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Studies on effect of surface coatings on shelf life and quality of guava (*Psidium guajava* L.) Cv. Arka Kiran

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Abstract

The present research entitled “Studied on effect of different surface coatings on shelf life and quality of Guava (*Psidium guajava* L.) Cv. Arkakiran” was carried out during 2020-21 at PG Laboratory, College of Horticulture, Rajendranagar, SKLTSU, Hyderabad, Telangana. The experiment was laid in completely randomized block design with 7 treatments 3 replications viz., T₁-Aloe vera gel @ 25%, T₂-Aloe vera gel @50%, T₃-Chitosan @0.5%, T₄-Chitosan @1%, T₅-Bee wax @1%, T₆-Bee wax @2%, T₇-control (uncoated) in three replications. The results pertaining to physical parameters Chitosan @1% recorded significantly minimum physiological loss in weight during storage, and least decay percentage, highest shelf life (9.94 days), highest firmness, minimum TSS, highest ascorbic acid, minimum amount of total sugars, reducing sugars and non-reducing sugars which was followed by T₂-Aloe vera @ 50% while least was recorded in T₇-Control. Highest benefit cost ratio was observed in T₄-Chitosan @1% (1.60) which was followed by T₂-Aloe vera@ 50% (1.55) and T₃-Chitosan @0.5% (1.50) while lowest was recorded in T₇-Control (0.80) was observed upto 10 days of storage.

Keywords: Guava, surface coatings, chitosan, aloe vera gel, bee wax, edible coatings and fungicides

Introduction

Guava (*Psidium guajava* L.) belongs to family Myrtaceae. It is widely grown in all over the tropical and sub-tropical regions. Guava native of Tropical America and from there it was spread to rest of the world. The genus *Psidium* includes about 150 SPS, but *Psidium guajava* is most important and widely cultivated fruit of this genus (Pommer and Murakami, 2009) [1]. Guava claims superiority over other fruits by virtue of its commercial and nutritional value. It is the fifth most important fruit crop after Mango, Banana, Citrus and Apple. Guava is considered as a poor man's apple and also the apple of tropics due to its low cost of production, high nutritional value and availability at cheaper rates throughout the year. Guava is one of the most popular dessert fruit in the world. It is mostly consumed as fresh fruit. According to United State Department of Agriculture (USDA), the nutritional value of guava per 100g of fruit includes Carbohydrates 14.32g, Proteins 2.55g, fat 0.95g, Vitamins like Vitamin-A 0.031 IU, Vitamin-C 225mg, Vitamin-K 0.0022mg, Riboflavin 0.04mg; and minerals like Calcium 18mg, Iron 0.26mg and Potassium 417mg, etc. The fruit contains vitamin C 2-5 times higher than that of citrus. The fruits are very nutritious and rich in carotenoids, phenols, dietary fibers (Viraj and Pillai, 2012) [19] and are known for high antioxidant activity it increases dietary value. Red or pink coloured guava have a higher content of polyphenols, carotenoids and pro-vitamin A activity as compared to yellow green ones. Guava consists of about 20% peel, 50% flesh portion and 30% seed core. The fruit also possesses many medicinal properties like anti-inflammatory, antibacterial, anti-malarial, antispasmodic, tonic, haemostatic, anti-diabetic, anti-diarrheal and anti-rheumatism in traditional remedy (Olajide, 1999) [7]. Guava is also good source of dietary fibre (5.4g) and pectin. In India, guava is grown in an area of 292 thousand ha with an annual production of 4361 thousand metric tons of fruits having a productivity of 16.99 MT/ha (NHB 2019-2020) [6]. Other major guava producers were China and Thailand. In Telangana guava is grown in an area of 3547 hectares with production of 35136.29 MT and productivity is 10 MT/ha. In Telangana include districts such as Sangareddy, Medak, Rangareddy and Mahabubnagar.

Material and Methods

The experiment was conducted at PG Laboratory, College of Horticulture, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad during the year 2020-2021. 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 17.900N latitude and 78.230 E longitude. It experiences hot dry summers and mild winters. The experiment was laid in completely randomized block design with 7 treatments 3 replications viz., T₁- *Aloe vera* gel @ 25%, T₂- *Aloe vera* gel @50%, T₃-Chitosan @0.5%, T₄-Chitosan @1%, T₅-Bee wax @1%, T₆-Bee wax @2%, T₇- control (uncoated) in three replications.

Guava fruits used for research were procured from Centre of Excellence, Mulugu, Sri Konda Laxman Telangana State Horticulture University. Fresh and fully matured uniform sized and disease-free guava fruits were washed with tap water to remove the dirt and dust particles and dried at room temperature. The dipping treatment of surface coatings to all the samples was done at ambient conditions for 10 minutes and stored at room temperature. The analysis of the fruits was done at every 2 days intervals.

Results and Discussion

1. Physiological loss of weight

The table represented that a gradually increased in PLW was shown towards the end of the storage period. Minimum PLW was recorded in T₄- Chitosan (1%) (12.25) which was on par with T₂- *Aloe vera* @ 50% (12.46) followed by T₃-Chitosan @0.5% (12.87) and maximum PLW was recorded in T₅-bee wax @1% (13.62). Chitosan (1%) showed post-harvest delays the ripening process, reduced physiological loss of weight, retained desired texture, maintained post-harvest quality, marketability and prolonged the shelf life Ramakrishna and Sudhakar Rao (2014) [13]. Banana shown delayed ripening processes and also confirmed by the reduction in weight loss in comparison to the uncoated banana (Natalia *et al.* 2013) [5].

2. Decay

The data pertaining to decay per cent of guava fruits as influenced by surface coatings is represented in Table 2. Decay percentage of fruits increases gradually with storage period. least decay percent was recorded in T₄-Chitosan @1% (12.00) which was on par with T₂-*Aloe vera* @ 50% (12.06) and highest was noticed in T₅-Bee wax @1% (13.98) which was at par with T₁-*Aloe vera* @ 25% (13.85). T₄-Chitosan (1%) showed least decay percentage compared to other treatments. Chitosan has broad spectrum anti-microbial activity thereby it could be able to control post-harvest decay (Hussain and Iqbal, 2016) [2].

3. Shelf life

The data pertaining to the Shelf life of guava fruits treated with surface coatings is presented in the Table 3. Highest shelf life of 9.94 days was recorded in T₄-Chitosan (1%) which was on par with T₂- *Aloe vera* @ 50% (9.86). T₃-Chitosan @0.5% (9.33), T₆-Bee wax @ 2% (9.25) and T₁-*Aloe vera* @ 25% (9.23) were at par with each other. While lowest shelf life was recorded in T₇-Control (7.77). Fruits treated with Chitosan recorded highest shelf life as chitosan coatings reduces shrinkage by reducing loss of moisture, transpiration and respiration losses thereby retains the freshness of the fruits (Sandeep and Bal (2003) [17], Sabir and Sabir (2009) [16] and Romanazzi *et al.* (2009) [15].

4. Firmness (kg/cm²)

The data pertaining to the firmness of guava fruits as influenced by the application of surface coatings is presented

in Table4. Firmness of guava fruits showed a decreasing tendency with increase in storage period. T₄-Chitosan (1%) recorded highest firmness (2.85) and T₂-*Aloe vera* @ 50% (2.75) and were on par to each other, while least firmness was recorded in T₅-Bee wax@1% (2.25) followed by T₁- *Aloe vera* @ 25% (2.55). The rate of decrease in firmness in treated fruits was slow when compared to control fruits which indicated the hinderance of ripening process. Highest firmness may due to low rate of respiration due to application of surface coatings which slowdowns the metabolic activity of fruits leading to retention of firmness in fruits. The findings are in accordance with Rama Krishna and Sudhakar Rao (2014) [13]. Similar results were obtained by Sophia *et al.* (2015) [18] were mango fruits stored at 13 °C significantly reduced loss of fruit firmness.

5. DA meter readings

The effect of surface coatings on DA meter readings of guava fruits stored at room temperature is presented in the Table 5. The DA meter values showed a decreasing trend from 2nd day to 10th day at room conditions. T₄- Chitosan (1%) recorded highest DA meter reading value (1.78) and was on par with T₂- *Aloe vera* @ 50% (1.75), T₁- *Aloe vera* @ 25% and T₃-Chitosan @0.5% and T₅-Beewax @1% (1.74) while least value was recorded in T₅-Bee wax @1% (1.63). 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.*, 1988) [20]. 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 (Medlocott *et al.*, 1990) [4]. Peter (2011) [10] noticed that decreasing trend in DA reading with degradation of chlorophyll content in Apple.

6. Total soluble solids (°Brix)

The effect of surface coatings at ambient storage condition of guava on total soluble solids is represented in the Table6. Total soluble solids increased with the storage period at room temperature from first day to tenth day. T₄-Chitosan (1%) recorded lowest TSS value (9.85) on par with T₂-*Aloe vera* @ 50% (9.98) while highest was noticed in T₅-Bee wax @1% (10.25) on par with T₁- *Aloe vera* @25% (10.17) and T₆-bee wax @2% (10.14). chitosan forms a semi permeable film and modifies the internal atmosphere, decreases transpiration losses and regulates the quality of the fruits as reported by Olivias and Barbosa-Cánovas (2005) [8] and Sabir and Sabir (2009) [16]. 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). Excess loss of water from the fruiting tissues may also be a valid reason behind this increment (Javed *et al.*, 2015). [3] The results are in accordance with Padmaja and Bosco (2014) [9].

7. Titrable acidity (%)

Results on titrable acidity of guava fruits stored at ambient temperature as influenced by surface coatings is represented in the Table 7. Acidity of a fruits decreased with the storage

period. highest acidity recorded in T₄-Chitosan @1% (0.32) is significantly higher than T₂- *Aloe vera* @ 50% (0.30) and lowest in T₅-Bee wax @ 1% and T₁-*Aloe vera* @25% (0.27). Titrable acidity of fruits decreases due to increase of soluble sugars during course of ripening. This decrease was observed less in fruits coated with surface coating compared to control due to edible coatings. T₅-Chitosan (1%) is the best treatment with maximum acidity, similar findings were reported by Baviskar *et al.* (1995) [1] in guava fruits were acidity decreased continuously towards the end of storage period regardless of post-harvest treatments and storage conditions.

8. Ascorbic acid content (mg/100g)

Results of ascorbic acid content in guava fruit as influenced by surface coatings is presented in the Table 8. T₄ Chitosan (1%) recorded highest ascorbic acid content (120.30) followed by T₃-Chitosan @ 0.5% (112.24) while lowest was noticed in T₂-*Aloe vera* @ 50% (102.32). The decrease trend of ascorbic acid is less in surface coated while it showed a rapid decrease in untreated fruits. This may be due to increase in total soluble sugars increases in the fruits. The results obtained that ascorbic acid content of fruits found to be increased during the initial days of storage but declined with the advancement of storage period in ber Ram *et al.* (1993) [12].

9. Total sugars (%)

The effect of surface coatings on total sugars in guava fruit is represented in the Table9. Total sugar content increased with the storage period at room temperature from first day to tenth day. T₄ Chitosan (1%) recorded lowest total sugar value (7.59) which was on par with T₂- *Aloe vera* @ 50% (7.62) followed by T₃-Chitosan @0.5% (7.67) while highest was noticed in T₅-Bee wax @1% (8.02). 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 Ramchandra and Ashok (1997) [14] in ber.

10. Reducing sugars (%)

Results on the effect of surface coatings on reducing sugars of guava fruit is presented in the Table 10. T₁-*Aloe vera* @25% recorded highest reducing sugar content (4.08) which was on par with T₅-Bee wax @1% (4.03) while lowest was noticed in T₃-Chitosan @0.5% (3.88) which was on par with T₄-Chitosan @1% (3.91) followed by T₂ and T₆ (3.93). 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 Ramchandra and Ashok (1997) [14] in ber.

11. Non-reducing sugars (%)

The data pertaining to the effect of surface coatings on non-reducing sugars of guava fruit is presented in the Table11. Highest non-reducing sugars was recorded in T₄-Chitosan (1%) (3.69) followed by T₃-Chitosan @0.5% (3.59) while lowest were recorded in T₆-bee wax @2% (3.43) which was on par with T₁-*Aloe vera* @25% (3.48).

12. Brix: Acid ratio

The data pertaining to the effect of surface coatings on brix:

acid ratio of guava fruit is presented in the Table 12. The brix: acid ratio values showed an increasing trend from 2nd day to 10th day at room conditions. T₄-Chitosan (1%) recorded lowest value (30.78) is significantly higher than T₂-*Aloe vera* @ 50% (33.26) followed by T₃-Chitosan @0.5% (34.65) while highest value was recorded in T₅-Bee wax @ 1% (37.96).

13. Benefit cost ratio

The data pertaining to the effect of surface coatings on benefit cost ratio of guava fruit is presented in the Table 13. Highest benefit cost ratio was observed in T₄-Chitosan (1%) (1.60) which was followed by T₂-*Aloe vera* @ 50% (1.55) and T₃-Chitosan @0.5% (1.45) while lowest was recorded in T₇-Control (0.80). 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) [17], Sabir and Sabir (2009) [16] and Romanazzi *et al.*, (2009) [15].

Table 1: Effect of different surface coatings on Physiological loss in weight (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Physiological loss of weight (%)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ - <i>Aloe Vera</i> (25%)	6.92	8.32	9.90	11.44	13.36
T ₂ - <i>Aloe Vera</i> (50%)	5.63	6.92	8.41	10.67	12.46
T ₃ -Chitosan (0.5%)	6.47	7.87	9.39	10.90	12.87
T ₄ -Chitosan (1%)	5.52	6.89	8.09	10.11	12.25
T ₅ -Bee wax (1%)	7.04	8.87	9.92	11.55	13.62
T ₆ -Bee wax (2%)	6.73	8.13	9.78	11.23	13.10
T ₇ -Control	7.97	10.29	12.33	*	*
S.Em±	0.03	0.04	0.03	0.04	0.03
CD @5%	0.10	0.13	0.11	0.43	0.42

Table 2: Effect of different surface coatings on Decay (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Decay (%)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ - <i>Aloe Vera</i> (25%)	4.68	7.86	10.25	12.37	13.85
T ₂ - <i>Aloe Vera</i> (50%)	3.94	6.64	8.06	10.12	12.06
T ₃ -Chitosan (0.5%)	4.06	6.93	8.47	10.34	12.35
T ₄ -Chitosan (1%)	3.76	5.95	7.35	9.91	12.00
T ₅ -Bee wax (1%)	4.75	7.93	10.26	12.41	13.98
T ₆ -Bee wax (2%)	4.35	7.85	10.14	12.36	13.54
T ₇ -Control	6.85	10.64	13.85	*	*
S.Em±	0.04	0.05	0.04	0.05	0.06
CD @5%	0.11	0.14	0.12	0.25	0.20

Table 3: Effect of different surface coatings on Shelf life (days) of guava Cv. Arka kiran under ambient conditions

Treatments	Shelf life (days)
T ₁ - <i>Aloe Vera</i> (25%)	9.23
T ₂ - <i>Aloe Vera</i> (50%)	9.86
T ₃ -Chitosan (0.5%)	9.33
T ₄ -Chitosan (1%)	9.94
T ₅ -Bee wax (1%)	8.75
T ₆ -Bee wax (2%)	9.25
T ₇ -Control	7.77
S.Em±	0.06
CD @5%	0.18

Table 4: Effect of different surface coatings on firmness (kg/cm²) of guava Cv. Arka kiran under ambient conditions

Treatments	Firmness (kg/cm ²)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	3.65	3.35	2.84	2.65	2.55
T ₂ -Aloe Vera (50%)	4.02	3.56	2.94	2.75	2.75
T ₃ -Chitosan (0.5%)	3.74	3.54	2.91	2.74	2.67
T ₄ -Chitosan (1%)	4.07	3.58	3.13	2.86	2.85
T ₅ -Bee wax (1%)	3.57	3.33	2.77	2.46	2.25
T ₆ -Bee wax (2%)	3.68	3.46	2.86	2.72	2.65
T ₇ -Control	3.32	2.64	1.45	*	*
S.Em±	0.07	0.07	0.06	0.05	0.05
CD @5%	0.21	0.20	0.18	0.17	0.18

Table 5: Effect of different surface coatings on Surface Colour measurement (DA meter readings) of guava Cv. Arka kiran under ambient conditions

Treatments	Surface Colour measurement				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	1.92	1.59	1.65	1.74	1.74
T ₂ -Aloe Vera (50%)	1.98	1.89	1.89	1.84	1.75
T ₃ -Chitosan (0.5%)	1.88	1.79	1.79	1.76	1.74
T ₄ -Chitosan (1%)	2.06	1.97	1.96	1.96	1.78
T ₅ -Bee wax (1%)	1.78	1.63	1.76	1.63	1.63
T ₆ -Bee wax (2%)	1.67	1.55	1.75	1.76	1.74
T ₇ -Control	1.70	1.73	1.61	*	*
S.Em±	0.07	0.07	0.05	0.06	0.06
CD @5%	0.20	0.21	0.16	0.18	0.19

Table 8: Effect of different surface coatings on Ascorbic acid (mg/100g) of guava Cv. Arka kiran under ambient conditions

Treatments	Ascorbic acid (mg/100g)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	166.84	156.61	133.95	114.23	107.91
T ₂ -Aloe Vera (50%)	176.78	158.52	137.76	119.96	102.32
T ₃ -Chitosan (0.5%)	171.30	156.61	135.60	123.94	112.24
T ₄ -Chitosan (1%)	177.21	160.98	146.07	127.33	120.30
T ₅ -Bee wax (1%)	164.73	153.96	135.75	112.12	104.67
T ₆ -Bee wax (2%)	169.67	161.97	146.09	126.34	109.23
T ₇ -Control	157.95	139.95	118.72	*	*
S.Em±	0.12	0.14	0.11	0.09	0.09
CD @5%	0.36	0.43	0.34	0.28	0.30

Table 9: Effect of different surface coatings on Total sugar content (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Total sugar content (%)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	6.89	7.21	7.89	7.44	7.90
T ₂ -Aloe Vera (50%)	6.76	6.94	7.78	7.50	7.62
T ₃ -Chitosan (0.5%)	6.79	6.99	7.69	7.28	7.67
T ₄ -Chitosan (1%)	6.69	6.99	8.03	7.52	7.59
T ₅ -Bee wax (1%)	6.91	7.29	8.17	7.48	8.02
T ₆ -Bee wax (2%)	6.86	7.12	7.91	7.39	7.81
T ₇ -Control	7.01	7.50	8.18	*	*
S.Em±	0.06	0.07	0.06	0.06	0.05
CD @5%	0.19	0.20	0.18	0.16	0.16

Table 10: Effect of different surface coatings on Reducing sugar content (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Reducing sugar content (%)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	3.50	3.78	3.82	3.92	4.08
T ₂ -Aloe Vera (50%)	3.26	3.46	3.54	3.83	3.93
T ₃ -Chitosan (0.5%)	3.31	3.50	3.61	3.72	3.88
T ₄ -Chitosan (1%)	3.25	3.43	3.52	3.71	3.91
T ₅ -Bee wax (1%)	3.46	3.67	3.78	3.86	4.03
T ₆ -Bee wax (2%)	3.40	3.59	3.69	3.78	3.93

Table 6: Effect of different surface coatings on TSS content (°Brix) of guava Cv. Arka kiran under ambient conditions

Treatments	TSS content (°Brix)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	9.19	9.75	9.84	10.13	10.17
T ₂ -Aloe Vera (50%)	9.02	9.54	9.74	9.93	9.98
T ₃ -Chitosan (0.5%)	9.16	9.56	9.76	9.95	10.05
T ₄ -Chitosan (1%)	8.98	9.33	9.44	9.58	9.85
T ₅ -Bee wax (1%)	9.28	9.83	10.05	10.27	10.25
T ₆ -Bee wax (2%)	9.05	9.65	9.83	10.05	10.14
T ₇ -Control	9.34	9.92	10.22	*	*
S.Em±	0.06	0.05	0.05	0.05	0.05
CD @5%	0.19	0.16	0.16	0.16	0.17

Table 7: Effect of different surface coatings on titrable acidity (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Titrable acidity (%)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	0.34	0.33	0.31	0.29	0.27
T ₂ -Aloe Vera (50%)	0.43	0.39	0.38	0.32	0.30
T ₃ -Chitosan (0.5%)	0.42	0.37	0.34	0.31	0.29
T ₄ -Chitosan (1%)	0.44	0.40	0.39	0.30	0.32
T ₅ -Bee wax (1%)	0.39	0.36	0.33	0.28	0.27
T ₆ -Bee wax (2%)	0.42	0.38	0.37	0.27	0.28
T ₇ -Control	0.48	0.37	0.31	0.00	0.00
S.Em±	0.01	0.38	0.01	0.005	0.008
CD @5%	0.02	NS	0.02	0.01	0.02

T ₇ -Control	3.64	3.88	3.99	*	*
S.Em±	0.05	0.05	0.06	0.05	0.05
CD @5%	0.16	0.17	0.18	0.16	0.16

Table 11: Effect of different surface coatings on Non-reducing sugar content (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Non-reducing sugar content (%)				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	3.26	3.32	3.40	3.36	3.48
T ₂ -Aloe Vera (50%)	3.45	3.48	3.64	3.53	3.62
T ₃ -Chitosan (0.5%)	3.34	3.42	3.61	3.47	3.59
T ₄ -Chitosan (1%)	3.57	3.58	3.73	3.46	3.69
T ₅ -Bee wax (1%)	3.22	3.29	3.58	3.31	3.51
T ₆ -Bee wax (2%)	3.30	3.37	3.66	3.41	3.43
T ₇ -Control	3.17	3.25	3.49	*	*
S.Em±	0.06	0.06	0.06	0.05	0.05
CD @5%	0.16	0.18	0.18	0.18	0.16

Table 12: Effect of different surface coatings on Non-reducing sugar content (%) of guava Cv. Arka kiran under ambient conditions

Treatments	Brix: acid ratio				
	2 nd Day	4 th Day	6 th Day	8 th Day	10 th Day
T ₁ -Aloe Vera (25%)	27.02	29.54	31.74	34.93	37.66
T ₂ -Aloe Vera (50%)	20.97	24.46	25.63	31.26	33.26
T ₃ -Chitosan (0.5%)	21.80	25.83	28.70	32.09	34.65
T ₄ -Chitosan (1%)	20.40	23.32	24.20	31.93	30.78
T ₅ -Bee wax (1%)	23.79	27.30	30.45	36.67	37.96
T ₆ -Bee wax (2%)	21.54	25.39	26.56	37.59	36.21
T ₇ -Control	19.45	26.81	32.96	*	*
S.Em±	0.73	0.64	0.58	0.57	0.56
CD @5%	2.23	1.95	1.77	1.77	1.71

*-End of the shelf life of fruits.

Table 13: Effect of different surface coatings on Benefit cost ratio of guava Cv. Arka kiran under ambient conditions

Treatments	Cost of inputs (Rs.)	Profit (Rs.)	B:C Ratio
T ₁ -Aloe Vera (25%)	100	140	1.40
T ₂ -Aloe Vera (50%)	100	155	1.55
T ₃ -Chitosan (0.5%)	100	150	1.50
T ₄ -Chitosan (1%)	100	160	1.60
T ₅ -Bee wax (1%)	100	135	1.35
T ₆ -Bee wax (2%)	100	145	1.45
T ₇ -Control	100	80	0.80

Conclusion

On the basis of result observed from this experiment it was concluded that chitosan (1%) coating was found significantly superior results in terms of minimum PLW, decay percentage and highest shelf life, firmness and quality parameters namely TSS, ascorbic acid content and benefit cost ratio followed by aloe vera gel 50% and chitosan 0.5% and bee wax 2%.

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