Asian Research Journal of Agriculture

8(4): 1-9, 2018; Article no.ARJA.41540
ISSN: 2456-561X

The Efficacy of *Aloe-vera* Coating on Postharvest Shelf Life and Quality Tomato Fruits during Storage

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Authors' contributions

This work was carried out in collaboration between all authors. Author LK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors ZYH and OPE managed the analyses of the study. Author OPE managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ARJA/2018/41540
Editor(s):
(1) Tancredo Souza, Centre for Functional Ecology, Department of Life Sciences, University of Coimbra, Portugal.
Reviewers:
(1) Małgorzata Gniewosz, Warsaw University of Life Science, Poland.
(2) Arkendu Ghosh, Bidhan Chandra Krishi Viswavidyalaya, India.
Complete Peer review History: http://www.sciencedomain.org/review-history/24710

Original Research Article

Received 7th March 2018
Accepted 14th May 2018
Published 21st May 2018

ABSTRACT

The efficacy of *Aloe vera* coating on the postharvest shelf life and quality of tomato fruits in storage was evaluated. Two varieties of tomatoes namely UTC and Roma were collected from different market in Makurdi, washed and treated with *Aloe vera* coatings in concentrations of 0%, 20%, 60% and 100%. The tomato fruits were afterwards left in storage for a period of 16 days during which physical properties relating to tomato qualities were recorded appropriately. 0% and 100% concentrations of *Aloe vera* coating produced the highest and lowest decay values respectively on days 7, 10, 13 and 16 with Roma having a higher decay percentage than UTC and the difference was significant. Firmness increased with increase in *Aloe vera* treatment at all concentrations but was not significant. Marketability of the tomato fruits treated with *Aloe vera* at 100% concentration was higher than those treated with 60%, 20% and 0% respectively with UTC variety producing higher values of marketability than Roma. Roma treated with 100% concentration of *Aloe vera* coating also had the highest fruit weight on days 1, 4, 7 and 16 while UTC treated with 100% concentration of *Aloe vera* coating recorded their peak weights on days 10 and 13 with shelf life showing no significant difference across all concentrations. *Aloe vera* is therefore an efficient bio-preservative and can be used as a successful alternative to synthetic preservatives.

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Keywords: Aloe vera; postharvest; storage; shelf life; quality; coating.

1. INTRODUCTION

In postharvest technology, bio-preservation aims at extending storage/shelf life of fruits and vegetables by utilizing plant-based products that have been used in food engineering for a long time. Bio-preservation is a novel food preservation method defined for extension of shelf life and enhanced the safety of foods by the use of natural or controlled microbiota and/or antimicrobial compounds [1]. Recently, plant-based products have now found usage in fresh fruits and vegetables as bio-preservatives. *Aloe vera* gel is one of the promising bio-preservatives which have a great potential to become a common use for most fresh fruits and vegetables.

Aloe vera can provide 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 and also enhance food safety. *Aloe vera* gel appears to contain various antibiotic and antifungal compounds that can potentially delay or inhibit microorganisms that are responsible for foodborne illness in humans as well 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 driven by its antifungal activity. *Aloe vera* gel-based edible coatings have been shown to prevent loss of moisture and firmness, control respiratory rate and maturation development, delay oxidative browning, and reduce microorganism proliferation on sweet cherries [2].

Aloe vera gel is applied to fruits as an edible coating which has been widely used for most fruits and vegetables. Edible coatings have various favourable effects on fruits such as imparting a glossy appearance and better colour, retarding weight loss, or prolonging storage/shelf life by preventing microbial spoilage [3]. The performance of *Aloe vera* gel as the edible coating is dependent on its composition [3]. *Aloe vera* has been used as a herbal remedy for regeneration and rejuvenation of human skin since ancient time in China, Japan and India [4]. Today, *Aloe vera* gel derived from its leaves is commonly used for medical studies and cosmetic products. Although mostly used for medical studies, the gel has been tested for few fresh fruits by a postharvest research group from Spain since 2005.

Considering the current problem of short shelf life of tomatoes, and the need for cheap methods of preservation of harvested fruits by farmers in Makurdi, Benue State, this study will seek to provide substantial information pertaining to the effectiveness of *Aloe vera* in preventing deterioration of harvested tomato fruits, therefore determining whether or not *Aloe vera* can be adopted by farmers as a means of extending shelf life.

2. MATERIALS AND METHODS

2.1 Sample Collection

Fully ripened tomato fruits of two varieties namely Roma and UTC were purchased from Wurukum, Wadata and Modern markets respectively in Makurdi, the capital of Benue state, Nigeria. Makurdi is located in North-central Nigeria along the Benue River, on latitude 07º43'N and longitude 08º35'E.

2.2 Preparation of *Aloe vera* Gel

Fully expanded, mature, healthy and fresh leaves of *Aloe vera* were collected from the plants using a sharp knife and washed with clean water then with sterile distilled water. The tapering point of the leaf top and the short sharp spines located along the leaf margins were removed by a sharp knife and then the knife was introduced into the mucilage layer below the green rind avoiding the vascular bundles. The top and bottom were removed and then the *Aloe vera* gel was obtained. After separating aloe vera gel from the outer cortex, this colourless hydro parenchyma was blended to remove fibers and put in clean and sterilized glass bottles. These bottles were stored in the fridge at 4 - 8ºC until ready for use. The liquid obtained constituted fresh *Aloe vera* gel.

2.3 Preparation of *Aloe vera* Concentrations

Serial dilutions of the *Aloe vera* gel were prepared to give 20, 60 and 100% respectively. To obtain gel concentration of 20%, 20 milliliters of *Aloe vera* gel was measured in a measuring cylinder and 80 milliliters of sterile distilled water was added. To obtain 60% gel concentration, 60

milliliters of the gel was measured in a measuring cylinder and 40 milliliters of sterile distilled water was added. To obtain 100% gel concentration, the gel in its undiluted state was used.

2.4 Coating of Tomato Fruits

The different varieties of the tomato fruits were washed in clean water to remove surface dirt and left to air dry. After drying, they were dipped completely in each gel/ film forming concentration of 20, 60 and 100% respectively for two minutes. Following treatment, the tomato fruits were removed and arranged in plastic crates and stored at room temperature.

Data collected during the storage period include;

2.4.1 Weight (g)

Tomato fruits were placed on a digital weighing balance and the readings were recorded.

2.4.2 Firmness

Firmness of fruits was determined by hand estimation using a numerical rating scale of 1 - 5. Where 1 = very poor, 2 = poor, 3 = acceptable, 4 = good and 5 = Excellent as reported by [5].

2.4.3 Decay (%)

The numbers of decaying fruits were counted on each day of storage and calculated using the formula.

$$Decay = \frac{number\ of\ fruits\ decaying}{Total\ number\ of\ fruits\ in\ the\ plot} \times 100$$

2.4.4 Shelf life

The number of days the tomato fruits still remained marketable and had eating quality during the storage period was recorded. It was decided based on appearance of the fruits.

2.4.5 Marketability (%)

Based on descriptive quality attributes such as level of visible lesion, shriveling, smoothness and shininess of fruit, the percentage of marketable fruits during the storage period were calculated using the formula reported by [5].

$$Marketability\ of\ tomato\ fruits = \frac{number\ of\ marketable\ fruits}{Total\ number\ of\ fruits} \times 100$$

2.5 Data Analysis

The data obtained from the study were analyzed using Analysis of Variance (ANOVA) and the Fishers least significant difference was used to separate the means at 5% level of significance.

3. RESULTS

3.1 Decay

The main effect of variety and *Aloe vera* concentration, as well as the interaction effects of variety and Aloe vera concentration on the decay of tomato fruits on day 1, was not significant ($P \geq 0.05$). On day 4, the main effect of variety was not significant ($P \geq 0.05$) but the main effect of *Aloe vera* concentration as well as the interaction effects of variety and *Aloe vera* concentration was significant ($P \leq 0.05$). On days 7, 10, 13 and 16, the main effect of variety was not significant ($P \leq 0.05$) as well as the interaction effects of variety and *Aloe* vera concentration but the main effect of *Aloe* vera concentration was significant ($P \leq 0.05$).

On day 1, decay showed no significant difference. However, Roma treated with 0% *Aloe vera* produced the highest decay on day 4 and this was significantly higher than that produced by any other treatment as shown in table 2. Generally, Roma variety gave higher decay than UTC on day 4 but the difference was not significant. 0% *Aloe vera* gave the highest decay among the concentrations evaluated at day 4 and this was significantly higher than that produced by 20, 60 and 100% respectively as shown in Table 1. On days 7, 10, 13 and 16, no significant difference was observed among the interactions but Roma produced the highest decay at day 7 and 10 when it was treated with 0% *Aloe vera*. Roma and UTC varieties have the same decay on day 13 when treated with 0% *Aloe vera* and this represented the highest decay. UTC variety treated with 20% concentration of *Aloe vera* gave the highest decay percentage on day 16 as shown in table 2. Roma variety gave higher decay percentage than UTC variety on day 7, 10 and 13 but the difference was not significant. On day 16, UTC variety gave higher decay than Roma variety but the difference was also not significant as shown in Table 1. On a general note, 0% and 100% *Aloe vera* concentration produced the highest and the lowest decay respectively on days 7, 10, 13 and 16 respectively and the difference was significant as shown in Table 1.

Table 1. Main effect of variety and *Aloe vera* concentration on the decay of tomato fruits during storage

Variety	1	4	7	10	13	16	(DAYS)
Roma	0.00	2.75	2.58	3.83	2.67	3.17	
UTC	0.00	2.58	2.50	3.41	2.42	3.50	
FLSD (0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	
Concentration (%)							
0	0.00	5.00	3.83	4.83	4.33	4.33	
20	0.00	2.83	3.17	5.17	3.17	4.50	
60	0.00	1.83	2.50	3.83	2.33	3.67	
100	0.00	1.00	0.67	0.67	0.33	0.83	
FLSD (0.05)	**NS**	**0.51**	**0.63**	**0.74**	**0.61**	**0.66**	

Table 2. Interaction effects of variety and *Aloe vera* concentration on the decay of tomato fruits during storage

Variety	Concentration (%)	1	4	7	10	13	16	(DAYS)
Roma	**0**	0.00	5.33	4.00	5.00	4.33	4.33	
	20	0.00	3.33	3.00	5.67	3.33	4.33	
	60	0.00	1.33	2.67	4.00	2.67	3.33	
	100	0.00	1.00	0.67	67	0.33	0.67	
UTC	**0**	0.00	4.67	3.67	4.67	4.33	4.33	
	20	0.00	2.33	3.33	4.67	3.00	4.67	
	60	0.00	2.33	2.33	3.67	2.00	4.00	
	100	0.00	1.00	0.67	0.67	0.33	1.00	
FLSD (0.05)		**NS**	**0.73**	**NS**	**NS**	**NS**	**NS**	

Table 3. Main effect of variety and *Aloe vera* concentration on the firmness of tomato fruits during storage

Variety	1	4	7	10	13	16	(DAYS)
Roma	5.00	4.67	4.00	3.25	2.50	2.25	
UTC	5.00	4.67	4.00	3.25	2.50	2.25	
FLSD (0.05)	NS	NS	NS	NS	NS	NS	
Concentration (%)							
0	5.00	4.33	3.00	2.00	1.00	1.00	
20	5.00	4.67	4.00	3.00	2.00	2.00	
60	5.00	4.67	4.00	4.00	3.00	3.00	
100	5.00	5.00	5.00	4.00	4.00	3.00	
FLSD (0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	

Table 4. Interaction effects of variety and *Aloe vera* concentration on the firmness of tomato fruits during storage

Variety	Concentration (%)	1	4	7	10	13	16	(DAYS)
Roma	**0**	5.00	4.33	3.00	2.00	1.00	1.00	
	20	5.00	4.67	4.00	3.00	2.00	2.00	
	60	5.00	4.67	4.00	4.00	3.00	3.00	
	100	5.00	5.00	5.00	4.00	4.00	3.00	
UTC	**0**	5.00	4.33	3.00	2.00	1.00	1.00	
	20	5.00	4.67	4.00	3.00	2.00	2.00	
	60	5.00	4.67	4.00	4.00	3.00	3.00	
	100	5.00	5.00	5.00	4.00	4.00	3.00	
FLSD (0.05)		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	

3.2 Firmness

The main effect of variety and *Aloe vera* concentration, as well as the interaction effects of variety and Aloe vera concentration on the firmness of tomato fruits on days 1, 4, 7, 10, 13 and 16, was not significant (P ≥ 0.05). Data presented in table 4 showed that irrespective of the variety, fruit firmness increased with increase in *Aloe vera* concentration on all the days evaluated except on day 1 but the difference was not significant. However, there was a decrease in firmness from the beginning to the end of the storage period and across all concentrations irrespective of variety.

3.3 Marketability

The main effect of variety and *Aloe vera* concentration, as well as the interaction effects of variety and Aloe vera concentration on the marketability of tomato fruits on day 1, was not significant (P ≥ 0.05). On day 4, the main effect of variety was not significant (P ≥ 0.05) but the main effect of *Aloe vera* concentration as well as the interaction effects of variety and *Aloe vera* concentration was significant (P ≤ 0.05). On day 7, the main effect of variety and *Aloe vera* concentration was significant (P ≤ 0.05) but the interaction effects of variety and *Aloe vera* concentration was not significant (P ≥ 0.05). On days 10 and 13, the main effect of variety, as well as the interaction effects of variety and Aloe vera concentration, was not significant (P ≥ 0.05) but the main effect of *Aloe vera* concentration was significant (P ≤ 0.05). On day 16, the main effect of variety and *Aloe vera* concentration was significant (P ≤ 0.05) but the interaction effects of variety and *Aloe vera* concentration was not significant (P ≥ 0.05).

Values of Marketability produced on day 1 where the same. On day 4, 100% *Aloe vera* produced the highest value of marketability irrespective of the variety. Values of marketability produced on days 7, 10, 13 and 16 increased with increase in *Aloe vera* application in all varieties but the difference was not significant as shown in table 6. UTC variety generally produced higher marketability value than Roma variety on days 4, 7, 10, 13 and 16 but the difference was only significant on day 7. Tomato fruits treated with 100% *Aloe vera* coating produced significantly higher marketability than those treated with 60%, 20% and 0% respectively as shown in Table 5.

Table 5. Main effect of variety and *Aloe vera* concentration on the marketability of tomato fruits during storage

Variety	1	4	7	10	13	16	(DAYS)
Roma	24.00	21.25	18.42	14.92	12.42	7.50	
UTC	24.00	21.42	19.17	15.42	13.00	9.58	
FLSD (0.05)	**NS**	**NS**	**0.50**	**NS**	**NS**	**2.02**	
Concentration (%)							
0	24.00	19.00	15.17	9.83	5.50	1.17	
20	24.00	21.17	18.00	13.33	10.17	5.67	
60	24.00	22.17	19.67	15.83	13.83	10.17	
100	24.00	23.00	22.33	21.67	21.33	17.17	
FLSD (0.05)	**NS**	**0.51**	**0.71**	**1.17**	**1.28**	**2.85**	

Table 6. Interaction effects of variety and *Aloe vera* concentration on the marketability of tomato fruits during storage

Variety	Concentration (%)	1	4	7	10	13	16	(DAYS)
Roma	**0**	24.00	18.67	14.67	9.67	5.33	1.00	
	20	24.00	20.67	17.67	13.00	9.67	5.33	
	60	24.00	22.67	19.00	15.33	13.33	10.00	
	100	24.00	23.00	22.33	21.67	21.33	13.67	
UTC	**0**	24.00	19.33	15.67	10.00	5.67	1.33	
	20	24.00	21.67	18.33	13.67	10.67	6.00	
	60	24.00	21.67	20.33	13.33	14.33	10.33	
	100	24.00	23.00	22.33	21.67	21.33	20.67	
FLSD (0.05)		**NS**	**0.73**	**NS**	**NS**	**NS**	**NS**	

Table 7. Main effect of variety and *Aloe vera* concentration on shelf life of tomato fruits during storage

Variety	1	4	7	10	13	16	(DAYS)
Roma	1.00	4.00	7.00	10.00	13.00	16.00	
UTC	1.00	4.00	7.00	10.00	13.00	16.00	
FLSD (0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	
Concentration (%)							
0	1.00	4.00	7.00	10.00	13.00	16.00	
20	1.00	4.00	7.00	10.00	13.00	16.00	
60	1.00	4.00	7.00	10.00	13.00	16.00	
100	1.00	4.00	7.00	10.00	13.00	16.00	
FLSD (0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	

Table 8. Interaction effects of variety and *Aloe vera* concentration on the shelf life of tomato fruits during storage

Variety	Concentration (%)	1	4	7	10	13	16	(DAYS)
Roma	**0**	1.00	4.00	7.00	10.00	13.00	16.00	
	20	1.00	4.00	7.00	10.00	13.00	16.00	
	60	1.00	4.00	7.00	10.00	13.00	16.00	
	100	1.00	4.00	7.00	10.00	13.00	16.00	
UTC	**0**	1.00	4.00	7.00	10.00	13.00	16.00	
	20	1.00	4.00	7.00	10.00	13.00	16.00	
	60	1.00	4.00	7.00	10.00	13.00	16.00	
	100	1.00	4.00	7.00	10.00	13.00	16.00	
FLSD (0.05)		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	

3.4 Shelf-Life

The main effect of variety and *Aloe vera* concentration, as well as the interaction effects of variety and Aloe vera concentration on the shelf-life of tomato fruits on days 1, 4, 7, 10, 13 and 16, was not significant ($P \geq 0.05$).

3.5 Fruit Weight

The main effect of *Aloe vera* concentration as well as the interaction effects of variety and *Aloe vera* concentration was not significant ($P \geq 0.05$) on day 1 but the main effect of variety was significant ($P \leq 0.05$). On days 4, 7, 10, 13 and 16, the main effect of variety, as well as the interaction effects of variety and Aloe vera concentration, was not significant ($P \geq 0.05$) but the main effect of *Aloe vera* concentration was significant ($P \leq 0.05$).

Data presented in table 10 revealed that Roma variety treated with 100% *Aloe vera* coating produced the highest fruit weight on days 1, 4, 7 and 16 while UTC variety treated with 100% *Aloe vera* produced the highest fruit weight

Table 9. Main effect of variety and *Aloe vera* concentrations on the weight of tomato fruits during storage

Variety	1	4	7	10	13	16	(DAYS)
Roma	87.50	73.70	69.00	60.80	56.40	53.70	
UTC	77.90	67.40	63.10	61.50	57.40	50.80	
FLSD (0.05)	**7.66**	**NS**	**NS**	**NS**	**NS**	**NS**	
Concentration (%)							
0	82.40	43.60	38.40	34.30	31.00	25.90	
20	82.40	78.40	73.70	67.60	62.90	58.20	
60	82.40	79.50	74.60	68.80	63.90	59.20	
100	83.80	80.70	77.40	74.00	69.90	65.80	
FLSD (0.05)	**NS**	**9.99**	**9.07**	**7.69**	**7.80**	**8.00**	

Table 10. Interaction effects of variety and *Aloe vera* concentration on Weight of tomato fruits during storage

Variety	Concentration (%)	1	4	7	10	13	16	(DAYS)
Roma	**0**	87.10	42.90	38.10	34.00	30.90	25.60	
	20	87.10	82.50	77.60	69.10	64.10	59.10	
	60	87.10	83.70	78.20	70.50	65.20	60.10	
	100	88.70	85.50	82.10	69.80	65.40	70.00	
UTC	**0**	77.60	44.30	38.70	34.60	31.10	26.10	
	20	77.60	74.30	69.90	66.10	61.60	57.20	
	60	77.60	75.20	71.10	67.10	62.60	58.40	
	100	78.90	75.90	72.80	78.20	74.40	61.50	
FLSD (0.05)		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	

on days 10 and 13 but the difference was not significant.

On a general note, Roma variety gave higher fruit weight than UTC variety on days 1, 4, 7 and 16 but only that produced on day 1 was significant. UTC variety gave higher fruit weight than Roma variety on days 10 and 13 but the difference was not significant. Among the *Aloe* vera concentrations evaluated, 100% *Aloe vera* concentrations gave higher fruit weight than all the other concentrations on all the days. Application of 0% *Aloe vera* produced the lowest fruit weight on days 4, 7, 10, 13 and 16 as shown in Table 9.

4. DISCUSSION

Results obtained from this study shows that *Aloe vera* lowered the decay of tomato fruits in both Roma and UTC varieties. This was evident in the fact that the control with 0% *Aloe vera* had the highest value for decay since there was no edible coating which could prevent/reduce the decay of the tomatoes from day 1 of storage and this became significantly different from what was obtained from other concentrations of *Aloe vera* (20%, 60% and 100%) on day 4 as shown in table 1. This study revealed that 0% and 100% concentrations of *Aloe vera* produced the highest and lowest value for decay respectively on days 7, 10, 13 and 16 and the difference was significant. This implies that *Aloe vera* concentration of 100% applied to tomato fruits is capable of preventing the fruit from decay. The ability of *Aloe vera* coating to lower the decay of tomato fruits as observed in this study is in agreement with the findings of [6] who reported that Jujube fruits coated with *Aloe vera* resulted in lowered decay due to the ability of *Aloe vera* to prevent the growth of fungi responsible for spoilage of fruits and reduction of shelf life. In terms of varieties of tomato fruits, Roma showed higher decay than UTC, but the difference was not significant. Interaction effects of variety and concentration of *Aloe vera* also presented Roma variety with higher decay than UTC.

Results obtained from this study for firmness revealed that irrespective of the variety, firmness increased with increase in *Aloe vera* concentration on all the days evaluated except on day 1 but the difference was not significant. Increase in firmness with increasing rate of *Aloe vera* is similar to the report of [7] who reported that *Aloe vera* treatment reduced the firmness losses of table grapes during cold storage whereas losses of greater than 50% were detected in control grapes after 21 days of storage. It is also similar to [7] who reported that Papaya treated with 100% *Aloe vera* gel and control fruits presented similar initial firmness values but control fruits decayed faster leaving *Aloe vera* coated fruits with better appearance. The finding of this study is also in agreement with the report of [6] who stated that *Aloe*-pectin treatment significantly reduced firmness losses during cold storage when compared to control. Preservation of firmness as observed in this study correlates with the findings of [8] who reported that *Aloe vera* coating of tomatoes exerted a beneficial effect on fruit firmness such that, by the end of storage period, *Aloe vera* coating gave rise to fruits with higher values for firmness than untreated fruits and the differences were significant.

Marketability of fruits coated with *Aloe vera* in this study were better than those without coating. This study revealed that marketability increased with increase in *Aloe vera* concentration on all varieties though the difference was not significant. Tomato fruits treated with a concentration of 100% of *Aloe vera* however produced significantly higher marketability than those treated with 60%, 20%,

and 0% respectively as shown in table 5. Increased marketability in tomato fruits as observed in this study is in line with the findings of [9] who reported that control fruits without coating have the least marketability while coated fruits have the maximum. UTC variety in this study, however, produced higher values of marketability than Roma on almost all days (Table 5) but the difference was not significant. Shelf life of the tomato fruits in this study was not significant (Table 7). The shelf life was consistent for all varieties and at all concentrations of *Aloe vera* application. Therefore, there was no significant difference between the shelf life of those coated and those not coated with *Aloe vera* from the beginning to the end of the study. Interaction effects of a variety of tomato fruits and concentrations of *Aloe vera* coating were also not significant (Table 8). This observation differs from the reports of [10] who stated that *Aloe vera* coating increased the shelf life of papaya fruits significantly during storage.

Post-harvest treatments used in this study exhibited a pronounced effect on weight maintenance of tomato fruits during storage and it was statistically significant. This was seen in the main effect of variety as shown on table 9 and 10. It was revealed that Roma variety treated with 100% concentration of *Aloe vera* coating produced the highest fruit weight on days 1, 4, 7 and 16 while UTC treated with 100% concentration of *Aloe vera* gel produced the highest fruit weight on days 10 and 13 respectively but the difference was not significant. In general, 100% concentration of *Aloe vera* gel produced higher fruit weight than other concentrations on all the days of storage. Application of 0% concentration of *Aloe vera*, however, produced the lowest fruit weight on days 4, 7, 10, 13 and 16 (Table 9). This observation is similar to earlier reports by [6] who stated that *Aloe vera* coated fruits had significantly lesser weight loss than those with no coating. The findings of this study are also similar to that of [7] who reported that *Aloe vera* gel/coating is an effective physical barrier and thus reduced weight loss and lowered the respiration rate during post-harvest storage of table grapes and cherries.

5. CONCLUSION

Aloe vera has potent preservative abilities and can be used as a successful bio-preservative and useful alternative to synthetic preservatives. Its harmless nature to both humans and the environment makes it far more advantageous than the average chemical preservative which often has dangerous side effects on health. *Aloe vera,* as an efficient preservative with emphasy on tomato which formed the basis of this study points to the wide prospects of the plant in the preservation of post-harvest fruits and vegetables in the future.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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