Sensory Evaluation of Different Value Added Products of Aonla

(*Emblica officinalis* G.) During Storage

ABSTRACT

A research experiment was conducted during the year 2019-20 and 2020-21 in the Fruit and Vegetable Processing Unit Laboratory, Department of Horticulture, College of Agriculture, Gwalior with seven different varieties of aonla 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 up to 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 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 high indigenous medicinal value such as an anti-ascorbutic, laxative and antibiotic. 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).

"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)" (Shekhawat et al., 2014).. 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 andready-to-serve.

Due to its perishable nature and glut after harvest, which lowers the market value of fruit, aonla experiences postharvest losses that range from 30 to 40%. Therefore, the only practical method for future economic usage of expanded aonla output would be value addition through processing. Traditional procedures were time-consuming and unhygienic. Due to this, the nutritive losses are seen in higher amounts. Therefore an attempt is madeto 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 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

Aonla fruits that were fully developed, had a firm texture, and were all the same size were blanched and utilised in the experiment. Using a small-scale pulping equipment, the fruits were processed to extract pulp, yielding a fine pulp. The final pulp was 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.

Preparation of Aonla toffee

Recipe

Aonla pulp	1 kg
Sugar	750 gm
Glucose	100 g
Skimmed milk powder	150 g
Butter	50 g

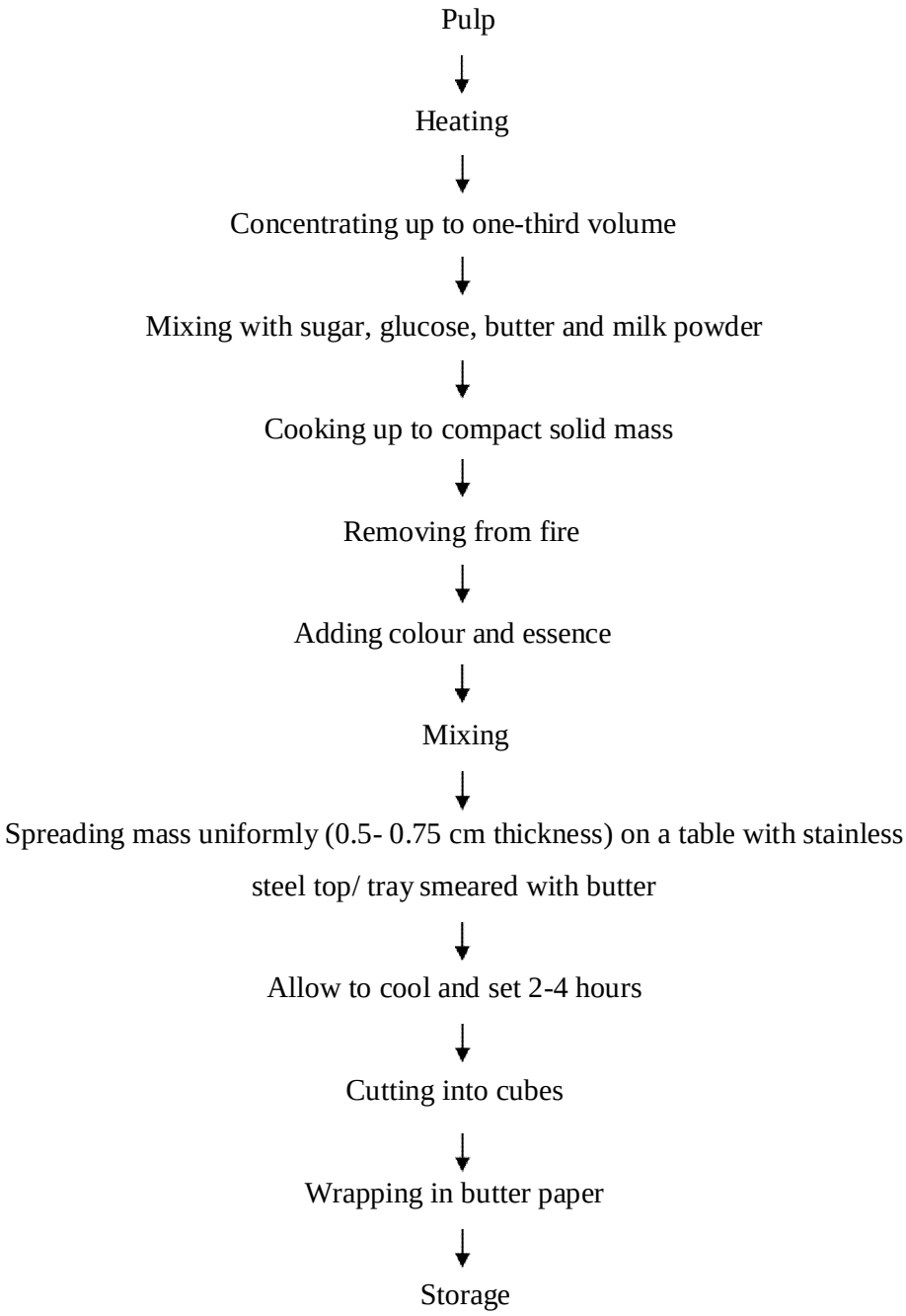

Fig. 1. Flow sheet for the preparation of aonla toffee

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.

Preparation of Aonla nectar

Recipe

Aonla pulp	20 per cent
Total soluble solids	15 per cent
Acidity	0.3 per cent
SO_2	70 ppm

Ripe fruit

↓

Washing

↓

Peeling

↓

Cutting into halves

↓

Seed removal

↓

Passing through pulpier

↓

Pulp

↓

Straining

↓

Determination of TSS and acid

↓

Addition of required amount of sugar and acid in the form of syrup formation

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Addition of preservative (By dissolving in small amount of nectar)

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Mixing/homogenization

↓

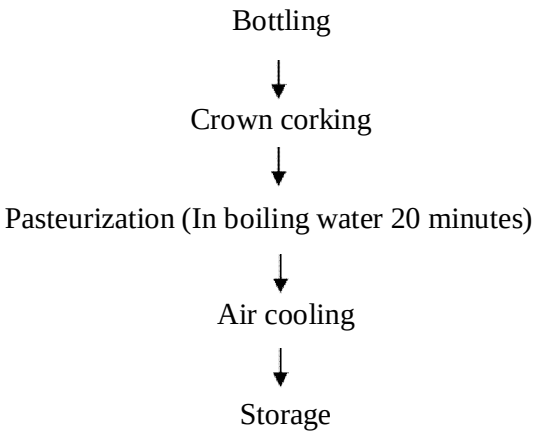


Fig. 2. Flow sheet of preparation of Aonla Nectar

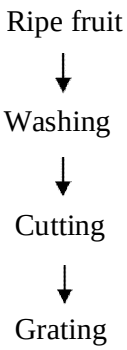
3. Aonla squash

Aonla squash 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.

Aonla squash type of fruit beverage, which contain at least 25 per cent juice and 45 per cent total soluble solids. It also contains about 1 per cent acidity and 350 ppm sulphur dioxide and 600 ppm sodium benzoate (in coloured juices). It is diluted before being served.

Recipe

Aonla pulp	25 per cent
Sugar	50 per cent
Acid	1.2 per cent
Sodium metabisulphite	350 ppm



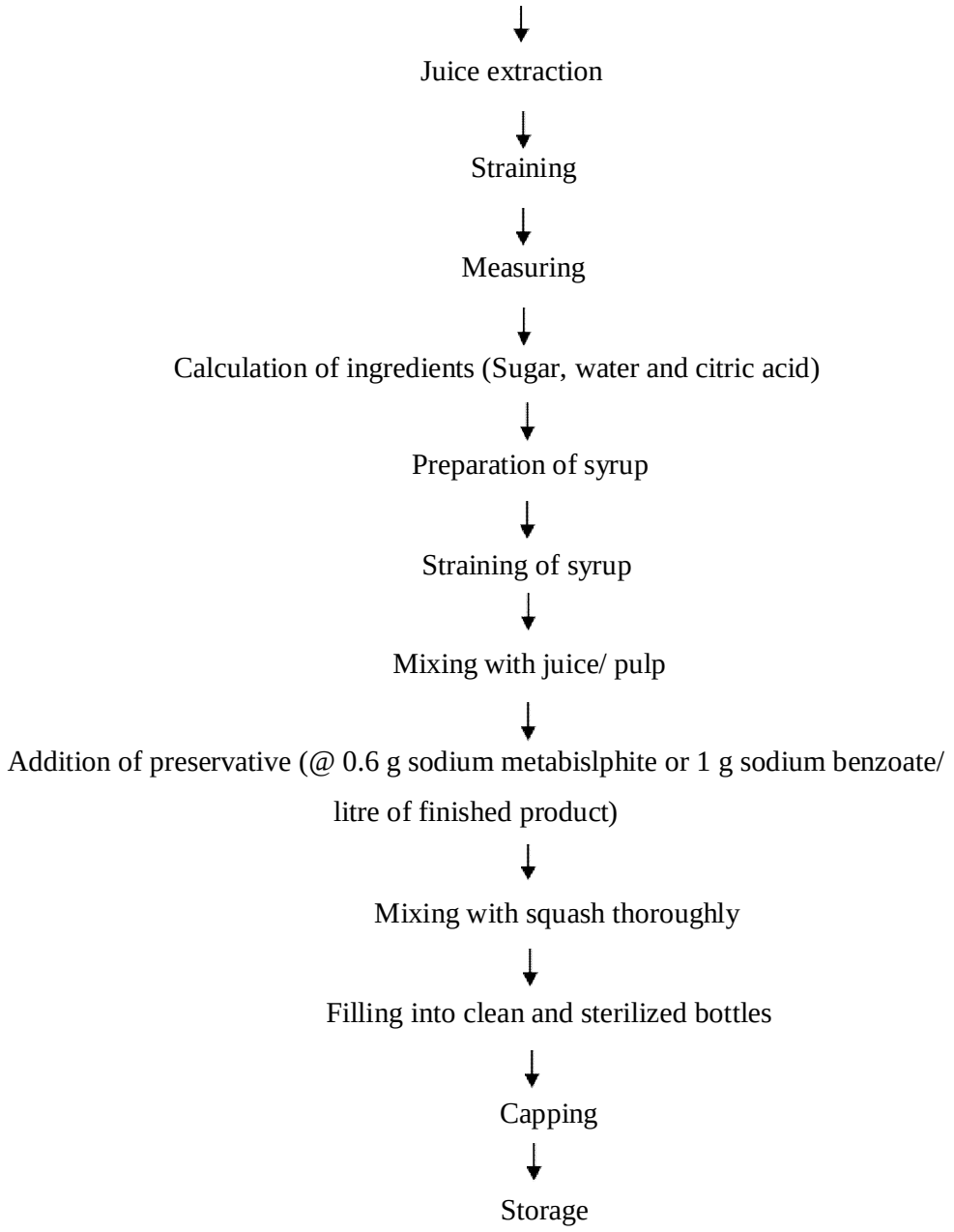


Fig. 3. Flowsheet on preparation of Aonla Squash

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

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).

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).

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

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

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., Chakaiya Variety was highest rank (mean score 7.18) was recorded.

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 3).

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

Aonla Squash	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
SeM±	0.103	0.114	0.540	0.153	0.553
CD at 5% (1-10)	0.581	0.054	0.255	0.544	0.261

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).

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 (Table 1). In case of aonla

nectar, the maximum aroma was observed (7.41) in Chakaiya variety as compared to minimum aroma score (6.91) in NA-4 variety (Table 2). In case of aonla squash, the maximum aroma (6.31) was recorded in Chakaiya variety while minimum aroma (5.87) was recorded in NA-4 variety (Table 3). 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 and Aroma. Though, the best result was recorded (7.60 score) in Laxmi variety, it is 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 Squash. 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. Even after a few days of storage, all of the sensory parameters continue to be within acceptable limits despite a modest reduction during storage.

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