

Shelf life of Aonla (*Emblca officinalis* Gaertn.) cv NA-7 under Ambient Conditions

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Abstract

An experiment was carried out to study the role of different chemicals and packaging films for enhancing the shelf life of aonla cv NA-7 during 2002-03. There were ten treatments T₀—Control, T₁—Fruits wrapped in perforated polythene bags, T₂—Fruits wrapped in LDPE, T₃—Fruits wrapped in HDPE, T₄—Fruits treated with NAA (50 ppm) and wrapped in perforated polythene bags, T₅—Fruits treated with NAA (50 PPM) and wrapped in LDPE bags, T₆—Fruits treated with NAA (50 ppm) and wrapped in HDPE bags, T₇—Fruits treated with CaCl₂ (4%) and wrapped in perforated polythene bags, T₈—Fruits treated with CaCl₂ (4%) and wrapped in LDPE bags, T₉—Fruits treated with CaCl₂ (4%) and wrapped in HDPE bags. Observations were recorded at regular interval of 7 days upto 42 days of storage under ambient conditions. Treatment CaCl₂ (4%) + HDPE significantly reduced physiological weight loss, change in diameter and change in specific gravity of fruits during storage as compared to other treatments. Hence, aonla fruits treated with CaCl₂ (4%) and wrapped in HDPE bags can be stored upto 42 days under ambient conditions without affecting its marketable quality.

Key words : Aonla, *Emblca officinalis*, Cv NA-7.

Aonla is an important fruit crop of salt affected soils. Hardy nature of the species and profuse bearing on marginal lands make the crop highly remunerative on degraded lands. To counteract depleting phytomass and meet increasing fruit requirement of ever increasing population, it is desirable to grow fruits like aonla. The fruit is highly nutritive. It is one of the richest source of vitamin C, next to Barbados cherry (Asenjoji 1953). It contains 500—1500 mg of ascorbic acid per 100 g of pulp. The fruit juice contains nearly 20 times as much vitamin C as in orange juice and a single fruit is equal in antiascorbic value to two oranges. In order to have a good return and to avoid glut of fruits in the market, it becomes essential to store the fruits for a considerably longer time. All these practices encourage or necessitates the development of suitable storage practices to extend the post-harvest shelf life and quality. Considering the productivity per unit area and suitability of aonla for the wasteland, it is supposed to be an important fruit of future. To ensure the production of aonla fruit, there is an urgent need to develop the storage techniques for longer shelf life. The recent development of antibiotics, fungicides, growth regulators and packaging films have provided new potential for prolong-

ing shelf life of many fruits. Therefore, the present investigation was undertaken to study the role of different chemicals and packaging films for enhancing/prolonging the shelf life of aonla.

Methods

The investigation was carried out in the Department of Horticulture, Allahabad Agricultural Institute, Deemed University, Allahabad during 2002-03. The fruits were harvested on 12 November, 2002 from the orchard of Allahabad Agricultural Institute, Allahabad. The freshly harvested mature yellowish green and uniform sized fruits of cultivar NA-7 were selected for the investigation. They were immediately brought to the laboratory in plastic crates to avoid mechanical injury. Five hundred and forty fruits of uniform size, unblemished, healthy, free from disease and pests were chosen for the experiment which were divided into ten equal lots and each lot consisted of 54 fruits. Fruits were washed with tap water and allowed to dry under electric fan and thereafter treated as per different treatments viz., NAA (50 ppm), CaCl₂ (4%) and packed in different packaging films. Both treated and untreated fruits were kept un-

Table 1. Physiological weight loss (%) as influenced by various treatments at different period of storage.

Treatments	Average P.W.L. (%) at different period of storage					
	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS	42 DAS
T ₀ Control	23.91	36.52	—	—	—	—
T ₁ Fruits wrapped in perforated polyethylene bags	7.90	8.65	9.15	9.85	10.55	—
T ₂ Fruits wrapped in LDPE bags	5.80	6.30	6.90	7.45	7.95	8.25
T ₃ Fruits wrapped in HDPE bags	5.40	5.95	6.35	6.80	7.20	7.65
T ₄ NAA (50 ppm) + perforated polyethylene bags	7.05	7.80	8.55	9.00	9.85	—
T ₅ NAA (50 ppm) + LDPE bags	5.05	5.50	5.98	6.40	6.85	7.05
T ₆ NAA (50 ppm) + HDPE bags	4.00	4.35	4.75	5.05	5.50	5.90
T ₇ CaCl ₂ (4%) + perforated polyethylene bags	6.10	6.75	7.10	7.95	8.75	—
T ₈ CaCl ₂ (4%) + LDPE bags	2.40	2.75	3.15	3.65	3.95	4.35
T ₉ CaCl ₂ (4%) + HDPE bags	2.20	2.65	2.95	3.45	3.75	3.95
S.Ed (±)	2.22	2.82	0.97	0.94	1.08	1.02
C.D. at 5%	4.63	5.88	2.02	1.96	2.25	2.14

der ambient conditions. The treatment combinations were T₀—Control, T₁—Fruits wrapped in perforated polythene bags, T₂—Fruits wrapped in LDPE, T₃—Fruits wrapped in HDPE, T₄—Fruits treated with NAA (50 ppm) and wrapped in perforated polythene bags, T₅—Fruits treated with NAA (50 ppm) and wrapped in LDPE bags, T₆—Fruits treated with NAA (50 ppm) and wrapped in HDPE bags, T₇—Fruits treated with CaCl₂ (4%) and wrapped in perforated polythene bags, T₈—Fruits treated with CaCl₂ (4%) and wrapped in LDPE bags, T₉—Fruits treated with CaCl₂ (4%) and wrapped in HDPE bags.

The polythene, HDPE and LDPE bags of size 23 × 20 cm, were closed by folding the upper side and using adhesive tape. The treatments were replicated thrice and the experiment was laid in CRD, physiological weight loss was recorded with the for-

mula :

$$PWL = \frac{\text{Initial weight} + \text{subsequent weight at analysis}}{\text{Initial weight}} \times 100$$

Fruit diameter was recorded with the help of vernier calliper and specific gravity of the fruits was recorded by water displacement method.

Results and Discussion

Table 1 shows that weight loss in aonla fruits increased steadily in all the treatments with the advancement of storage. A maximum weight loss of 23.91 and 36.52% was observed in control (T₀) after 7 and 14 days of storage, respectively. Minimum weight loss of 2.20, 2.65, 2.95, 3.45, 3.75 and 3.95% were re-

Table 2. Diameter (cm) as influenced by various treatments at different periods at storage.

Treatments	Average diameter (%) at different periods of storage					
	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS	42 DAS
T ₀ Control	3.83	3.80	—	—	—	—
T ₁ Fruits wrapped in perforated polyethylene bags	3.89	3.85	3.80	3.74	3.68	—
T ₂ Fruits wrapped in LDPE bags	3.95	3.91	3.87	3.83	3.79	3.74
T ₃ Fruits wrapped in HDPE bags	3.99	3.93	3.89	3.84	3.80	3.76
T ₄ NAA (50 ppm) + perforated polyethylene bags	3.91	3.86	3.81	3.76	3.70	—
T ₅ NAA (50 ppm) + LDPE bags	4.01	3.98	3.92	3.87	3.84	3.80
T ₆ NAA (50ppm) + HDPE bags	4.06	4.04	4.01	3.96	3.92	3.88
T ₇ CaCl ₂ (4%) + perforated polyethylene bags	3.93	3.90	3.85	3.80	3.73	—
T ₈ CaCl ₂ (4%) + LDPE bags	4.07	4.05	4.02	4.00	3.98	3.95
T ₉ CaCl ₂ (4%) + HDPE bags	4.09	4.07	4.04	4.02	4.00	3.98
S.Ed (±)	NS	NS	0.50	0.52	0.38	0.72
C.D. at 5%	NS	NS	1.05	1.08	0.80	1.51

Table 3. Specific gravity as influenced by various treatments at different periods at storage.

Treatments	Average specific gravity different periods of storage					
	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS	42 DAS
T ₀ Control	0.97	0.95	–	–	–	–
T ₁ Fruits wrapped in perforated polyethylene bags	0.99	0.97	0.94	0.92	0.91	–
T ₂ Fruits wrapped in LDPE bags	1.02	1.00	0.98	0.97	0.95	0.94
T ₃ Fruits wrapped in HDPE bags	1.04	1.03	1.01	0.98	0.97	0.96
T ₄ NAA (50 ppm) + perforated polyethylene bags	1.00	0.97	0.95	0.94	0.93	–
T ₅ NAA (50 ppm) + LDPE bags	1.05	1.03	1.00	0.99	0.98	0.97
T ₆ NAA (50 ppm) + HDPE bags	1.07	1.05	1.03	1.01	0.99	0.98
T ₇ CaCl ₂ (4%) + perforated polyethylene bags	1.01	0.98	0.97	0.96	0.94	–
T ₈ CaCl ₂ (4%) + LDPE bags	1.08	1.06	1.04	1.02	1.00	0.99
T ₉ CaCl ₂ (4%) + HDPE bags	1.09	1.07	1.05	1.04	1.02	1.00
S.Ed (±)	NS	NS	0.12	0.14	0.17	0.21
C.D. at 5%	NS	NS	0.26	0.30	0.35	0.43

corded in T₉ (CaCl₂ + LDPE) after 7, 14, 21, 28, 35 and 42 days of storage, respectively under ambient conditions. Packing the fruits in HDPE bags reduces weight loss to some extent, compared to fruits wrapped in LDPE bags and to a great extent when compared to fruits wrapped in perforated polythene with treatment of either CaCl₂ (4%) or NAA (50 ppm) or without any chemical treatment.

In comparison to every treatment the fruits wrapped in HDPE bags showed considerable reduction in weight loss, which might be due to reduced exposure to transpiration and respiration of the fruit surface compared to control. Fruits treated with CaCl₂ (4%) and wrapped in HDPE were found to be quite acceptable in respect of color, firmness, texture and quality for their marketability after 42 days of storage. Similar findings were also reported by Sharkey et al. (1985) and Poovaiah (1986). The improvement in marketability of fruits treated with CaCl₂ (4%) + HDPE (T₉) can be due to their significant effect on the rate of dehydration and rotting. Apparently, aonla fruits treated with CaCl₂ (4%) wrapped in HDPE bags helped in lowering the physiological loss in weight and shrivelling thereby extending the shelf life.

Gupta et al. (1987) also reported that calcium compounds reduces the rate of weight and decay losses and decreases ethylene evolution. Similar results were also given by Aman et al. (1987) and Hussein et al. (2001).

Table 2 shows that there was a continuous decrease in diameter of fruits with all the treatments under ambient conditions with the increase in the storage

period. The reduction in diameter of control (T₀) fruits was quite considerable, being 3.83 cm and 3.80 cm after 7 and 14 days of storage respectively. A maximum diameter of 3.98 cm was observed in T₉ (CaCl₂ + HDPE bags) after 42 days of storage. However, there was not much difference in the diameter among the fruits treated with CaCl₂ and NAA and packed in LDPE and HDPE bags i.e., T₈, T₆ and T₅ (3.95 cm, 3.88 and 3.80 cm respectively) after 42 days of storage. The reduction in diameter might be due to the corresponding decrease in the volume of fruits. The results coincide with the findings of Cohen et al. (1990).

Table 3 reveals that the specific gravity decreased in all the treatments with the advancement of storage period and maximum reduction (0.95) was recorded in control (T₀) fruits after 14 days of storage. However, minimum reduction (1.00) was recorded with (T₉) CaCl₂ + HDPE bags followed by (0.99) in (T₈) CaCl₂ + LDPE bags after 42 days of storage. Decrease in specific gravity might be because of reduced water loss from the fruits during transpiration in fruits wrapped in HDPE bags compared to control.

From these findings it can be concluded that fruits treated with CaCl₂ and wrapped in HDPE bags proved to be best over all other treatments and the fruits could be stored in marketable condition upto 42 days.

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