

Studies on the effect of sesame oil and pre-packaging with polyethylene on the quality and shelf life of guava (*Psidium guajava L.*) CV L .49

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The guava, *Psidium guajava L.* belongs to family myrtaceae is the most important highly prolific delicious and nutritive fruit of tropical and sub-tropical regions of Indo-Pak sub-continent. However, belonging a fruit of perishable nature it is most difficult to store of long periods. In the light of above, the present study has been undertaken to increase the physico-chemical quality and shelf-life (storage life) of Lucknow-49 cultivar of Guava fruits at ambient temperature. Sesame oil were used to coating of fruits of Guava for Six treatments in different percentile in which 2 % sesame oil were found best followed by ventilation 0.2 %, 0.4% and 0.8 % ventilation.

Introduction

The guava, *Psidium guajava L.* belongs to family myrtaceae is the most important highly prolific delicious and nutritive fruit of tropical and sub-tropical regions of Indo-Pak sub-continent. The guava fruit is an excellent source of vitamin C containing 2-5 times more than oranges and 10 times more than tomatoes. It is a good source of calcium, phosphorus and iron. However, belonging a fruit of perishable nature it is most difficult to store of long periods[1]. Guavas are rich in dietary fibre, vitamins A and C, folic acid and the dietary minerals, potassium, copper and

manganese. Having a generally broad, low-calorie profile of essential nutrients and a single common guava (*P. guajava*) fruit contains about four times the amount of vitamin C as an orange. Guavas contain both carotenoids and polyphenols like (+) - gallicocatechin, guaijaverin, leucocyanidin and amritoside the major classes of antioxidant pigments – giving them relatively high potential antioxidant value among plant foods. As these pigments produce the fruit skin and flesh colour, guavas that are red-orange have more pigment content as polyphenol, carotenoid and pro-vitamin A, retinoid sources than yellow-green ones.

Methodology

Fresh fruits of Guava cultivar and a quantity of 10 fruits were replicated three times and dipped separately in solution of Sesame oil (1%), Sesame oil (2%), and water (control) for two minutes. Treated fruits were dried in air and then packed without or within 0.2%, 0.4% and 0.8% perforated polythene bags (size 40x23cm) as per treatment details and stored at ambient-temperature for recording the observation on physiological, pathological, chemical losses and vitamin 'C' (ascorbic acid) content.

All the observations were recorded at 3 days intervals up to 15 days (i.e. 0, 3, 6, 9, 12 and 15 days) storage at room temperature. Took required number of polythene bags (100 gauge, size 40x23cm) and made ventilation 0.2, 0.4 and 0.8 per cent of total calculated area of polythene sheet.

Physical and Chemical observation were recorded as per described in research work accordingly [2].

Organoleptic evaluation test was carried out with the help of a panel of four judges who awarded mark out of 100 with regarded to colour, flavour, texture and taste. The data presented as the average of the mark awarded by the four judges. Mark obtained below than 60 was considered not for marketing condition. To find out the significance of difference between variable values observed under influence of different treatments, the data were subjected to statistical analysis, which was accomplished through following steps [3].

Results and Discussion

The data of Physico-Chemical quantities of shelf life of fruits are given in different tables. The data of 15 days storage that the highest circumference reduction 13.52% was found in fruit under controlled where as lowest reduction 6.92 was observed in case of fruit coated with sesame oil 2%. Similar results were also obtained by [4], in guava fruits.

Fruits coated with Sesame oil 2% for 30 seconds (T₃) was found significantly most effective in reducing the PLW (16.76 per cent) up to 15 days of storage. The results that the reduction in PLW of Guava fruits with the application of Sesame oil (2 per cent), Sesame oil (1 percent) and packed in 0.2% ventilated polymeric film bags (200gauge) may be due to the fact that these treatments increase the firmness, retarding the rate of transpiration, respiration and prevent the cellular disintegration by maintaining protein and nucleic acid synthesis and thus, delay senescence.

Control fruits showed increase in PLW, which might be due to increased storage breakdown associated with higher respiration and transpiration rates. The results are in conformity with the findings of [5], [6], [7], [8], and [9] in guava fruits. Fruit rotting was enhanced as storage period prolonged under various treatments.

The maximum pathological loss (70.00 per cent) was observed with untreated fruits (T₁) on 15 days of storage period, whereas application of Sesame oil (2 per cent (T₃)) found best in extending the storage life of fruits with minimum decay loss (36.60 per cent) till the end of the 15 days storage. Results also indicate that

besides control (T₁) decay loss was also more prominent in other treatments as compared to fruits coated with Sesame oil 2 per cent (T₃).

Treatments T₂ and T₃ showed no significant response in relation to postharvest treatments at 15 days storage. The reduction in pathological loss was higher in treated fruits as compared to control (untreated) may possibly be due to its effects on firmness of fruit tissues by retarding rate of respiration and preventing cellular disintegration by maintaining synthesis which leads to the delayed senescence. In addition, the moisture content of fruits was maximum at harvest which declined gradually during storage resulting shrivelling and spoilage, high decay might be due to attack of fungi. These findings are similar to [10] in Aonla fruits, [11] in Guava fruits. [12], [13], and [14] observed similar results in other fruits. Specific gravity of the fruits gradually decreased under all treatments during 15 days of storage. The lowest value of specific gravity was recorded in the treatment T₁ (control) whereas maximum value (0.975) was observed in fruits treated with Sesame oil 2 per cent (T₃) followed by fruits treated with Sesame oil 1 percent (T₂) at 15 days storage. Decrease in specific gravity was also reported by [9] in mango fruits. The fruits of treatment T₃ retained greenish yellow colour up to 24 th day of

storage.

The changes in colour during storage of Guava fruits is due to the gradual change of chlorophyll content in to xanthophyll's. Similar finding were also reported by [7] in guava fruits. The data shows gradual increase in T.S.S. during storage with the advancement of storage period of fruits under all treatments. It may be possible that with the advancement of storage period the loss of moisture takes place and the starch content of the fruits was hydrolyzed in the presence of enzyme α -amylase, β -amylase and starch phosphorelase. The treatment T₃ (Sesame oil 2 per cent) reduced the enzymatic activity of those enzymes. The present results are in close agreement with the findings of [15], [16] and [17] on various fruits and vegetables and Singh and [18] in Aonla fruits.

pH value of fruits gradually increased with the prolongation of storage period under all treatments in a regular manner, with corresponding decrease of acidity up to 12 days of storage. The minimum pH value (5.00) was observed with the treatment T₃ i.e. fruits coated with Sesame oil 2 per cent whereas maximum pH value (6.50) was noted with untreated open control (T₁) at 15 days of storage.

Table 1. Effect of various post-harvest treatments in guava fruits cv. L-49 during storage at (Ambient temperature.) at 15 days.

Observation	Physical			Chemical			
	Treatments	Pathological loss (%)	Fruits Colour	P ^H Value	Reducing Sugar (%)	Non-Reducing Sugar (%)	Total Sugar (%)
T ₁	70.00	Dull Yellow	6.50	4.58	4.49	11.88	48.32
T ₂	46.00	Yellow	5.30	4.42	3.58	10.45	63.36
T ₃	36.60	Yellow	5.00	4.41	3.45	9.72	65.21
T ₄	46.60	Dull Yellow	5.50	4.44	4.38	10.68	61.32
T ₅	50.00	Dull Yellow	5.70	4.58	4.45	10.72	58.51
T ₆	56.00	Dull Yellow	6.00	4.58	4.48	11.32	55.51
C.D for Treatment 5%	1.027		0.141	0.115	0.114	0.194	0.309

Table 2. Effect of various post-harvest treatments in guava fruits cv. L-49 during storage at (Ambient temperature.) at 15 days.

Observation	Physical			Chemical			
	Treatments	Circumference Reduction%	PLW %	Specific gravity	T.S.S.	Acidity (% as citric acid)	Ascorbic acid (mg/100g)
T ₁	13.52	38.94	0.827	11.00	0.20	88.35	0.45
T ₂	8.07	21.03	0.940	10.60	0.42	98.50	0.90
T ₃	6.92	16.76	0.975	10.20	0.50	114.20	1.00
T ₄	8.92	25.22	0.935	10.80	0.40	92.50	0.80
T ₅	9.01	27.20	0.925	11.00	0.35	92.50	0.80
T ₆	9.13	28.12	0.902	11.00	0.35	92.30	0.60
C.D for Treatment 5%	0.170	0.308	0.016	0.199	0.022	1.368	0.065

Of the various postharvest treatments, coating with Sesame oil 2 per cent showed the highest retention of titrable acidity (0.5 per cent) at the end of storage under ambient conditions. The decrease in acid content of Guava fruit juice during storage might be due to utilization of acids by the respiratory process. The higher loss in titrable acidity during ambient storage conditions may be due to higher rate of metabolism in the open control fruits. The present results are in agreement with the findings of [8].

After 15 days storage, the highest retention of ascorbic acid (114.20 mg/100g) was obtained in the fruits treated with Sesame oil 2 per cent (T₃) followed by T₂ (Postharvest treatment with Sesame oil 1 per cent) whereas the minimum ascorbic acid content (88.35 mg/100g) was observed in control (T₁). Retention of vitamin 'C' content (ascorbic acid) during storage in fruits coated with Sesame oil 2 per cent and with polythene packaging has also been reported by [18].

The minimum reducing sugars (4.41 per cent) was obtained in the treatment T₃ (fruits treated with Sesame oil 2 per cent), which was superior in retarding the reducing sugar enhancement over rest of the treatments including control at 15 days storage whereas reducing sugar content of treatment T₁, T₆, (4.58, 4.58 per cent), respectively showed at par. However, data regarding reducing sugars were found non-significant among the treatments. These results have also been reported by [14] and [17] in Anola fruits and Mango fruits.

Fruits treated with Sesame oil 2 per cent (T₃) proved to be the best to retard the enhancement of total sugar during storage and gained lowest enhancement of total sugar (9.72 per cent) at 15 days storage which was significantly superior over other treatments including control. Although, treatment T₂ (fruits treated with Sesame oil 1 per cent) also gave better result with 10.45 per cent total sugar content. Rise and fall in sugars are due to degradation of polysaccharides into simple sugars causing increase in total sugars may be due to enzymatic reactions [19] were also observed same trend of results on various fruits. The effect of Sesame oil 2 per cent (T₃) was more apparent in reducing the loss of tannin content during storage followed by T₂, T₄, T₅ and T₆ (0.90, 0.80, 0.80 and 0.60 per cent), respectively, whereas the control fruits shows maximum loss in tannin contents during 15 days of storage. [20] also determined the oxidase and polyphenolase enzymes activity in apple fruits.

The result of organoleptic ratings presented in Table-2 depict that fruits treated with Sesame oil 2 per cent emulsion (T₃) was found significantly most effective in maintaining more acceptable ratings at 6 th, 9 th, 12 th and 15 th day of storage (88.60, 82.20, 78.60 and 65.21), respectively followed by Sesame oil 1 per cent (T₂) at 6 th, 9 th, 12 th and 15 th DAY storage (83.40, 80.30, 73.40 and 63.36) and fruits pre-packaged in polyethylene bags of 200 gauge with 0.2 per cent ventilation T₄.

Conclusion

It is concluded that Guava fruits treated with Sesame oil 2 per cent was performed well for increasing shelf life and Physico-chemical quality of L-49 variety of Guava fruits. It was maintained maximum acidity, ascorbic acid, tannin, pectin as well as low pathological loss, and low PLW. Fruits remained in acceptable condition comparatively better up to 15 days of

storage period. It may be an effective mean of storing Guava fruits cvL-49 for an extended period in Lucknow agro-climatic conditions.

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Notes and References

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1. **Sanjay, S. (2000)** Effect of season on the vegetative and reproductive attributes of Sardar guava (*Psidium guajava*).
2. **Rangana, S. (1986)**, Handbook of analysis and quality control for fruit and vegetable products Second ed. Tata Mc. Graw Hill publication company Ltd., New Delhi.
3. **Chandel, S.R.S. (1977)**, Handbook of agriculture statics Achal Prakashan Mandir 117/574, Pandunagar, Kanpur.
4. **Agnihotri, B.N. and Ram, H.B. (1971)**, Storage behaviour of guava variety Allahabad safeda treated with fungicide wax emulsion. Prog. Horti. 1971, 3(3): 31-37.
5. **Singh, R.V., Tiwari, J.D. and Chauhan, B.B.S. (1993)**, Effect of wax coating of pre-packaging in polyethylene bags on the storage behaviour of Guava cv. Allahabad Safeda. Haryana Journal of Horticulture Science 22(2):126-136.
6. **Sharma, R.K., Kumar, Jitendra, Ram and Kumar, Surinder (1994)**, Shelf life of Guava fruit as effected by different (cushioning) materials. Haryana Journal of Horticulture Science 23(2):114-118.
7. **Venkatesha, M. and Venkatesh, (1994)**, Use of polythene bags to extent the shelf life of Guava fruits. Indian fd. Packer Vol. XL VII No. 5.
8. **Begum, S. Ara., Rahim, M.A., Haider M.A., and M.A. Kader (2002)**, Shelf Life Of Ten Guava Varieties under Different Postharvest Treatments in on Season. Pakistan Journal of Biological Sciences 5(11):1176-1180.
9. **Maini, S.B.; Lal, B.S.; Anand, J.C. and B. diwan (1985)**, "physico-chemical characteristics in relation of market quality of apples during storage". Ind. Food.Pack. 34.
10. **Nath V.; Singh I.S.; Sanjeev kumar and Panday, A.K. (1992)**, Effect post harvest treatment on selflife of Aonla fruits. Progo. Hort. 24:79-82.

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11. **Sharma, R.K., Kumar, Jitendra, Ram and Kumar, Surinder (1994)**, Shelf life of Guava fruit as effected by different (cushioning) materials. *Haryana Journal of Horticulture Science* **23**(2):114-118.
 - 5 12. **Garg, R.C. and Ram, H.B. (1978)**, a note on effect of post harverst treatment with growth regulators on ripening and storage behaviour of guava (*P. guajava* L.) .*Prog. Hort.* **9**: 48-49.
 13. **Chopra, S.K., Tripathi, S.K., Chadha, S.N. and Nautial, R.K. (1984)**, “Effect of postharvest treatment of Ca, Boran DDA, cycocel, MH and Benomyl on storage behaviour of Royal Apricot”. Paper in national symposium on temperate fruits, March, 15-18, Solan, H.P.
 - 10 14. **Singh, G. (1987)**, Effect of calcium nitrate and plant growth regulators on the storage life of Allahabad Safeda guava. *Indian j. Hort.* **45**: 45-40.
 - 15 15. **Gangawar, B.M. and Tripathi, R.S. (1973)**, a study on Physico-chemical changes during growth maturity and ripening in mango. *Punjab H. Horticulture Journal* **13**(4):230-236.
 - 20 16. **Chopra, S.K., Tripathi, S.K., Chadha, S.N. and Nautial, R.K. (1984)**, “Effect of postharvest treatment of Ca, Boran DDA, cycocel, MH and Benomyl on storage behaviour of Royal Apricot”. Paper in national symposium on temperate fruits, March, 15-18, Solan, H.P.
 - 25 17. **Kumar, P, Kaushik, R.A. and Charia A.S. (1992)**, Effect of postharvest treatment on the quality of mango during storage. *Haryana j.Hort. Sci* **21**: 46-55.
 18. **Singh, R.P. and Kumar, S. (1997)**, Effect of postharvest application on different chemical on the shelf life of Aonla cv. Chakaiya. *Haryana J. Hort. Sci.* **26**: 16-19.
 - 30 19. **Sandhu, S.S.; Dhillon, B.S. and Singh, S. (1983)**, Postharvest application of gibberellic acid and wrappers on storage behaviour of kinnow. *Indian food packer.* **37**: 65-71.
 20. **Koch, J. and Brethauer, G. (1956)**, the vitamin ‘C’ content of ripening fruits. *Londw Forsch*; **9**: 51-61 (*Hort. Abstr.* **26**: 33-92).

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