gel* (100%) | 4.64 | 4.81 | 4.93 | * |
| $T_5$ : Guar gum (1%) | 4.63 | 4.77 | 4.90 | * |
| $T_6$ : Guar gum (2%) | 4.49 | 4.60 | 4.74 | 4.65 |
| $T_7$ : Control (without edible coating) | 5.12 | 5.40 | 5.97 | * |
| S.Em± | 0.015 | 0.016 | 0.019 | 0.012 |
| CD at 5% | 0.046 | 0.048 | 0.056 | 0.035 |

* End of shelf life

**Table 8:** Effect of edible coatings on ascorbic acid (mg $100g^{-1}$ pulp) of strawberry under ambient conditions.

| Treatments | Ascorbic acid (mg $100g^{-1}$ pulp) | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| $T_1$ : Chitosan (0.5%) | 32.34 | 29.65 | 25.45 | * |
| $T_2$ : Chitosan (1%) | 36.81 | 35.24 | 29.87 | 26.78 |
| $T_3$ : *Aloe vera gel* (50%) | 30.21 | 28.32 | 19.21 | * |
| $T_4$ : *Aloe vera gel* (100%) | 36.04 | 33.17 | 32.04 | * |
| $T_5$ : Guar gum (1%) | 34.27 | 31.05 | 27.58 | * |
| $T_6$ : Guar gum (2%) | 37.83 | 35.87 | 32.26 | 28.45 |
| $T_7$ : Control (without edible coating) | 26.68 | 21.26 | 16.54 | * |
| S.Em± | 0.33 | 0.29 | 0.25 | 0.28 |
| CD at 5% | 1.01 | 0.89 | 0.75 | 0.86 |

* End of shelf life

**Table 9:** Effect of edible coatings on pH of strawberry under ambient conditions.

| Treatments | pH | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| $T_1$ : Chitosan (0.5%) | 3.36 | 3.47 | 3.61 | * |
| $T_2$ : Chitosan (1%) | 3.15 | 3.29 | 3.38 | 3.69 |
| $T_3$ : *Aloe vera gel* (50%) | 3.45 | 3.66 | 3.73 | * |
| $T_4$ : *Aloe vera gel* (100%) | 3.22 | 3.34 | 3.49 | * |
| $T_5$ : Guar gum (1%) | 3.29 | 3.40 | 3.53 | * |
| $T_6$ : Guar gum (2%) | 3.06 | 3.18 | 3.26 | 3.51 |
| $T_7$ : Control (without edible coating) | 3.63 | 3.85 | 4.15 | * |
| S.Em± | 0.012 | 0.014 | 0.017 | 0.011 |
| CD at 5% | 0.035 | 0.043 | 0.052 | 0.033 |

* End of shelf life

**Table 10:** Effect of edible coatings on Brix acid ratio of strawberry under ambient conditions.

| Treatments | Brix acid ratio | | | |
|---|---|---|---|---|
| | Days after storage | | | |
| | 1st Day | 2nd Day | 3rd Day | 4th Day |
| $T_1$ : Chitosan (0.5%) | 7.23 | 8.16 | 10.40 | * |
| $T_2$ : Chitosan (1%) | 6.10 | 6.84 | 7.62 | 8.63 |
| $T_3$ : *Aloe vera gel* (50%) | 7.92 | 8.80 | 11.64 | * |
| $T_4$ : *Aloe vera gel* (100%) | 6.44 | 7.18 | 8.22 | * |
| $T_5$ : Guar gum (1%) | 6.82 | 7.56 | 8.83 | * |
| $T_6$ : Guar gum (2%) | 5.82 | 6.42 | 7.18 | 7.78 |
| $T_7$ : Control (without edible coating) | 10.08 | 12.82 | 16.46 | * |
| S.Em± | 0.11 | 0.08 | 0.11 | 0.08 |
| CD at 5% | 0.34 | 0.26 | 0.33 | 0.25 |

* End of shelf life

## Conclusion

Based on the results obtained from the present investigation, it can be concluded that edible coatings found to have influence on the shelf life and quality of strawberry. With respect to the edible coatings Guar gum (2%) was best compared to all other treatments, recorded significantly superior results concerning all physical, biochemical characters and shelf life of strawberry.

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