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To study the titratable acidity of aonla powder prepared using different drying conditions at different temperatures

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Abstract
Present work have been undertaken to formulate and evaluate the Titratable Acidity of Aonla Powder during ambient storage under different drying conditions. In the experiment, dried aonla shreds were categorized into controlled, blanched and blanched+ sulphiting treated aonla shreds and allowed to dry at different temperatures (60 ^{0}C, 70 ^{0}C, 80 ^{0}C). Osmosis as a pre treatment prior to convective air drying was able to decrease drying time. The values of Titratable Acidity were lower in blanched and blanching + sulphating aonla powder as compared to the values in controlled aonla powder. Titratable Acidity was minimum in osmo-air dried aonla followed by hot air oven dried and tray dryer and a significant increase was witnessed in the Titratable Acidity values during storage.

Keywords: Blanching, titratable acidity, aonla powder and osmosis

Introduction
Indian gooseberry or aonla is an important fruit, which is highly valued among indigenous medicines. Aonla fruits are a natural source of vitamin-C and work better than synthetic ascorbic acid in the cure of deficiency diseases. The storability after harvesting is limited due to its high perishable nature (Kumar and Nath 1993) [4]. The other methods of extending shelf life are cold storage, sun drying and hot air drying or processing to murabba, pickle, juice syrup, squash and dehydrated powder (Kalra 1988) [3]. Aonla possesses the highest level of heat and storage-stable vitamin C known to man. Pectin and minerals like iron, calcium and phosphorus are also found abundantly in the fruit. It is a very powerful anti-inflammatory herb. Aonla is the richest source of natural vitamin C. It provides up to 900 mg/100 g of juice of the fresh fruit. It has the same amount of ascorbic acid or vitamin C present in two oranges. Due to high vitamin C content Aonla has anti oxidative properties. Osmo-air drying is the combined approach of drying method in which osmotic dehydration and hot air drying is carried out simultaneously one after another. The final reduction of moisture is achieved through drying. This process of drying is an economical drying of fruit or vegetable material containing higher moisture content, greater than 70%. At the end of drying final stable product having longer shelf life can be obtained. The acidity in fresh fruit was found to be 1.5% (Kalra, 1988[3] and Mehta, 1995) [6]. Acidity was reported to be 1.82% (Dahiya and Dhawan, 2001) [1]; (Singh *et al*., 2005) [10] and 2.23% (Gomez and Khurdiya, 2003) [2]. Nayak *et al*., (2012) [7] reported that titratable acidity in fresh fruit ranged from 1.5 to 1.8%. Organic acids are mainly responsible for sourness of fruits.

Material and Methods
This chapter deals with the preparation of aonla powder under cabinet dryer, hot air oven and osmo-air drying and determined their Titratable Acidity. Fully mature aonla fruits of 'Banarasi' variety was harvested and properly washed with clean running water to remove the adhering dust particles and to reduce the microbial flora present on the surface of the fruits. After this, aonla fruits was blanched in boiling water (90±2°C for 10 min). Blanched aonla was immediately put in cold water for two min. Then, the Fruits was dipped in a solution of 0.1 per cent potassium metabisulphite for 10 minutes.

The fruit was drained and pits were removed manually. Thereafter, the fruit was subjected to different drying treatments. Titratable Acidity was determined by the method of Ranganna (1986).

Reagents

- Sodium hydroxide (N/10)
- Phenolphthalein solution (1%)

Procedure

Took 5kg fresh sample (or 2 gm dried powder). Added 30 ml boiling distilled water and filtered rapidly using whatman no. 1. Pipette 10 ml aliquot in a conical flask. Added a few drops of 1% Phenolphthalein solution. Titrated against N/10 NaOH until finally one drop of NaOH gave a pink colour lasting for a minute or longer. Results were calculated as percent citric acid.

Calculation

$$\text{Calculation: Total acid (\%)} = \frac{ml\ of \frac{N}{10} NaOH\ X\ citric\ acid\ factor}{weight\ of\ sample}\ x\ 100$$

Result and Discussion

It was observed that the Titratable Acidity for the sample held at 60^0C temperature, and stored for 0, 30, 60, 90, 120, 150, and 180 days respectively was found to be in the range of 7.23 to 7.96 % for controlled, 6.66 to 7.31 % for blanched, and 6.00 to 6.88 % for blanching + sulphiting under cabinet tray dryer. It was observed that the highest Titratable Acidity 7.23 % was found for the controlled held at 60^0C for 180 days of storage period and lowest Titratable Acidity 6.00 % was found for the blanching + sulphiting held at 60^0C before storage (initial stage of storage). The variations in Titratable Acidity with storage period are shown in Fig 1. The ANOVA for Titratable Acidity variations at 60^0C under cabinet tray dryer for controlled, blanched and blanching + sulphiting with respect to storage period in the range of 0, 30, 60, 90, 120, 150, and 180 days was performed and given in table 1, result were found to be non-significantly at 5% level of significance.
In hot air drying, the Titratable Acidity for the sample held at 60^0C temperature, and stored for 0, 30, 60, 90, 120, 150, and 180 days respectively was found to be in the range of 6.88 to 7.57 % for controlled, 6.06 to 6.66 % for blanched, and 5.74 to 6.23 % for blanching + sulphiting. It was observed that the highest 4.17 Titratable Acidity 6.88 % was found for the controlled held at 60^0C for 180 days of storage period and lowest Titratable Acidity 5.74 % was found for the blanching + sulphiting held at 60^0C before storage (initial stage of storage). The variations in Titratable Acidity with storage period are shown in Fig 2. The ANOVA for Titratable Acidity variations at 60^0C under hot air oven drying for controlled, blanched and blanching + sulphiting with respect to storage period in the range of 0, 30, 60, 90, 120, 150, and 180 days was performed and given in table 2, result were found to be non-significantly at 5% level of significance.
In osmo- air drying, the Titratable Acidity for the sample held at 60^0C temperature, and stored for 0, 30, 60, 90, 120, 150, and 180 days respectively was found to be in the range of 6.02 to 6.19 % for controlled, 5.76 to 5.93 % for blanched, and 4.81 to 5.04 % for blanching + sulphiting. It was observed that the highest Titratable Acidity 6.02 % was found for the blanching+ sulphiting held at 60^0C for 180 days of storage period and lowest Titratable Acidity 4.81 % was found for the controlled held at 60^0C before storage (initial stage of storage). The variations in Titratable Acidity with storage period are shown in Fig 3. The ANOVA for Titratable Acidity variations at 60^0C under osmo- air drying for controlled, blanched and blanching + sulphiting with respect to storage period in the range of 0, 30, 60, 90, 120, 150, and 180 days was performed and given in table 3, result were found to be significantly at 5% level of significance.
Acidity content did not change in the beginning of storage, thereafter it increased during storage. Pectic acid has been reported to increase the acidity in fruit products, hence, degradation of pectic substances into soluble solids might have contributed towards an increased in acidity of aonla products. An increase in acidity with storage period has also been observed in aonla preserve. Similar findings were also observed by Sethi (1980) [9]; Kumar and Singh (2001) [5] in aonla products. These results were contrary to the results obtained by Rani and Bhatia (1985) [8]; Tripathi *et al.* (1988) [11] in which the acidity decreases with storage.

Table 1: ANOVA for changes in Titratable Acidity of aonla powder at 60°C (Tray dryer) during ambient storage condition

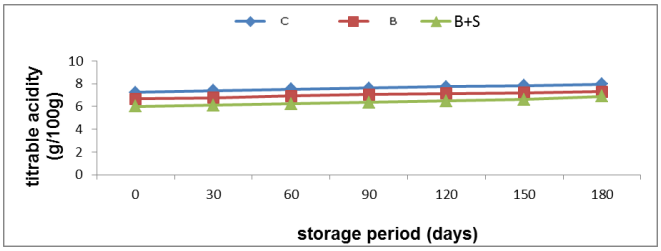
Source of Variation	DF	Sum of Squares	Mean Squares	F-Calculated	Signficance
Replication	2	0.184			
Treatment	2	0.558	0.279	1.206	0.38906
Error	4	0.926	0.231		
Total	8	1.669			

Table 2: ANOVA for changes in Titratable Acidity of aonla powder at 60°C (HAO) during ambient storage condition

Source of Variation	DF	Sum of Squares	Mean Squares	F-Calculated	Signficance
Replication	2	0.206			
Treatment	2	1.032	0.516	2.262	0.22021
Error	4	0.913	0.228		
Total	8	2.151			

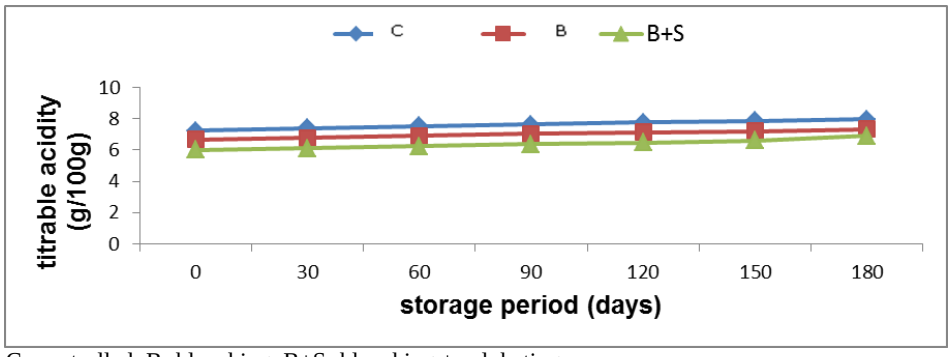
Table 3: ANOVA for changes in Titratable Acidity of aonla powder at 60°C (osmo-air drying) during ambient storage condition

Source of Variation	DF	Sum of Squares	Mean Squares	F-Calculated	Signficance
Replication	2	0.138			
Treatment	2	0.714	0.357	132.633	0.00022
Error	4	0.011	0.003		
Total	8	0.863			



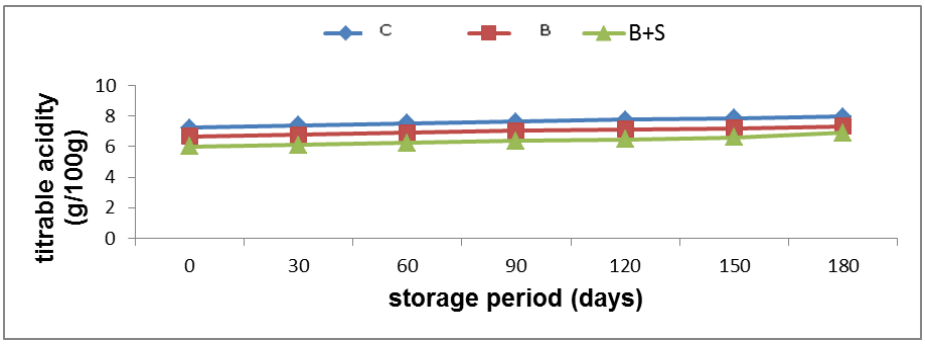
C- controlled; B- blanching; B+S- blanching + sulphating

Fig 1: Effect of storage period on Titratable Acidity (g/100g) of aonla powder at 60^0C under cabinet tray dryer.



C- controlled; B- blanching; B+S- blanching + sulphating

Fig 2: Effect of storage period on Titratable Acidity (g/100g) of aonla powder at 60^0C under hot air dryer.



C- controlled; B- blanching; B+S- blanching + sulphating

Fig 3: Effect of storage period on Titratable Acidity (g/100g) of aonla powder at 60^0C under osmo-air drying

Conclusion

The values of Titratable Acidity were lower in blanched and blanching + sulphating aonla powder as compared to the values in controlled aonla powder at all 60ºC, 70ºC and 80ºC. Titratable Acidity was minimum in osmo-air dried aonla followed by hot air oven dried and tray dryer and a significant increase was witnessed in the Titratable Acidity values during storage.

References

1. Dahiya PS, Dhawan SS. Effects of drying methods on nutritional composition of dehydrated aonla fruit (*Emblica officinalis* G.) during storage. Plant Foods for Human Nut. 2001; 58:1-9.
2. Gomez S, Khurdiya DS. Quality changes in aonla pulp under different storage conditions. Indian Food Packer. 2005; 59(4):54-57.
3. Kalra CL. The chemistry and technology of amla (*Phyllanthus Emblica*): A resume. Indian Food Pac. 1988; 42(4):67-82.
4. Kumar S, Nath V. Storage stability of amla fruits: a comparative study of zero- energy cool chamber versus room temperature. J Food Sci. Technol. 1993; 30:202-203.
5. Kumar S, Singh IS. Storage studies of aonla fruit products at ambient temperature. Progress. Hort. 2001; 33(2):169-173.
6. Mehta S. Evaluation of different cultivars of Aonla (*Emblica officinalis* Garten) for processing. M.Sc. Thesis, CCS HAU, Hisar, 1995.
7. Nayak P, Tandoon DK, Bhatt DK., Study on changes of nutritional and organoleptic quality of flavoured candy prepared from aonla *(Emblica officinalis* G.) during storage. Int. J Nut. Met. 2012; 4(7):100-106.
8. Rani U, Bhatia BS. Studies pear candy processing. Indian Food Packer. 1985; 29:40.
9. Sethi V. Studies on preparation and storage of semidry preserve (murrabba). Ph.D Thesis, IARI, New Delhi, 1980.
10. Singh BP, Pandey G, Pandey MK, Pathak RK. Shelf life evaluation of aonla cultivars. Indian Journal of Horticulture. 2005; 62(2):137-140.
11. Tripathi VK, Singh MB, Singh S. Studies on comparative compositional changes in different preserved products of amla (Emblica officinalis Gaertn.) var. Banarasi. Indian Food Packer. 1988; 42(4):60-66.