



A Comparative Study on Increasing Post Harvest Shelf Life of Certain Fruits and Vegetables by Using Plants and Plant Products

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ABSTRACT: Fruits and vegetable have their own self life. After harvesting, perishable fruits and vegetables that require combined efforts by growers, storage operators, processors, and retailers to maintain quality and reduce food loss and waste. The extent of coordination can vary greatly from loose in the case of local food supplies to complex for global supply chains. For smooth coordination and fresh use of vegetables and fruits, shelf life of fruits and vegetables can be increased using some plants like Aloe vera, Lemon, Turmeric and also by using some plant products like Castor oil or rich source of Ascorbic acid.

KEYWORDS: Post harvest issues, Fruits, vegetables, increasing self life, edible preservatives

INTRODUCTION

Food and Agriculture Organization (FAO) recorded that 32% (weight basis) of all food produced in the world was lost or wasted in 2009 Warriner K. et al, 2009). When converted into calories, global losses represent approximately 24% of all food produced. Reducing the loss and waste of fresh fruits and vegetables (FFV) is important since these foods provide essential nutrients and represent sources of domestic and international revenue. Fresh produce attributes (appearance, texture, flavour and nutritional value) have been traditional quality criteria, but increasingly safety (chemical, toxicological and microbial) and traceability are important for all the role players along the supply chain from the farm to consumers. Substantial differences exist in the varieties of given vegetables and fruits. Varieties differ with respect to weather, insect and disease resistance; also they will differ in size, shape, time of maturity, and the resistance to physical damage. Varietal differences further extend into warehouse storage stability, and suitability for such processing methods as canning, freezing, pickling or drying. Fresh products are often eaten raw or after minimal processing and food pathogen contamination can present risk of outbreaks of foodborne illnesses (Lipinski et al, 2013). *Listeria monocytogenes*, *Salmonella enteritidis* phage, *Escherichia coli* O157:H7, O104:H4 are major pathogens contributing to outbreaks of foodborne illness with fresh produce as vectors for these pathogens (Caleb OJ et al, 2013). Due to multiple uncertainties along the supply chain, microbial contamination leading to spoilage and postharvest losses can occur at any of stages in the continuum from farm-to-consumer. Therefore, postharvest treatments are essential to minimise microbial spoilage and reduce the risk of pathogen contamination for FFV (Olaimat AN, Holley RA. 2012).

Post-harvest Losses

In a hungry and increasingly competitive world, reducing postharvest food losses is a major agricultural goal. For highly perishable commodities, such as tomatoes, squash, and peaches, as much as 30 percent of the harvested crop may be lost to postharvest diseases before it reaches the consumer. (Arowora, K.A. et al, 2013). Many factors contribute to postharvest losses in fresh fruits and vegetables. These include environmental conditions such as heat or drought, mechanical damage during harvesting and handling, improper postharvest sanitation, and poor cooling and environmental control. The objective of post-harvest handling is, therefore, the creation of an understanding of all the operations concerned from harvesting to distribution so as to enable people to apply the proper technology in each step and in such a way to minimize losses and maintain quality as high as possible during the distribution chain.

MATERIAL AND METHOD

Fruits like Apple (*Malus domestica*), Chikoo (*Manikara zapota*), Banana (*Musa paradisiacal* Linn.), vegetables like *Solanum lycopersicum* (tomato), *Capsicum annum* (chili), *Abelmoschus esculentus* (lady's finger), *Solanum melongena* (brinjal), *Cyamopsis tetragonoloba* (Cluster beans) were taken as testing material. Whereas, Aloe vera, Lemon juice and ascorbic acid powder was used as layering material. (Kumar, S.; Bhatnagar, T.,2014). Specially, Aloe vera gel is considered as novel coating for

preservation of fresh fruits. (Misir, J.; Brishti, F.H.; Hoque, M.M.,2014). Aloe vera gel and Lemon juice has antibacterial and antifungal activity so it can prevent microbial growth on FFV (Saks, Y.; Barkai-Golan, R.,1995).

After separating aloe vera gel from the outer cortex, this colorless hydroparenchyma was blended. This mixture was then filtered to remove fibres. The liquid obtained constituted fresh aloe vera gel. The fruits – Apple, chickoo, banana and vegetable - tomato were selected according to size, shape and color. After dipping into aloe vera gel solution, lemon juice, 5% ascorbic acid solution for 5 mins, the fruits (Apple, Chikoo, Banana, Tomato) were air dried and kept on trays placed on laboratory floor at room temperature. Temperature of the storage room was recorded daily during the study period with the help of a digital thermometer.

The minimum and maximum temperatures during the study period of the storage room were 29⁰C to 33⁰C, respectively. External fruit characters such as color, physical changes were recorded just after harvesting the fruits, changes in skin color were recorded during storage by matching the colors with a standard color chart (Royal Horticultural Society color chart). For Vegetables, the methodology selected was an adaptation of a more comprehensive systems assessment described by La Gra (1990). Three samples of each vegetables like lady’s finger, brinjal, chili, tomato, cluster beans were taken and washed thoroughly to remove dust and all impurities (Jhalegar, J.,2014). Control and treated vegetables and fruits are coated with respective coating material (Benhamou, N,2004).



Figure 1. Coating of Vegetables

RESULT

Observations were started from next day morning and results were recorded for FFV. Fruits were kept for 15 days under observations and results of fifteenth day showed in Figure.2



Figure 2: Observation of Post harvest shelf life of untreated and treated fruits
Where AS- Ascorbic Acid, AG- Aloe vera gel, L- Lemon Juice, C- Control

Table 1. Observation of Deterioration day of fruits

Deterioration day	Control	Aloe vera juice	Lemon juice	Ascorbic acid
<i>Malus domestica</i> (Apple)	8 th day	10 th day	5 th day	fresh
<i>Manilkara zapota</i> (Chickoo)	5 th day	10 th day	5 th day	15 th day
<i>Musa acuminat a</i> (Banana)	5 th day	10 th day	5 th day	10 th day

Table 1 indicates that *Malus domestica* fruit which was untreated, deteriorated in 8 days, *Manilkara zapota* get perished after 5 days only and Banana perished after 5 days which is normal. Whereas when the same batch of *Malus domestica* were treated with Aloe vera, it takes 10 days for deterioration. *Manilkara zapota* took 10 days and *Musa acuminata* also sustained for 10 days when treated with Aloe vera gel.

Fruits like *Malus domestica*, *Manilkara zapota* and *Musa acuminata* when compared to untreated, layered with lemon juice, get perished within five days which shows no difference between untreated and treated one, whereas the same batch treated with ascorbic acid, shows different results. *Malus domestica* and *Manilkara zapota* remained edible even up to fifteen days, *Musa acuminata* get perished after ten days. Figure 2. shows the periodic observation of untreated and treated fruits.

Vegetables those treated with Alovera juice and Lemon juice, showing results as in Table 2.

Table 2. Observation of Deterioration day of Vegetables

Deterioration day	Control	Aloe vera juice	Lemon juice
<i>Abelmoschus esculentus</i> (Lady’s finger)	3 rd day	5 th day	4 th day
<i>Solanum melongena</i> (Brinjal)	4 th day	5 th day	8 th day
<i>Solanum lycopersicum</i> (Tomato)	11 th day	12 th day	13 th day
<i>Cyamopsis tetragonoloba</i> (Cluster beans)	11 th day	12 th day	9 th day
<i>Capsicum annum</i> (Chili)	7 th day	8 th day	9 th day



Figure 3. a. vegetables after one day of coating, b. vegetables after 5 days of coating



CONCLUSION

By the experiment we concluded that in lady'sfinger the sample which is coated with *Aloe vera* juice is more good than other 2 samples because it take more days for perish, in brinjal the sample which is coated with lemon juice is more good after harvesting (Wills, R.B.H. 1988), in chili & tomato also the lemon juice coated sample is more good than other and in cluster beans *aloe vera* juice coated sample is more good.

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