

Sensory Evaluation of Different Value Added Products of Aonla (*Emblica officinalis* G.) During Storage

ABSTRACT

A research experiment was conducted during the year 2019-2021 and 2020-21 in the Fruit and Vegetable Processing Unit Laboratory, Department of Horticulture, College of Agriculture, Gwalior with seven different aonla varieties viz., NA-4, NA-5, NA-6, NA-7, NA-10, Laxmi and Chakaiya. It was studied about the preparation of various value added products such as aonla toffee, with beverages like nectar and squash. Observations were recorded upto storage period of six months at ambient conditions. This study is analyzed in a completely randomised design with three replications. Laxmi and Chakaiya varieties were found superior with respect to colour, appearance, taste and aroma as well as flavour. It has been noticed that the overall acceptability of processed products have been found significant with the storage intervals such as 30,60,90 and 120 days. As far as sensory evaluation of different aonla products was concerned, the Laxmi and Chakaiya varieties are found to be superior for the purpose of the processing industry.

Keywords: Aonla, processing industry, storage and value addition.

INTRODUCTION

Aonla is one of the oldest minor fruit and is considered to be a wonder for human health. India ranks 1st in aonla area and production all over the world. It belongs to the family Euphorbiaceae and comprises about 350 pieces (Hooker, 1973). The fruit has a high indigenous medicinal value such as an anti-

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ascorbic, laxative, antibiotic and acidic, cooling and refrigerant. Aonla is used in Ayurvedic systems of Indian medicines (Om Singh, 2014). Area and production of aonla has increased from 67,000 hectares to 1,08,000 hectares according to the world wide record. In India, aonla is grown in area of about 50,000 hectares with a production of around 200000 metric tonnes. The area under aonla has been expanding rapidly in the last couple of years (Shekhawat *et al.*, 2014).

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The main cultivated varieties are Banarasi (Drying), Bansi Red, Chakaiya (Pickle, Candy and Syrup), Desi, Krishna/NA-5 (Candy and jam), Kanchan/NA-4 (Candy and Jam), Franchis (Hathijhool), NA-6, NA-7 (Candy and Jam), NA-8, NA-9, NA-10 and Anand-7 (Pickle). Besides, it is not consumed as fresh or in the raw state as it is acidic and astringent. Therefore, it is not so much popular as a table fruit. The excellent nutritive and therapeutic value offers great potential for processing it into several quality products like preserve, squash, candy, jelly, jam, syrup, pickle, chutney, powder, barfi, segments in sugar syrup, supari, blended beverage, carbonated drinks and RTS.

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The postharvest losses in aonla vary from 30-40% due to its perishable nature and glut during harvesting time, which reduces the market value of fruit. Hence, value addition through processing would be the only effective tool for economic utilization of increased production of aonla in future. Traditional methods were used unhygienic and time consuming. Due to this, the nutritive losses are seen in higher amounts. Therefore an attempt is made to find out the suitability of some varieties for processing as well as stability of different aonla products.

MATERIAL AND METHODS

Plant Material

Fully matured aonla fruits of different varieties such as NA-4, NA-5, NA-6, NA-7, NA-10, Laxmi and Chakaiya. etc are harvested from the main

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experimental station of Department of Horticulture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior during the year 2019-20 and 2020-21.

Chemicals and additives

All chemicals used in this investigation were of analytical grade. Cane sugar, skimmed milk powder, glucose, butter, citric acid, hot spices, vegetables and salt were obtained from a local market and used as ingredients for the preparation of different products such as aonla toffee, nectar and squash.

Extraction of pulp

Fully mature aonla fruits with a firm texture and uniform in size were blanched and used for the experiment. The fruits were processed for extraction of pulp with a home scale pulping machine to obtain a fine pulp. The final pulp were prepared with an addition of 2% potassium bisulphite solution for 15-20 minutes.

Standardization of recipes

1. Aonla toffee

Aonla toffees were prepared from seven different varieties of aonla with the standardized recipe. The other ingredients, such as sugar, skimmed milk powder, glucose, butter and salt were kept constant.

2. Aonla nectar

Aonla nectar was prepared from seven different varieties of aonla with the standardized recipe. The other ingredients, such as sugar, citric acid and water were kept constant as per required for the preparation of nectar.

3. Aonla squash

Aonla squashes were prepared from seven different varieties of aonla with the standardized recipe of that beverage. The other ingredients, such as sugar, citric acid and water were kept constant as per required for the preparation of squash.

Preparation of value added products:

Following standardization, five value added products of aonla were prepared using the standardized recipe of toffee, nectar and squash.

1. Aonla toffee
2. Aonla nectar
3. Aonla squash

Chemical analysis of value added products

The products was chemically analysed for TSS (Total soluble solids), titratable acidity and total sugars are content according to the standard methods of A.O.A.C. (1990).

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Organoleptic analysis

The organoleptic evaluation of the various processed products for assessing the colour, flavour, texture, appearance etc., were done by a panel of 6 judges who allotted marks on the basis of 9.0 Point Hedonic Scale (Amerine *et al.*, 1965).

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Microbial quality of value added products

Microbial counts were recorded using standard plate count (SPC). Each colony was counted. Tryotone dextrose yeast extract agar was used as the growth medium, and petri dishes were incubated at $37^{\circ}\pm$ C for 48 hr count bacterial colonies. The colonies were counted with a magnifying lens. The total count was recorded, and pinpoint colonies were likewise

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Statistical analysis

The data were analysed according to a factorial completely randomized design (FCRD) with three replications for statistical significance, as specified by Panse and Sukhatme (1967).

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RESULT AND DISCUSSION

The recovery of aonla pulp was found to be 950 g/kg of fruit without straining and the various value added products such as toffee, nectar and squash were prepared from seven different varieties NA-4, NA-5, NA-6, NA-7, NA-10, Laxmi and Chakaiya.

Table 1. Effect of varieties on organoleptic properties of aonla toffee

<u>Aonla toffee</u>	<u>Sensory score</u>				
	<u>Colour and appearance</u>	<u>Taste</u>	<u>Aroma</u>	<u>Flavour</u>	<u>Overall acceptability</u>
<u>NA-4</u>	<u>6.88</u>	<u>6.16</u>	<u>6.34</u>	<u>6.91</u>	<u>6.67</u>
<u>NA-5</u>	<u>6.90</u>	<u>6.33</u>	<u>6.46</u>	<u>7.21</u>	<u>6.70</u>
<u>NA-6</u>	<u>7.38</u>	<u>6.67</u>	<u>6.67</u>	<u>7.41</u>	<u>6.83</u>
<u>NA-7</u>	<u>7.06</u>	<u>6.68</u>	<u>6.92</u>	<u>7.25</u>	<u>6.92</u>
<u>NA-10</u>	<u>7.41</u>	<u>7.33</u>	<u>7.22</u>	<u>7.91</u>	<u>7.10</u>
<u>Laxmi</u>	<u>7.52</u>	<u>7.57</u>	<u>7.30</u>	<u>7.60</u>	<u>7.25</u>
<u>Chakaiya</u>	<u>7.71</u>	<u>7.39</u>	<u>7.57</u>	<u>7.41</u>	<u>7.33</u>
<u>SeM±</u>	<u>0.702</u>	<u>0.653</u>	<u>1.062</u>	<u>0.758</u>	<u>0.543</u>
<u>CD at 5% (1-10)</u>	<u>0.332</u>	<u>0.308</u>	<u>0.501</u>	<u>0.357</u>	<u>0.256</u>

Colour and Appearance

The effect of treatments on Colour and Appearance of Aonla Toffee is depicted in Table 1. Variety Chakaiya was (mean score 7.71) ranked highest for colour and appearance followed by variety Laxmi. Similarly, the effect of treatments on Colour and Appearance of Aonla Nectar was observed in Table 2. Variety NA-7 was (mean score 6.83) ranked highest for colour and appearance followed by variety Chakaiya. The effect of treatments on Colour and Appearance of Aonla Squash is depicted in Table 3., highest rank (7.18) was recorded In Chakaiya Variety.

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Table no. 2 Effect of treatments on organoleptic properties of aonla nectar

Aonla Nectar	Sensory score				
	Colour and appearance	Taste	Aroma	Flavour	Overall acceptability
NA-4	6.50	8.01	6.24	6.20	6.55
NA-5	6.00	8.06	6.39	6.50	6.67
NA-6	6.67	8.07	6.44	6.50	6.77
NA-7	6.83	8.26	6.76	6.70	6.80
NA-10	6.67	8.41	6.83	6.71	6.92
Laxmi	6.75	8.28	7.25	6.80	7.00
Chakaiya	6.79	8.48	7.41	6.84	7.10
SeM±	0.628	0.758	0.940	0.854	0.152
CD at 5% (1-10)	0.296	0.357	0.443	0.403	0.072

Taste

In organoleptic evaluation, taste is very important factor after colour and appearance. Statistical analysis revealed a significant effect of treatment on taste of various value added products of aonla. Variety Chakaiya (7.39 score) got higher scores of taste in Aonla Toffee was followed by (7.57 score) in variety Laxmi (Table 1) while the variety Chakaiya (8.48 score) got higher scores of taste in Aonla Nectar was followed by (8.41 score) in Variety NA-10 (Table 2). Similarly, variety Chakaiya (7.39 score) got higher scores of taste in Aonla Squash was followed by (7.33 score) in variety Laxmi (Table 4).

Flavour

The varieties had pronounced the effect on flavour of fruits. The varieties significantly affected the flavour value on days of storage. In case of aonla toffee, maximum flavour taste (7.91) was in NA-10 variety as compared to minimum (6.91) in NA-4 variety (Table 1). Similarly it has been reported that, maximum flavour taste (6.84) was in Chakaiya variety as compared to minimum (6.20) in NA-4 variety in aonla nectar (Table 2). The Chakaiya variety showed higher flavour value (7.96) at the end of storage period as compared to lower value (5.00) in NA-4 variety in aonla squash (Table 3).

Table no. 3 Effect of treatments on organoleptic properties of aonla squash

Aonla toffee	Sensory score				
	Colour and appearance	Taste	Aroma	Flavour	Overall acceptability
NA-4	5.97	6.58	5.87	5.00	6.80
NA-5	6.30	6.61	5.89	5.50	6.87
NA-6	6.64	6.70	5.92	6.00	6.99
NA-7	6.50	7.01	5.97	6.00	7.05
NA-10	6.81	7.20	5.99	7.50	7.21
Laxmi	6.92	7.33	6.02	7.80	7.35
Chakaiya	7.18	7.39	6.31	7.96	7.43
S.E \pm	0.103	0.114	0.540	0.153	0.553
CD (P = 0.05)	0.581	0.054	0.255	0.544	0.261

Aroma

Aroma scores of the value added products increased with the varieties. The maximum aroma value (7.57) was observed in Chakaiya variety followed by Laxmi (7.30) and NA-10 (7.22) in aonla toffee. In case of aonla nectar, the maximum aroma score (7.41) in Chakaiya variety as compared to minimum aroma score (6.91) in NA-4 variety. In aonla squash, the maximum aroma (6.31) was recorded in Chakaiya variety while minimum aroma (5.87) was recorded in NA-4 variety. The interaction effect of various varieties and products on flavour was found to be significant at the beginning of the storage.

Overall Acceptability

Overall acceptability was influenced with the varieties. It decides the consumer's preference to the product. Higher level of value added products could not produce top acceptability due to deviation from standard colour, Taste, Flavour, Aroma. Though, the best result was recorded (7.60 score) in Laxmi variety. Closely followed by (7.36 score) in Chakaiya variety. No certain pattern was observed with overall acceptability with the varieties concerned.

Conclusion

It can be concluded from this study that, the products can be effectively used as alternative source of value addition in toffee, nectar and Sauce. On the basis of results obtained it may be concluded that the varieties Laxmi and Chakaiya can be used in commercialization of different value added products. All of the sensory parameters decline slightly during storage but remain in acceptable region even after some days of storage.

References

1. Amerine, M.A., Pangborn, R.M., Rossler, E.B. Principles of sensory evaluation of Food. *Academic press*. New York, 1965; 283-289.
2. Anonymous. Annual Report, AICRP on arid fruits, Tech. Doc. 1988;18.
3. Khushbu, MahendraBairwa, Vijay Bahadur, Manisha K Rolaniya and Jayvanth Kumar. Study on changes in organoleptic quality of value added blended

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herbal Ready-to-serve (RTS) of aonla (*Emblica officinalis* Gaertn.) CV. NA-6 during storage period. *Journal of Pharmacognosy and Phytochemistry*, 2018; 708-711.

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4. Jat, M.L., Shrivam, J.S., Jat, R.K. and Pragati. Commercial products of aonla fruits, increasing the value addition. *Journal of Pharmacognosy and Phytochemistry*, 2021; 10 (1): 1331-1337.

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5. Kalra C.L., The Aonla. Indian food packer 1988; 42: 67-83.

6. Nath V., Sharma, R.K. Screening of aonla (*Emblica officinalis* Gaertn.) cultivars for processing. *Progressive Horticulture* 1998; 30 (1 & 2): 76-77.

7. Pareek, S., Rathore, N.S., Kaushik, R.A. Aonla (*Emblica officinalis* Gaertn.): Post harvest handling and processing technology, Rajasthan College of Agriculture, Techn. Bull. No. 1, Udaipur, India 2011; 45.

8. Rajendra Kumar. Studies on process standardization and storage behaviour of ready to serve (RTS) beverage prepared from aonla cultivars. *Journal of Pharmacognosy and Phytochemistry*. 2018; 7(6):74 -77.

9. Rakesh, Arya, S.S., Moond, S.K. Processed products of aonla. *Processed Food Industry* 2004; 7(4):20-23.

10. Seema Shekhawat, Rathore, N.S. and Kaushik, R.A. Advances in processing and Product development of aonla (*Emblica Officinalis*) in Indian context- A review. *International journal of food and nutritional sciences*. e - ISSN 2320-7876.

11. Singh, I.S., Pathak, R.K. Evaluation of aonla (*Emblica Officinalis* Gaertn.) varieties for processing. *Acta Horticulturae*. 1987; 208: 173-177.

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12. Singh, V. Studies on processing and storage stability of aonla (*Emblica Officinalis* Gaertn.) products. Ph. D. Thesis, Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) 1999.