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Studies on effect of different surface coatings on shelf life and quality of fig (*Ficus carica* L.) Cv. Brown Turkey

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Abstract
The present investigation entitled "Effect of different surface coatings on shelf life and quality of Fig (*Ficus carica* L.) cv. Brown turkey" was carried out at College of Horticulture, SKLTSHU, Rajendranagar, Hyderabad. In an attempt to achieve the objective of effect of surface coatings on the shelf life and quality of Fig (*Ficus carica* L.) cv. Brown turkey". The experiment was conducted in Completely Randomized Design in three replications with ten treatments consisting of three edible coatings at three concentrations each and control (without coatings) *viz*., T_1:Honey: (5%), T_2:Honey: (10%), T_3:Honey: (15%), T_4:Chitosan: (0.5%), T_5:Chitosan: (1%), T_6:Chitosan: (1.5%), T_7:*Aloe vera*: (25%), T_8:*Aloe vera*: (33.3%), T_9:*Aloe vera*: (50%), T_{10}: Control. The fruits used in all the treatments are stored at ambient conditions and the physical and quality parameters are analysed daily. Among all the treatments T_5: Chitosan: (1%) have shown the found significantly best results in terms of minimum PLW (22.01%), decay percentage (30.67%), highest shelf life (5.86 days), firmness (1.87 kg/cm^2), Surface colour measurement (1.76 DA meter value) and quality parameters namely TSS (15.78 ^{o}Brix), Titrable acidity (0.13%), Total sugars (16.48%), Reducing sugars (14.70%), Non-reducing sugars (1.43%), Brix: acid ratio (141.99) and benefit cost ratio (1.67) at the end of the experiment, followed by T_9 - *Aloe vera* gel (50%) and T_9 - chitosan (0.5%).

Keywords: Fig, surface coatings, chitosan, *Aloe vera* gel, honey, edible coatings and shelf life

Introduction
Fig (*Ficus carica* L.) belongs to family Moraceae. It is moderate sized deciduous tree in subtropics but performs as evergreen in tropics. Branches are irregular, shoots develop at the base of trunk, leaves are very broad, ovate and long stalked. Fruits are mostly long stalked, pear shaped with a velvety or glabrous skin, yellow, brown, purplish or black in colour. Fig is a multiple fruit, botanically known as 'Syconium' which consists of hollow receptacle with a narrow aperture at the tip and numerous small tiny fruits lining in inner surface. Fig is one among the oldest fruit crops known to the mankind, very much associated with the ancient culture of east Mediterranean region. It is originated in southern parts of Arabian Peninsula. Cultivation of fig was first reported in southern parts of Arabia during 3000 BC. According to Telangana State Rythu Samagra Samachara Sekarana 2021-2022 [25], the area under fig cultivation in Telangana is around 277.24 acres with Jogulamba Gadwal District leading with production of 674.03 MT in an area of 96.29 Acres. In India Maharashtra, Gujarat, Uttar Pradesh, Karnataka and Tamil Nadu are the major fig cultivating States. Figs are wholesome, nutritious and delicious fruits having very promising health benefits *viz*., improves digestion by decreasing constipation and aids in managing blood fat and sugar level in the body. It has potential to kill cancer cells. Fresh fruits have 85% pulp and 15% skin. Fruits have high calorific value (74 k calories/100 grams) and rich in protein, calcium, iron and fiber. Surface portion of dried fig contains proteins (4 g), carbohydrate (69 g), fat (1 g), calcium (200 mg), iron (4 mg), vitamin A (100 IU) and thiamine (0.1mg). Total sugar content of fresh fruit is 16% while dried one is 52%. Fruit has many dietary and medicinal properties. They are used as a laxative and in treatment of skin infections (Chadha, 2001) [4].

Material and Methods
The experiment was conducted at PG Laboratory, College of Horticulture, Rajendranagar, Hyderabad during the year 2019-2020. Rajendranagar falls under arid sub-tropical climatic zone with an average rainfall of 800 mm at an altitude of 542.3 m above mean sea level on 17°20.092' N latitude and 78°24.5144' E longitude.

It experiences hot dry summers and mild winters. The experiment was laid in completely randomized block design with 10 treatments 3 replications *viz*., T_1: Honey: (5%), T_2: Honey: (10%), T_3: Honey: (15%), T_4: Chitosan:(0.5%), T_5: Chitosan: (1%), T_6: Chitosan: (1.5%), T_7: *Aloe vera*: (25%), T_8: *Aloe vera*: (33.3%), T_9: *Aloe vera*: (50%) and T_{10}: Control in three replications. Fig (*Ficus carica* L.) Cv. Brown turkey, fruits used for research were procured from the orchard in Jogulamba Gadwal district of Telangana.

Preparation of *Aloe vera* gel

Fresh *Aloe vera* leaves collected from Medicinal and Aromatic Plants Research Station were washed to remove the dust, *Aloe vera* gel matrix was separated from the outer cortex of leaves using knife and then the colourless hydro parenchyma was grinded in a blender and strained through muslin cloth to remove thick particles. Now the optimized *Aloe vera* gel (*Aloe vera* juice mixed with 1.5% pectin at 60°C for gelation) was taken in three different concentrations *i.e*., 1:1(200 ml of *Aloe vera* gel: 200 ml of water), 1:2 (133.3 ml of *Aloe vera* gel: 266.6 ml of water) and 1:3 (100 ml of *Aloe vera* gel: 300 ml of water) with distilled water in decreasing concentration of *Aloe vera* gel (Padmaja and Bosco, 2014) [14] then the Fig fruits were dipped in the solution for one minute and dried for two hours in ambient conditions.

Preparation of chitosan solution

To prepare 100 ml of 0.5%, 1.0% and 1.5% chitosan solution, 0.5, 1.0 and 1.5 g of chitosan, respectively was dissolved in 75 ml of distilled water added with 2 ml of glacial acetic acid. The mixture was heated with continuous stirring (55°C and 500 rpm) for proper dissolution of chitosan. The final pH of the solution was adjusted to 5.6 with 2N NaOH and volume was made up to 100 mL with sterilized distilled water (Jiang and Li, 2001) [8] then the Fig fruits were dipped in the solution for one minute and dried for two hours at ambient conditions.

Preparation of honey solution

Food grade honey was purchased from Dabur India Limited and 5%, 10%, and 15% honey solution was prepared in auto claved distilled water by vigorous stirring for twenty minutes with magnetic stirrer then the Fig fruits were dipped in the solution for one minute and dried for two hours in ambient conditions.

Method of application of treatments

Fresh and fully matured uniform sized and disease-free fig fruits were washed with tap water to remove the dirt and dust particles and dried at ambient conditions. The dipping treatment of surface coatings to all the samples was done at ambient conditions and stored at ambient conditions for conduction of first experiment. The analysis of the fruits was done at daily interval.

Results and Discussion

1. Physiological loss in weight (%)

The data on physiological loss in weight of fig fruits treated with surface coatings presented in the Table 1. The percentage of PLW values showed an increasing trend from 1st day to 5th day at room conditions. There was a significant difference observed among all the treatments with respect to PLW. On 1stday, T_5 - Chitosan (1%) recorded least PLW (6.83) which was on par with T_9 -*Aloe vera* @ 50% (7.27), followed by T_4 - Chitosan @0.5% (7.58), T_8 - *Aloe vera* @ 33.3% (8.49), T_7 - *Aloe vera* @ 25% (9.79) and T_6 - Chitosan @ 1.5% (10.04), while highest PLW was recorded in T_{10} - Control (14.07). Similar trend was observed among the treatments with respect to PLW on 2nd, 3rd and 4th day, On 5th day, except T_4, T_5, T_7, T_8 and T_9 other treatments showed the end of shelf life. With T_5 - Chitosan (1%) recorded least PLW (22.01) followed by T_9 - *Aloe vera* @ 50% (22.76) and highest PLW was recorded in T_7 - *Aloe vera* @ 25% (23.71). Among all the treatments, fruits treated with chitosan (1%) showed minimum loss in physiological weight during storage compared to other treatments as chitosan coating reduces the water loss and respiration rate of fruits during storage by acting as a protective layer between fruit surface and atmosphere. The results obtained in the present investigation are in close conformity with Manpreet *et al.* (2009) [10]. During storage, irrespective of treatments physiological loss in weight of fruits increased with the storage period. This might be attributed to loss of moisture due to evapotranspiration and respiration from the fruits during storage. Similar results were also observed by (Saran *et al*., 2004) [22], (Randhawa *et al*., 2009) [18], (Manpreet *et al*. 2009) [10] and (Singh *et al*. 2013) [23].

2. Decay (%)

The data on decay percentage of fig fruits treated with surface coatings is presented in the Table 2. Decay percent increases throughout the storage period, on 1st day significantly lowest decay percent was recorded in T_5 - Chitosan (1%) (1.69) which was on par with T_9 - *Aloe vera* @ 50% (2.15), followed by T_4 - Chitosan @ 0.5% (3.35), T_8 - *Aloe vera* @ 33.3% (3.98), T_7 - *Aloe vera* @ 25% (4.40) and T_6 - Chitosan @ 1.5% (5.09), while highest decay per cent was recorded in T_{10} - Control (11.88), Similar trend was observed among the treatments 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan (1%) recorded lowest decay per cent (30.67) and was on par with T_9 - *Aloe vera* @ 50% (31.94) and highest decay per cent was recorded in T_8 - *Aloe vera* @ 33.3% (41.22). Among all the treatments, fruits treated with T_5 - Chitosan (1%) showed least decay percentage in fruits during storage compared to other treatments. Chitosan has broad spectrum anti-microbial activity thereby it could control post-harvest decay of the fruits. These findings are in the accordance with the results of Bautista Banos *et al*. (2005) [2]; Meng *et al*. (2008) [11]; Pandey and Singh (2012) [15].

3. Shelf life (days)

The data on shelf life of fig fruits treated with surface coatings is presented in the Table 3. Highest shelf life was recorded in T_5 - Chitosan (1%) (5.86), followed by T_9: *Aloe vera*: (50%) (5.72), T_4 - Chitosan @0.5% (5.48), T_8 - *Aloe vera* @ 33.3% (5.36), T_7 - *Aloe vera* @ 25% (5.19), T_6: Chitosan: (1.5%) (4.80) and T_3: Honey: (15%) (4.46), while the lowest shelf life was recorded in T_{10} - Control (3.12). From the results, it is observed that T_5 - Chitosan (1%) recorded best results in maintaining highest shelf life. High molecular weight of chitosan enhanced the storability of fig by efficiently delaying the reduction of fresh weight. The present results are in conformity with the findings of Sandeep and Bal (2003) [21], Sabir and Sabir (2009) [20]; Romanazzi *et al*. (2009) [19].

4. Firmness (kg/cm^2)

The data on firmness of fig fruits treated with surface coatings is presented in the Table 4. Firmness of fig fruits showed decreasing tendency with increase in storage period. On 1st day, highest firmness was recorded in T_5 - Chitosan (1%) (3.89) which was on par with T_9 - *Aloe vera* @ 50% (3.76), followed by T_7 - *Aloe vera* @ 25% (3.64), T_4 - Chitosan @ 0.5% (3.61), T_8 - *Aloe vera* @ 33.3% (3.59) and T_6 - Chitosan @ 1.5% (3.57), while lowest firmness was recorded in T_{10} - Control (3.33). Similar trend was observed among the treatments 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan (1%) recorded highest firmness (1.87), followed by T_9 - *Aloe vera* @ 50% (1.80) and T_8 - *Aloe vera* @ 33.3% (1.78), while the lowest firmness was recorded inT_7 - *Aloe vera* @ 25% (1.58). From the results it was observed that highest firmness was observed with fruits treated with T_5 - Chitosan (1%). The progressive loss of firmness is the result of a gradual transformation of protopectin in to pectin which is degraded by the enzyme poly galacturonase in the cell wall. Further, it was observed that there is a close relation between water loss and berry firmness during storage (Srivastava and Dwivedi, 2000) [24]. Maximum deterioration and minimal degree of firmness indicates the maximum quality degradation. Findings of present study are absolutely in accordance with that of Akhtar *et al*. (2010) [1].

5. Surface colour measurement

Impact of surface coatings on Surface colour measurement (DA meter readings) of fig stored at ambient conditions is presented in the Table 5. The DA meter values showed a decreasing trend from 1st day to 5th day at room conditions. There was a significant difference observed among all the treatments with respect to DA meter readings. On 1st day significantly highest value of DA meter was recorded in T_5 - Chitosan (1%) (1.98) which was on par with T_9 - *Aloe vera* @ 50% (1.97) and T_4 - Chitosan @ 0.5% (1.88), followed by T_6 - Chitosan @ 1.5% (1.86) and T_7 - *Aloe vera* @ 25% (1.85), while lowest DA meter value was recorded in T_{10} - Control (1.74). Similar trend was observed among the treatments 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9 all other treatments showed the end of shelf life with T_5 - Chitosan (1%) recorded highest value of DA meter (1.76) and was on par with T_9 - *Aloe vera* @ 50% (1.75), T_7 - *Aloe vera* @ 25% (1.73) and T_8 - *Aloe vera* @ 33.3% (1.72) whereas lowest value of DA meter was recorded in T_4 - Chitosan @ 0.5% (1.64). DA meter measures the chlorophyll content in a fruit and, as a consequence, its state of ripeness. The index of absorbance difference (IAD) decreases in value during ripening by absorbency properties of the fruit, until it reaches very low value, when ripening was complete. Each kind of fruit and cultivar has specific DA values according to the different phases of maturation. (Ziosi *et al*., 2008) [28], (Noferini *et al*., 2008) [12]. The decreasing trend in DA reading with the advancement of ripening may be attributed to the reason that during fruit ripening, chlorophyll concentration reduced substantially, while carotenoids concentration increased. Peter (2011) [16] noticed that decreasing trend in DA reading with degradation of chlorophyll content in Apple. The results published by Lorenzo *et al*. (2012) [9] revealed that the DA index allows separation of the fruits in different categories of maturation in Mango. Similar results were demonstrated by Noferini *et al*. (2008) [12] who reported that DA was found to be a reliable parameter for monitoring on tree apple ripening, decreasing index ranges corresponded to increasingly advanced stages of ripening.

6. Total soluble solids (º Brix)

The effect of surface coatings of fig on total soluble solids is presented in the Table 6. Total soluble solids increased with the storage period at ambient conditions from 1st day to 5th day. On 1st day of storage lowest TSS was recorded in T_5 - Chitosan @1% (7.94) which was on par with T_9 - *Aloe vera* @ 50% (8.08), followed by T_4 - Chitosan @ 0.5% (8.58), T_8 - *Aloe vera* @ 33.3% (8.71) and T_7- *Aloe vera* @ 25% (9.11), while the highest TSS was recorded in T_{10} - Control (10.81). Similar trend was observed among the treatments 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan @ 1% recorded lowest TSS (15.78) and was on par with T_9 - *Aloe vera* @ 50% (16.05) and T_4 - Chitosan @ 0.5% (16.63), whereas highest TSS was recorded in T_7 - *Aloe vera* @ 25% (16.56). From the above results, it can be concluded that the fruits treated with Chitosan (1%) showed superior over other treatments; this may be due to the fact that chitosan forms a semi permeable film and modifies the internal atmosphere, decreases transpiration losses and regulates the quality of the fruits as reported by Olivas *et al*. (2005) [13]; Sabir and Sabir (2009) [20]. The increment in soluble solids is attributed towards rapid conversion of complex starch molecules in to simple sugars as reported by Gallo *et al*. (2014) [6]. Excess loss of water from the fruiting tissues may also be a valid reason behind this increment (Javed Ali *et al*., 2016) [7]. The results are in accordance with Baviskar *et al*. (1995) [3]; Padmaja and Bosco (2014) [14].

7. Titrable acidity (%)

Impact of surface coatings on titrable acidity of fig stored at ambient conditions is presented in the Table 7. Acidity of fruits decreases with the progress in the storage period. On 1st day and 2nd day of storage, effect of surface coatings on titrable acidity was found non-significant. On 3rd day of storage, highest titrable acidity was recorded in T_5 - Chitosan @ 1% (0.17) which was on par with T_9- *Aloe vera* @ 50% (0.16), T_3 - Honey @ 15% (0.15), T_4 - Chitosan @ 0.5% (0.15), T_6 - Chitosan @ 1.5% (0.15), T_7 - *Aloe vera* @ 25% (0.15), T_8 - *Aloe vera* @ 33.3% (0.15) and T_9 - *Aloe vera* @ 50% (0.15), while the lowest titrable acidity was recorded in T_{10} - Control (0.14). On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan @ 1% recorded highest titrable acidity (0.13) and was on par with T_9 - *Aloe vera* @ 50% (0.12), followed by T8 - *Aloe vera* @ 33.3% (0.11), T_4 - Chitosan @ 0.5% (0.11) and T_7-*Aloe vera* @ 25% (0.11). The progressive reduction in the acidity with advancement of storage period might be due to the increased catabolism of organic acids present in fruit through the process of respiration. The decrease in titratable acids during storage may be attributed to utilization of organic acid in pyruvate de-carboxylation reaction occurring during the ripening process of fruits (Echeverria and Valich, 1989) [5]. The decrease in titrable acidity was observed less in fruits coated with surface coatings compared to control as surface coatings act as moisture barrier and thus reduces weight loss, browning, softening and growth of molds and yeast as documented by Baviskar *et al*. (1995) [3]; (Valuerde *et al*., 2005 [26] and Zafari *et al*. (2015) [27].

8. Total Sugars (%)

The effect of surface coatings on total sugars in fig fruit is presented in the Table 8. Total sugar content increased with the storage period at ambient conditions from first day to fifth day. On 1st day, lowest total sugars were recorded in T_5 -

Chitosan @ 1% (4.08), followed by T_9 - *Aloe vera* @ 50% (5.94), T_4 - Chitosan @0.5% (6.78), T_8 -*Aloe vera*@ 33.3% (7.28) and T_7 - *Aloe vera* @ 25% (7.31), while the highest total sugars were recorded in T_{10} - Control (12.95). Similar trend was observed among the treatments 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan @ 1% recorded lowest total sugars (16.48) and was on par with T_9 - *Aloe vera* @ 50% (16.84), T_4 - Chitosan @0.5% (17.15) and T_8 - *Aloe vera* @ 33.3% (17.44), whereas highest total sugars were recorded in T_7 - *Aloe vera* @ 25% (18.86). Chitosan (1%) was the best treatment with maximum total sugars during storage period. 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. Similar observation was reported by Ramachandra and Ashok (1997) [17] in ber.

9. Reducing Sugars (%)

The influence of surface coatings on reducing sugars of fig is presented in the Table 9. Reducing sugar content increased with the storage period at ambient conditions from 1st day to 5th day. On 1st day of storage lowest reducing sugar content was recorded in T_5Chitosan @1% (3.82), followed by T_9 - *Aloe vera* @ 50% (4.73) and was at par with T_4 - Chitosan @ 0.5% (5.32) and T_8 - *Aloe vera* @ 33.3% (5.92), followed by T_7 - *Aloe vera* @ 25% (6.38) and T_4- Chitosan @ 0.5% (6.54), while the highest reducing sugars was recorded in T_{10} - Control (10.75). Similar trend was observed among the treatments with respect to reducing sugars on 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan (1%) recorded lowest reducing sugars (14.70) and was on par with T_9 - *Aloe vera* @ 50% (14.92) and T_4 - Chitosan @0.5% (15.18), followed byT_8 - *Aloe vera* @ 33.3% (15.72), whereas highest reducing sugars was recorded in T_7 - *Aloe vera* @ 25% (16.20). The total and reducing sugars were increased in all treatments. The raise in sugars may be due to conversion of starch into sugars during storage. Similar observation was reported by Ramachandra and Ashok (1997) [17] in ber.

10. Non-reducing sugars (%)

The data pertaining to the effect of surface coatings on non - reducing sugars of fig fruit is presented in the Table 10. On 1st day, lowest non-reducing sugars was recorded in T_5 - Chitosan @ 1% (0.60), followed by T_9 - *Aloe vera* @ 50% (0.76), T_4 - Chitosan @ 0.5% (1.11), T_8 *Aloe vera* @ 33.3% (1.18), T_7 - *Aloe vera* @ 25% (1.39), T_6 - Chitosan @ 1.5% (1.68) and T_3 - Honey @ 15% (1.80), while the highest non-reducing sugars was recorded in T_{10} - Control (2.33). Similar trend was observed among the treatments with respect to reducing sugars on 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9, all other treatments showed the end of shelf life with T_5 - Chitosan (1%) recorded lowest non-reducing sugars (1.43), followed by T_9 - *Aloe vera* @ 50% (1.67) and T_4 - Chitosan @ 0.5% (1.73), whereas highest non-reducing sugars was recorded in T_7 - *Aloe vera* @ 25% (2.12).

11. Brix: Acid ratio

Impact of surface coatings on brix acid ratio of fig is presented in the Table 11. It is the ratio of TSS and acidity which increased with the storage period from 1st day to 5th day of storage at ambient conditions. On 1st day, lowest brix acid ratio was recorded in T_5 - Chitosan @ 1% (39.78), followed by T_9 - *Aloe vera* @ 50% (40.90), T_4 - Chitosan @ 0.5% (41.43) and T_8 - *Aloe vera* @ 33.3% (43.14), which was at par with T_7- *Aloe vera* @ 25% (44.32) and T_6 - Chitosan @ 1.5% (46.41), while the highest brix acid ratio was recorded in T_{10} - Control (55.67). Similar trend was observed among the treatments with respect to reducing sugars on 2nd day, 3rd day and 4th day. On 5th day, except T_4, T_5, T_7, T_8 and T_9 all other treatments showed the end of shelf life with T_5 - Chitosan (1%) recorded lowest brix acid ratio (141.99), followed by T_9 - *Aloe vera* @ 50% (145.70) and T_4 - Chitosan @ 0.5% (147.57), whereas highest brix acid ratio was recorded in T_7 - *Aloe vera* @ 25% (154.62).

12. Benefit cost ratio

The data pertaining to the effect of surface coatings on benefit cost ratio of fig fruit is presented in the Table 12. Highest benefit cost ratio (1.67) was observed in T_5 - Chitosan @ 1%, followed by T_9 - *Aloe vera* @ 50% (1.54), T_4 - Chitosan @ 0.5% (1.45) and T_6 - Chitosan @ 1.5% (1.34), while the lowest benefit cost ratio (0.75) was recorded in T_{10} - Control. Fruits treated with Chitosan (1%) recorded highest benefit cost ratio which was correlated with highest shelf life as chitosan coatings reduces shrinkage by reducing loss of moisture, transpiration and respiration losses thereby retains the freshness of the fruits. The present results are in conformity with the findings of Sandeep and Bal (2003) [21], Sabir and Sabir (2009) [20]; Romanazzi *et al*. (2009) [19].

Table 1: Effect of different surface coatings on Physiological loss in weight (%) of Fig (*Ficus carica* L.) cv. Brown Turkey conditions

Treatments	Physiological loss of weight (%)				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	10.86	16.10	21.33	*	*
T_2 - Honey (10%)	10.52	15.55	20.13	23.08	*
T_3 – Honey (15%)	10.21	15.12	20.60	21.88	*
T_4- Chitosan (0.5%)	7.58	12.61	18.32	20.73	23.49
T_5 – Chitosan (1%)	6.83	11.34	15.23	19.27	22.01
T_6 – Chitosan (1.5%)	10.04	14.89	19.69	21.63	*
T_7 – *Aloe vera* (25%)	9.79	14.70	19.70	20.96	23.71
T_8 – *Aloe vera* (33.3%)	8.49	13.91	18.95	20.21	23.21
T_9 – *Aloe vera* (50%)	7.27	11.95	16.18	19.75	22.76
T_{10}- Control	14.07	18.88	23.28	*	*
S.Em±	0.175	0.36	0.473	0.35	0.21
CD @ 0.05%	0.515	1.07	1.39	1.05	0.64

*End of the shelf life of fruits

Table 2: Effect of different surface coatings on Decay (%) of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Decay (%)				
	1st day	2nd day	3rd day	4th day	5th day
T1- Honey (5%)	6.88	12.53	30.59	*	*
T2 - Honey (10%)	6.08	12.24	24.45	39.83	*
T3 – Honey (15%)	5.47	10.70	21.00	36.91	*
T4- Chitosan (0.5%)	3.35	6.08	12.03	24.03	35.82
T5 – Chitosan (1%)	1.69	4.19	8.50	16.18	30.67
T6 – Chitosan (1.5%)	5.09	9.16	17.98	36.66	*
T7 – *Aloe vera* (25%)	4.40	8.33	16.28	30.75	40.37
T8 – *Aloe vera* (33.3%)	3.98	6.90	11.94	23.95	41.22
T9 – *Aloe vera* (50%)	2.15	4.50	8.73	16.63	31.94
T10- Control	11.88	23.42	37.28	*	*
S.Em±	0.16	0.26	0.44	0.51	0.49
CD @ 0.05%	0.47	0.78	1.30	1.52	1.45

*- End of the shelf life of fruits

Table 3: Effect of different surface coatings on Shelf life (days) of Fig (*Ficus carica* L.) *cv.* Brown turkey

Treatments	Shelf life (days)
T1- Honey (5%)	3.85
T2 - Honey (10%)	4.18
T3 – Honey (15%)	4.46
T4- Chitosan (0.5%)	5.48
T5 – Chitosan (1%)	5.86
T6 – Chitosan (1.5%)	4.80
T7 – *Aloe vera* (25%)	5.19
T8 – *Aloe vera* (33.3%)	5.36
T9 – *Aloe vera* (50%)	5.72
T10- Control	3.12
S.Em±	0.04
CD @ 0.05%	0.11

Table 4: Effect of different surface coatings on Firmness (kg cm^{-2}) of Fig (*Ficus carica* L.) cv. Brown turkey

Treatments	Firmness (kg cm^{-2})				
	1st day	2nd day	3rd day	4th day	5th day
T1- Honey (5%)	3.42	2.20	1.51	*	*
T2 - Honey (10%)	3.55	2.38	1.95	1.17	*
T3 – Honey (15%)	3.46	2.57	2.09	1.64	*
T4- Chitosan (0.5%)	3.61	3.47	3.18	2.49	1.67
T5 – Chitosan (1%)	3.89	3.70	3.48	2.87	1.87
T6 – Chitosan (1.5%)	3.57	2.79	2.46	1.86	*
T7 – *Aloe vera* (25%)	3.64	3.13	2.62	2.09	1.58
T8 – *Aloe vera* (33.3%)	3.59	3.25	2.86	2.28	1.78
T9 – *Aloe vera* (50%)	3.76	3.63	3.26	2.69	1.80
T10- Control	3.33	2.05	1.42	*	*
S.Em±	0.049	0.073	0.054	0.026	0.018
CD @ 0.05%	0.14	0.21	0.15	0.076	0.055

*- End of the shelf life of fruits

Table 5: Effect of different surface coatings on surface colour measurement (DA meter value) of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Surface Colour measurement				
	1st day	2nd day	3rd day	4th day	5th day
T1- Honey (5%)	1.74	1.07	0.58	*	*
T2 - Honey (10%)	1.83	1.20	0.81	0.41	*
T3 – Honey (15%)	1.79	1.23	1.08	0.60	*
T4- Chitosan (0.5%)	1.88	1.64	1.39	1.01	1.64
T5 – Chitosan (1%)	1.98	1.90	1.66	1.29	1.76
T6 – Chitosan (1.5%)	1.86	1.41	1.20	0.71	*
T7 – *Aloe vera* (25%)	1.85	1.51	1.22	0.88	1.73
T8 – *Aloe vera* (33.3%)	1.83	1.54	1.37	1.05	1.72
T9 – *Aloe vera* (50%)	1.97	1.73	1.51	1.14	1.75
T10- Control	1.74	0.82	0.46	*	*
S.Em±	0.03	0.03	0.03	0.042	0.03
CD @ 0.05%	0.10	0.09	0.09	0.125	0.09

*- End of the shelf life of fruits

Table 6: Effect of different surface coatings on total soluble solids (°Brix) of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Total soluble solids (°Brix)				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	10.18	14.11	15.20	*	*
T_2 - Honey (10%)	8.78	9.46	13.95	15.60	*
T_3 – Honey (15%)	8.80	9.87	13.17	14.32	*
T_4- Chitosan (0.5%)	8.58	9.29	13.87	14.19	16.63
T_5 – Chitosan (1%)	7.94	9.01	13.01	13.91	15.78
T_6 – Chitosan (1.5%)	9.40	10.40	14.47	15.28	*
T_7 – *Aloe vera* (25%)	9.11	10.01	13.76	15.50	16.56
T_8 – *Aloe vera* (33.3%)	8.71	9.75	13.73	14.77	16.54
T_9 – *Aloe vera* (50%)	8.08	9.15	13.05	14.02	16.05
T_{10}- Control	10.81	14.77	15.69	*	*
S.Em±	0.22	0.21	0.29	0.35	0.12
CD @ 0.05%	0.65	0.63	0.88	1.05	0.36

*- End of the shelf life of fruits

Table 7: Effect of different surface coatings on Titrable acidity (%) of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Titrable acidity (%)				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	0.20	0.17	0.15	*	*
T_2 - Honey (10%)	0.22	0.17	0.15	0.12	*
T_3 – Honey (15%)	0.20	0.17	0.15	0.12	*
T_4- Chitosan (0.5%)	0.21	0.17	0.15	0.13	0.11
T_5 – Chitosan (1%)	0.23	0.18	0.17	0.14	0.13
T_6 – Chitosan (1.5%)	0.22	0.17	0.15	0.13	*
T_7 – *Aloe vera* (25%)	0.20	0.16	0.15	0.13	0.11
T_8 – *Aloe vera* (33.3%)	0.19	0.17	0.15	0.13	0.11
T_9 – *Aloe vera* (50%)	0.22	0.17	0.16	0.14	0.12
T_{10}- Control	0.19	0.17	0.14	*	*
S.Em±	0.016	0.005	0.004	0.003	0.005
CD @ 0.05%	NS	NS	0.013	0.009	0.015

*- End of the shelf life of fruits

Table 8: Effect of different surface coatings on Total Sugars (%) of Fig (*Ficus carica* L.) cv. Brown turkey

Treatments	Total sugars (%)				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	10.12	11.84	13.97	*	*
T_2 - Honey (10%)	9.33	11.59	12.99	18.02	*
T_3 – Honey (15%)	8.83	11.01	12.93	16.95	*
T_4- Chitosan (0.5%)	6.78	8.15	10.41	15.03	17.15
T_5 – Chitosan (1%)	4.08	6.73	8.99	14.07	16.48
T_6 – Chitosan (1.5%)	8.10	10.02	11.86	17.18	*
T_7 – *Aloe vera* (25%)	7.31	9.06	10.96	16.68	17.86
T_8 – *Aloe vera* (33.3%)	7.28	8.54	10.43	15.17	17.44
T_9 – *Aloe vera* (50%)	5.94	7.33	10.32	14.55	16.84
T_{10}- Control	12.95	14.07	17.91	*	*
S.Em±	0.23	0.26	0.29	0.30	0.23
CD @ 0.05%	0.70	0.77	0.86	0.90	0.68

*- End of the shelf life of fruits

Table 9: Effect of different surface coatings on Reducing Sugars (%) of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Reducing sugars (%)				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	7.92	9.03	12.16	*	*
T_2 - Honey (10%)	7.35	9.56	10.92	14.86	*
T_3 – Honey (15%)	7.55	8.30	10.81	15.23	*
T_4- Chitosan (0.5%)	5.32	7.01	9.18	13.40	15.18
T_5 – Chitosan (1%)	3.82	5.20	7.93	13.06	14.70
T_6 – Chitosan (1.5%)	6.54	8.73	10.58	15.25	*
T_7 – *Aloe vera* (25%)	6.38	7.41	9.85	15.05	16.20
T_8 – *Aloe vera* (33.3%)	5.92	7.70	9.82	13.60	15.72
T_9 – *Aloe vera* (50%)	4.73	6.02	8.20	13.33	14.92
T_{10}- Control	10.75	12.59	15.12	*	*
S.Em±	0.34	0.42	0.34	0.43	0.35
CD @ 0.05%	1.01	1.25	1.01	1.27	1.04

*- End of the shelf life of fruits

Table 10: Effect of different surface coatings on Non-reducing sugars (%) of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Non-reducing sugars (%)				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	2.10	2.37	2.40	*	*
T_2 - Honey (10%)	2.06	2.13	2.30	2.43	*
T_3 – Honey (15%)	1.80	1.91	2.17	2.31	*
T_4- Chitosan (0.5%)	1.11	1.35	1.40	1.51	1.73
T_5 – Chitosan (1%)	0.60	1.00	1.07	1.25	1.43
T_6 – Chitosan (1.5%)	1.60	1.68	1.80	1.99	*
T_7 – *Aloe vera* (25%)	1.39	1.43	1.67	1.80	2.12
T_8 – *Aloe vera* (33.3%)	1.18	1.29	1.54	1.70	1.81
T_9 – *Aloe vera* (50%)	0.76	1.18	1.31	1.39	1.67
T_{10}- Control	2.33	2.45	2.85	*	*
S.Em±	0.042	0.06	0.051	0.04	0.03
CD @ 0.05%	0.13	0.18	0.151	0.11	0.09

*- End of the shelf life of fruits

Table 11: Effect of different surface coatings on Brix: acid ratio of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Brix: acid ratio				
	1st day	2nd day	3rd day	4th day	5th day
T_1- Honey (5%)	53.29	87.02	105.89	*	*
T_2 - Honey (10%)	44.95	61.00	93.45	122.46	*
T_3 – Honey (15%)	44.90	59.29	90.59	119.31	*
T_4- Chitosan (0.5%)	41.43	55.12	86.02	110.18	147.57
T_5 – Chitosan (1%)	39.78	53.25	82.92	105.43	141.99
T_6 – Chitosan (1.5%)	46.41	61.17	92.83	123.37	*
T_7 – *Aloe vera* (25%)	44.32	59.29	91.22	118.04	154.62
T_8 – *Aloe vera* (33.3%)	43.14	56.94	89.45	112.36	151.80
T_9 – *Aloe vera* (50%)	40.90	53.63	83.71	106.76	145.70
T_{10}- Control	55.67	90.56	109.61	*	*
S.Em±	0.46	0.53	0.58	0.69	0.47
CD @ 0.05%	1.36	1.57	1.73	2.04	1.41

Table 12: Effect of different surface coatings on benefit cost ratio of Fig (*Ficus carica* L.) cv. Brown Turkey

Treatments	Cost of inputs (Rs.)	Net returns (Rs.)	Benefit: Cost Ratio
T_1- Honey (5%)	79.6	70	0.87
T_2 - Honey (10%)	84.3	99	1.17
T_3 – Honey (15%)	82.3	83	1.00
T_4- Chitosan (0.5%)	79	115	1.45
T_5 – Chitosan (1%)	83	139	1.67
T_6 – Chitosan (1.5%)	87	117	1.34
T_7 – *Aloe vera* (25%)	77	100	1.29
T_8 – *Aloe vera* (33.3%)	77.6	87.5	1.12
T_9 – *Aloe vera* (50%)	78.3	121	1.54
T_{10}- Control	75	56.5	0.75

Conclusion

On the basis of results observed from the experiment it was concluded that surface coatings have influence on the shelf life and quality of Fig Fruits. From the experiment it is concluded that T_5 - Chitosan (1%) coating was found significantly best results in terms of minimum PLW (22.01%), decay percentage (30.67%), highest shelf life (5.86 days), firmness (1.87 kg/cm^2), Surface colour measurement (1.76 DA meter value) and quality parameters namely TSS (15.78 ºBrix), Titrable acidity (0.13%), Total sugars (16.48%), Reducing sugars (14.70%), Non-reducing sugars (1.43%), Brix: acid ratio (141.99) and benefit cost ratio (1.67) at the end of the experiment, followed by T_9 - *Aloe vera* gel (50%) and T_9 - chitosan (0.5%).

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