



RESEARCH PAPER

Evaluation of different aonla (*Emblica officinalis Gaertn*) varieties for osmodehydrated candy product processing

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SUMMARY :

An experiment on evaluation of different aonla (*Emblica officinalis Gaertn*) varieties for osmodehydrated candy product processing” was carried out at the Post Graduate and Post Harvest Laboratory, Department of Horticulture, N.M. College of Agriculture and ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during the month of January to June 2009. Keeping the varieties V₁ (Gujarat aonla-1), V₂ (Krishna), V₃ (NA-7), V₄ (Chakaiya) and V₅ (Kanchan) in Complete Randomized Design with four replication. The nutritional value viz., TSS (%), acidity (%), ascorbic acid (mg/100g), total sugar (%), reducing sugar (%) and moisture (%) was carried out. The acidity of candy was found lower in NA-7 while higher in Krishna variety. While ascorbic acid was significantly maximum in NA-7 and Krishna while lower in Kanchan variety. In respect of total and reducing sugar content, it was found maximum in NA-7 and lowest in Kanchan and Krishna variety. However, TSS was significantly highest in NA-7 while the lowest in Chakaiya and Kanchan was equivalent. In other hand moisture was found significantly maximum in Gujarat aonla-1 while the lowest in Na-7.

KEY WORDS : Gujarat Aonla-1, Krishna, NA-7, Chakaiya, Kanchan, Candy

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The aonla (*Emblica officinalis Gaertn*) or Indian gooseberry (*Emblica officinalis Gaertn*) is one of the most important dry land crops grown in Gujarat. It is mainly grown in Maharashtra, Gujarat, Rajasthan, A.P., Karnataka and Tamil Nadu.

Aonla, is a very hardy and prolific bearer and the fruits are richest sources of vit. C ranging from 200 to 1814mg/100g. The fruit have little table value due to acrid in taste however known for great medicinal as well as therapeutic properties and also have good processing qualities. Hence, fruit is utilized for various value added products such as beverages, jam, chavanprash, triphala, arishtha, preserve, candy, sauce, dried chips, powder, tablets, chutney, pickles etc.

In Gujarat aonla is grown popularly by the orchardist mainly in middle, North and some parts of Saurashtra region.

Looking to the importance of aonla ICAR has started one project at Sardarkrushinagar Agricultural University, Dhantiwada (Gujarat) i.e., AICRP on Arid fruits the varieties are under testing for quality test and production point of view, Moreover, Gujarat Aonla-1 has been released by Anand Agricultural University and standardized osmodehydrated candy product (Ray and Kikani, 1999). Among different aonla products, candy is most popular product because of higher vitamin-C content, attractiveness and best taste value which is presently commercialized by processors under aonla growing region. Not only that but the Health Department, Government of Gujarat has also circulated circular in each department for utilization of aonla products in daily diets to school childrens as well as each and every family for maintaining the best health because vitamin-C is useful as

antioxidants and thereby creating immunity in our body against diseases. Looking to the various varieties of aonla under testing its needs to evaluate the suitable varieties for candy processing and to study the shelf life during storage in respect to nutritional and organoleptic acceptability point of view. Therefore, the present investigation was under taken with objectives to evaluate suitable varieties for osmodehydrated candy product processing and to study the nutritional status and shelf life of osmodehydrated aonla candy during storage period.

EXPERIMENTAL METHODS

The matured fruit was selected and washed with running water. The fruits were cut into pieces and dipped into 2% salt solution for 24 hours. Later on, the fruit pieces were blanched in the pressure cooker for 5 to 10 min. The sugar syrup having 70°B strength with 2% citric acid was prepared in and the blanched pieces was immersed into the syrup for 3 days for impregnation of sugar into flesh of segment and coating. Later on, the syrup strength was maintained to 70°B by adding extra sugar and again the pieces were kept in the syrup solution for 3 days. Then, the pieces were removed and dehydrated into the sun for 2 to 3 days. Thus, the aonla candy prepared and packed in the polyethylene bag which was stored for further observations (Anonymous, 2000). The same process was carried out four times for each variety as per experimental

design and repetition of treatment.

Chemical analysis :

Chemical composition of Aonla candy prepared from Gujarat aonla-1, Krishna, NA-7, Chakaiya and Kanchan varieties was determined. The total sugar, reducing sugar, acidity, ascorbic acid, TSS, moisture analysed as per the Ranganna (1986).

EXPERIMENTAL FINDINGS AND ANALYSIS

It was manifested from the presentation of statistically analyzed data of all biochemical constituents in the aonla candy made from different varieties were found statistically significant. The maximum (0.728 %) acidity was found in V₂ (Krishna) candy while, lowest (0.695 %) acidity was found in candy of V₃ (NA-7) it is mostly due to the varietals characters, the observation recorded there of, are presented in Table 2. Among all the candy of aonla varieties under study V₂ (Krishna) was found to be significantly maximum (88.60 mg/100g) in AA content and was at par with V₃ may be due to the highest content of AA in fruits and status of variety. While lowest (82.39 mg/100 g) in AA content was observed under V₅ (Kanchan) variety, observation recorded there of are presented in Table 3. In case of TSS V₃ (NA-7) significantly gave highest (78.41 %) value of TSS content due to high TSS (%) content in fruit pulp varietal character, the observation recorded there,

Table 1 : Nutritional composition of candy

Treatments	Acidity (%)	Ascorbic acid (mg/100g)	Total soluble solids (%)	Reducing sugar (%)	Total sugar (%)	Moisture (%)
V ₁ Gujarat aonla-1	0.698	83.76	73.33	34.55	45.13	16.50
V ₂ Krishna	0.728	88.60	76.59	33.16	43.57	14.75
V ₃ NA-7	0.695	87.72	78.41	35.13	47.00	14.37
V ₄ Chakaiya	0.708	84.52	72.79	33.64	44.56	16.21
V ₅ Kanchan	0.725	82.39	73.14	32.38	43.44	16.27
S.E.±	0.004	0.29	0.43	0.36	0.46	0.24
C.D. (P=0.05)	0.014	0.86	1.31	1.095	1.39	0.71
CV %	1.27	0.67	1.16	2.15	2.06	3.03

Table 2 : Changes in total soluble solids (%) during the storage of osmodehydrated aonla candy prepared from different varieties

Different varieties of Aonla	Storage periods			Mean
	0 Months	3 Months	6 Months	
V ₁ Gujarat Aonla-1	70.40	72.68	73.33	72.13
V ₂ Krishna	70.74	75.84	76.59	74.39
V ₃ NA-7	71.74	75.88	78.41	75.34
V ₄ Chakaiya	70.36	71.50	72.79	71.55
V ₅ Kanchan	70.14	71.62	73.14	71.63
S.E. ±	0.198	0.37	0.43	
C.D. (P=0.05)	0.598	1.12	1.31	
CV %	0.56	1.02	1.16	

are presented in Table 4. While the lowest (72.79 %) was found in V₄ (Chakaiya) and was at par with V₅ and V₁. The variety V₃ (NA-7) recorded the highest (35.13 %) reducing sugar content, while, lowest (32.38 %) was recorded in V₅ (Kanchan

Table 3 : Changes in total sugar (%) during the storage of osmodehydrated aonla candy prepared from different varieties

Different varieties of Aonla		Storage periods			Mean
		0 Months	3 Months	6 Months	
V ₁	Gujarat Aonla-1	43.50	44.20	45.13	44.28
V ₂	Krishna	41.73	42.35	43.57	42.55
V ₃	NA-7	45.00	46.10	47.00	46.03
V ₄	Chakaiya	42.14	43.15	44.56	43.28
V ₅	Kanchan	41.32	42.00	43.44	42.25
S.E. ±		0.49	0.52	0.46	
C.D. (P=0.05)		1.48	1.56	1.39	
CV %		2.29	2.37	2.06	

Table 4 : Changes in reducing sugar (%) during the storage of osmodehydrated aonla candy prepared from different varieties

Different varieties of Aonla		Storage periods			Mean
		0 Months	3 Months	6 Months	
V ₁	Gujarat Aonla-1	32.20	33.72	34.55	33.49
V ₂	Krishna	30.35	32.34	33.16	31.95
V ₃	NA-7	33.00	34.20	35.13	34.11
V ₄	Chakaiya	31.15	32.44	33.64	32.41
V ₅	Kanchan	30.15	32.00	32.38	31.51
S.E. ±		0.41	0.36	0.36	
C.D. (P=0.05)		1.25	1.08	1.095	
CV %		2.64	2.18	2.15	

Table 5 : Changes in acidity (%) during the storage of osmodehydrated aonla candy prepared from different varieties

Different varieties of Aonla		Storage periods			Mean
		0 Months	3 Months	6 Months	
V ₁	Gujarat Aonla-1	0.650	0.668	0.698	0.672
V ₂	Krishna	0.705	0.713	0.728	0.715
V ₃	NA-7	0.645	0.663	0.695	0.668
V ₄	Chakaiya	0.655	0.685	0.708	0.683
V ₅	Kanchan	0.695	0.700	0.725	0.707
S.E. ±		0.006	0.004	0.004	
C.D. (P=0.05)		0.020	0.014	0.014	
CV %		1.95	1.39	1.27	

Table 6 : Changes in Ascorbic acid (mg/100g) during the storage of osmodehydrated aonla candy prepared from different varieties

Different varieties of Aonla		Storage periods			Mean
		0 Months	3 Months	6 Months	
V ₁	Gujarat Aonla-1	105.53	92.70	83.76	93.996
V ₂	Krishna	110.06	99.02	88.60	99.23
V ₃	NA-7	112.80	98.49	87.72	99.67
V ₄	Chakaiya	109.81	94.28	84.52	96.20
V ₅	Kanchan	106.21	92.99	82.39	93.86
S.E. ±		0.05	0.52	0.29	
C.D. (P=0.05)		0.15	1.57	0.86	
CV %		0.09	1.09	0.67	

variety) because status of fresh varieties having high content of sugar retained higher and lower retained lower in candy, the observation recorded there of, are presented in Table 5. It is apparent from Table 6 that the level of total sugar was significantly highest (47.00 %) in a V_3 (NA-7), while V_1 was stood second and was at par with V_4 . While the lowest (43.44 %) level of total sugar was found in V_5 (Kanchan) variety. It might be due to the genetically character and status of the varieties the observation recorded there of are presented in Table 6. The maximum moisture content (16.50 %) was recorded in V_1 (Gujarat Aonla-1) variety, which was at par with V_5 and V_4 varieties. The minimum moisture content (14.37 %) was found in V_3 (NA-7) variety observation recorded there of, are presented in Table 7. Similar results were reported by Lal *et al.* (2005); Naik and Chundawat (1996). Singh *et al.* (2008) and Singh *et al.* (2007) also worked on quality and preparation of aonla candy. Gupta (1983) and Rani and Bhatia (1985) also worked on making delicious candy from ber and pear, respectively.

Summary:

The candy of five varieties were dipped in 70^o Brix sugar solution with 2% citric acid thereafter osmodehydrated and analyzed for chemical and organoleptic characters for nutritional qualities status during 0, 3 and 6 months storage. Study indicated that maximum osmodehydrated products recovery was obtained from Gujarat aonla-1, while Krishna at 2nd rank and NA-7 was at 3rd rank, respectively. In respect to the chemical status TSS, TS, RS, and AA content in

osmodehydrated product highest was found in NA-7 and TS and RS were equally good in Gujarat aonla-1 than rest of the varieties which was equally good in for nutritional status. However, acidity level was highest in Krishna. While lower level of TSS, TS and RS content were obtained in Kanchan but TS and RS equally lowest in Chakaiya and Krishna. The lower level of ascorbic acid was found in Kanchan and it was followed by Gujarat Aonla-1 added equally lowest in respect of ascorbic acid of osmodehydrated candy. The moisture level was lowest in NA-7 and Krishna, which showed higher shelf life of osmodehydrated candy product and moisture level was highest in Kanchan and Gujarat Aonla-1. Looking to the storability in respect of behaviour of chemical constituents in the osmodehydrated candy *viz.*, TSS, TS, RS, acidity and moisture level found increasing trend, while AA had decreasing trend during 0, 3 and 6 months storage.

The maximum colour, taste and texture were found in NA-7 which was equally good with Krishna in respect of taste, except taste which was equally good with Chakaiya variety. The lowest acceptability in respect of colour, texture and overall acceptability were found in Gujarat Aonla-1; While, taste of osmodehydrated candy was lowest in Kanchan. The flavour acceptability was found unchanged during storage. Looking to the organoleptic quality during storage it was found in decreasing trend during the 0, 3 and 6 month of storage. However, overall organoleptic acceptability in respect of colour, taste, texture and flavor only NA-7 candy was appeared significantly superior than rest of the varieties of aonla.

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