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Screening of aonla cultivars for making squash

Vijay Jain*, Prabhakar Singh and A.K.Singh[1]

Department of Horticulture, Indira Gandhi Agricultural University, Raipur, Chattisgarh

[1]Direcotrate of Research Services, Indira Gandhi Agricultural University, Raipur, Chattisgarh

Abstract

An experiment was conducted at IGKV, Raipur to assess the suitability of aonla cultivar viz. Banarsi, Chakaiya, Francis, Kanchan, Krishna, NA-10, NA-6 and NA-7 for preparation of squash and their shelf life. A recipe of 40 per cent pulp, 60 per cent total soluble solids and 0.75 per cent acidity was found most ideal to prepare squash from Aonla. Among all the eight cultivars of aonla "Chakaiya" was found most suitable cultivar for preparation of squash. This squash remained acceptable up to period of six months during storage at room temperature. The total soluble solid, acidity, reducing sugar and total sugar of the squash increased continuously during storage while the ascorbic acid in contrast decreased.

Key words : *Aonla squash, oragnoleptic quality*

Introduction

Aonla (*Emblica officinalis*) a member of family Euphorbiaceae drop their leaves during February-March and goes under dormant condition and fruit starts growth during rainy season. This character makes aonla remunerative for wasteland and rainfed areas. As aonla is not consumable in fresh form or in raw state or even in the form of juice due to its highly astringent taste, its juice needs to be converted in the form of beverage to dilute its astringency. An attempt was therefore, made to utilize this fruit as beverage in the form of squash because the quality of the processed products can be maintained from good quality of raw materials only. Therefore, the present experiment was planned to screen the aonla cultivars for making squash.

Materials and methods

Studies were performed on eight cultivars of aonla viz Banarasi, Chakaiya, Francis, Kanchan, Krishna, NA-10, NA-6 and NA-7. The fruits were obtained from Horticulture farm, I.G.A.U., Raipur. Harvesting of fruits and preparation of squash was done in the month of December. The squash of following recipes were prepared. R_1 40 per cent pulp adjusted to 40 per cent TSS and 0.75 per cent acidity, R_2 40 per cent pulp adjusted to 50 per cent TSS and 0.75 per cent acidity, R_3 40 per cent pulp adjusted to 60 per cent TSS and 0.75 per cent acidity. For formulation of recipe the total soluble solids and total acidity present in the pulp were first determined and then remaining amount of sugar and citric acid were added. One litre of squash of each recipe was prepared by mixing the calculated amount of pulp, sugar, citric acid and water in different recipes. First sugar syrup was prepared by heating the mixture of sugar, water and citric acid and then it was blended with fruit pulp. Organoleptic quality of the recipes for aonla squash was evaluated by a panel of five judges who scored on a 9-point Hedonic scale (Ranganna, 1997). The trial was conducted under the set up of randomized block design with the judges acting as blocks. The recipe, found ideal for aonla squash, was used for screening suitable cultivar for squash. The bottles of aonla squash were stored (from December to July) at room temperature to study the physico-chemical changes during storage. The physico-chemical study of fresh aonla fruits of different cultivars alongwith the same for stored squash were determined as per the method described by Ranganna (1997). The TSS was measured using a hand refrectometer. The titrable acidity was determined by titrating against N/10 sodium hydroxide solution of thoroughly mixed sample with phenolphthalein indicator. The acidity was expressed in term of per cent citric acid of juice. The ascorbic acid (mg/100g) was determined by titrate known weight of sample with 2,6-dichlorophenol indophenol dye using metaphosphoric acid as a stabilizing agent. The reducing sugar in a sample was estimated by determining the volume of the unknown sugar solution required to completely reduce a measured

***Corponding author :**
Assistant Professor (Hort.)
IGAU, Raipur (chattishgarh).

volume of fehlings solution. The total sugar percentage was similarly estimated after acid inversion.

Result and discussion

The fresh fruit was analyzed for TSS, acidity, sugar and ascorbic acid. Results are presented in Table-1. The results of organoleptic evaluation (Table 2) indicates a significant difference between the recipes with respect to

Table-1. Percentage of TSS, Acidity, Sugar and Ascorbic acid (mg/100g pulp) in different cultivars of aonla.

Cultivar	TSS	Acidity	Sugar		Ascorbic acid
			Reducing	Total	
Banarsi	1088	2.07	2.63	3.83	431.4
Chakaiya	7.74	1.87	1.69	3.44	445.7
Francis	8.25	2.2	2.00	3.54	3.80.0
Kanchan	9.66	1.87	2.21	2.83	409.0
Krishna	11.75	1.99	2.54	3.85	455.6
NA-10	7.94	1.85	2.09	3.83	3.87.6
NA-6	9.28	1.76	2.01	3.39	420.6
NA-7	9.97	2.04	2.70	3.77	381.5

acceptability of aonla squash. A significantly highest score of 7.6 was recorded for acceptability of aonla squash in Recipe R-3 having 40 per cent aonla pulp, 60 per cent total soluble solids and 0.75 per cent acidity followed by Recipe R-1 with score 6.4. The least organoleptic score 6.2 was recorded in case of Recipe R-2. The data recorded on organoleptic quality of squash prepared from different

Table-2 : Average organoleptic score for recipe standardization of squash of aonla.

Recipe	Average score
40% pulp adjusted to 40% TSS and 0.75% acidity	6.4^{b}
40% pulp adjusted to 50% TSS and 0.75% acidity	6.2^{b}
40% pulp adjusted to 60% TSS and 0.75% acidity	7.6^{a}
SE (m) ±	0.32
CD (5%)	1.06

The superscripts indicate the treatment means with same letter are at par at 5% level of significance while the means with different letters are significantly different at 5% level. These letters have been affixed based on CD-value comparisons of treatment means.

cultivars of aonla are presented in Table-3. The squash prepared from the Chakaiya cultivar recorded significantly highest organoleptic score 8.4. The Chakaiya has also been reported to be suitable for preparation of beverages by Singh and Pathak (1987), Singh and Kumar (1995) and Nath

Table-3 : Screening of aonla cultivars for preparation of squash

Cultivars	Average organoleptic score
Banarasi	7.0^{b}
Chakaiya	8.4^{a}
Francis	6.0^{d}
Kanchan	6.2^{cd}
Krishna	6.4^{bcd}
NA-10	6.8^{bc}
NA-6	6.0^{d}
NA-7	6.6^{bcd}
SE(m)±	0.23
CD (5%)	0.67

and Sharma (1998). The squash prepared from Banarsi stood second highest within acceptable limit of score 7.0, however, it was statistically at par with those of Krishna, NA-10 and NA-7 at 5 per cent significant level. Both the cultivars NA-6 and Francis recorded least organoleptic scores of 6.0 for aonla squash, which was statistically at par with cultivars Kanchan, Krishna and NA-7.

A gradual change was recorded upto 6 months in the physico-chemical composition of aonla squash of Chakaiya cultivar during storage as evidenced by the organoleptic scores presented in Table 4. After 6 months the deterioration in composition of squash was rapid which brought down the scores below 7 and the product became unacceptable for consumption. Further, the perusal of Table 4 indicates that the TSS, titrable acidity, reducing and total sugar of Chakaiya squash increased continuously during storage. The significant changes were observed almost every month for TSS and Acidity. However, the changes in reducing and total sugar were slow. Ascorbic acid of the squash decreased continuously during storage. An increase in TSS during storage may possibly be due to the conversion of polysaccharides into sugar. The degradation of pectin substances of pulp into soluble solids might have contributed towards an increase in acidity of aonla beverage. The reason for rise in reducing sugar might be ascribed to the conversion of non-reducing sugar to reducing sugar due to the process of hydrolysis. Similarly the increase in total sugar might be due to partial hydrolysis

Table-4 : Physico-chemical changes in aonla squash of Chakaiya cultivar during storage.

Month	Average organoleptic score	TSS (%)	Acidity (%)	Reducing sugar (%)	Total Sugar	Ascorbic acid (mg/100g)
0	8.6[a]	60.07[a]	*4.95[a] (0.74)	37.60[a] (37.22)	45.45[a] (50.79)	393.0[a]
1	8.0[ab]	60.57[b]	5.17[b] (0.81)	37.93[b] (37.78)	45.69[b] (51.20)	376.6[b]
2	7.6[bc]	60.80[c]	5.29[c] (0.85)	38.25[c] (38.05)	45.83[c] (51.44)	363.0[c]
3	7.2[c]	60.97[d]	5.37[c] (0.87)	38.52[d] (38.78)	45.99[d] (51.72)	344.3[d]
4	7.2[c]	61.00[de]	5.62[d] (0.96)	38.58[d] (38.89)	46.31[e] (52.22)	330.0[e]
5	7.0[c]	61.07[e]	5.71[e] (0.99)	38.60[d] (38.92)	46.33[e] (52.32)	318.6[f]
6	7.0[c]	61.27[f]	5.83[f] (1.03)	39.06[e] (39.70)	46.44[f] (52.52)	297.0[g]
7	5.2[d]	61.43[g]	5.90[g] (1.06)	39.21[e] (39.96)	46.75[f] (53.06)	269.5[h]
SE (m) ±	0.20	0.02	0.02	0.08	0.02	2.71
CD (5%)	0.61	0.08	0.08	0.24	0.07	8.13

* Mean arcsine transformed value.

Figure in parenthesis are inverse transformed valued of the corresponding mean arcsine transformed values

Superscripts letters indicate the treatment means with same letter are at par at 5% level of significance while the means with different letters are significantly different at 5% level. (Superscript affixed on CDvalue comparisons of treatment means).

of complex carbohydrates. And the hydrolysis must have been accelerated due to high temperature and acidity. The reduction in ascorbic acid may be due to oxidation by trapped oxygen in glass bottle resulting in the formation of dehydroascorbic acid. These chemical changes in beverages of aonla juice during storage have been reported by Mehta and Rahotre (1976); in squash of litchi by Singh and Singh (1994); in squash of pomegranate by Prasad and Mali (2000).

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