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RESEARCH PAPER

Sensory attributes changes in aonla (*Emblica officinalis* Gaertn) candy during the storage

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SUMMARY :

An experiment on evaluation of different aonla [*Emblica officinalis* Garten] 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 V_1 (Gujarat aonla-1), V_2 (Krishna), V_3 (NA-7), V_4 (Chakaiya) and V_5 (Kanchan) in Complete Randomized Design with four repetitions. The nutritional value *viz.*, TSS (per cent), acidity (per cent), ascorbic acid (mg/100g), total sugar (per cent), reducing sugar (per cent) and moisture (per cent) was carried out. The acidity of candy was found lower in NA-7 while higher in Krishna variety. 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. It was equivalent in Kanchan variety. On the 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 or Indian gooseberry (*Emblica officinalis* Garten) is one of the most important dry land crops grown in Gujarat. It is mainly grown in Maharashtra, Gujarat, Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu.

Aonla is a very hardy and prolific bearer and the fruits are richest sources of vitamin 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 having good processing qualities. Hence, the 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 mainly middle, North and some parts of Saurashstra region, aonla is grown popularly by the orchardist. Looking to the importance of aonla ICAR has started one project at Sardar krishinagar 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). Amongs 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 children's as well as each and every family for maintaining the best health because

vitamin-C useful as antioxidants and thereby creating immunity in our body against diseases. Looking to the various varieties of aonla under testing it's need 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 fruit 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 minutes. The sugar syrup having 70°B strength with 2% citric acid was prepared in and the blanched pieces were 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 was 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 repitation 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 were analysed as per the Ranganna (1986).

Organoleptic evaluation :

Candy was evaluated for sensory characteristics *viz.*, colour, texture, flavour, taste and overall acceptability (Total score/100 points). Each attributes was given a separate score of 25 points. Sensory evaluation panel consisted of 5 trained panellists and were instructed to evaluate the sample as per hedonic scale procedure as described by Ranganna (1986).

EXPERIMENTAL FINDINGS AND ANALYSIS

It can be summarized that V_3 (NA-7) had highest colour acceptability score value and it decreased during the storage, which was at par with V_4 and V_2 they also decreased score value during storage (Table 1). Colour score value of a candy decreasing during the storage, it may be due to absorption of atmospheric moisture and oxygen which effect on compositional

Table 1: Changes in colour (score out of 25) of various aonla candy during the storage periods

Treatments		Storage periods			
		0 Month	3 Months	6 Months	Mean
V_1	Gujarat aonla-1	17.21	16.79	16.78	16.93
V_2	Krishna	18.16	17.33	16.88	17.46
V_3	NA-7	21.59	20.95	20.41	20.99
V_4	Chakaiya	21.52	20.78	20.37	20.89
V_5	Kanchan	19.32	17.83	17.58	18.24
S.Em. ±		0.196	0.209	0.212	
C.D. (P=0.05)		0.59	0.63	0.64	
CV %		2.01	2.23	2.31	

Table 2: Changes in texture (score out of 25) of various aonla candy during the storage periods

Treatments		Storage periods			
		0 Month	3 Months	6 Months	Mean
V_1	Gujarat aonla-1	17.80	18.74	18.04	18.19
V_2	Krishna	18.01	18.95	18.45	18.47
V_3	NA-7	22.63	22.12	20.52	21.76
V_4	Chakaiya	20.72	20.23	17.19	19.38
V_5	Kanchan	19.27	18.28	17.61	18.39
S.Em. ±		0.48	0.31	0.39	
C.D. (P=0.05)		1.44	0.93	1.16	
CV %		4.86	3.15	4.20	

status and browning reaction. This kind of observation was also recorded by Singh *et al.* (2008) for aonla candy, Naik and Chundawat (1996) in aonla dehydrated product. It can be concluded that the texture acceptability was superior in candy processed from V_3 (NA-7) and V_4 (Chakaiya) variety stood at 2nd rank, while the lowest texture acceptability score was found in V_1 (Gujarat aonla-1), the score value of all the varieties decreased during storage period up to 6 months (Table 2). The texture score value decreased during storage may be due to the absorption of moisture and hygroscopic nature of candy. This type of observation was also recorded by Naik and Chundawat (1996) in aonla dehydrated product, Singh *et al.* (2006) in aonla osmodehydrated product and Singh *et al.* (2008) for aonla candy. The statistical data showed non significant result hence, statistically there were no any differences during 0, 3 and 6 months storage of aonla candy in respect of flavour. The decreasing score trend was observed during storage, may be due to the browning reaction and loss of flavour evidenced by decreasing colour score value during storage (Table 3). This type of result also observed by Singh *et al.* (2008) for aonla candy, Naik and Chundawat (1996) in aonla dehydrated product and Collado *et al.* (1989) in passion fruit . The maximum taste acceptability score was found in V_3 (NA-7), and it decreased during the storage period. The minimum taste score value was found in V_5 (Kanchan) (Table 4). During the storage period taste acceptability score value was decreased, and higher

Table 3: Changes in flavour (score out of 25) of various aonla candy during the storage periods

Treatments		Storage periods			
		0 Month	3 Months	6 Months	Mean
V_1	Gujarat aonla-1	18.13	17.27	15.94	17.11
V_2	Krishna	18.46	17.57	16.66	17.56
V_3	NA-7	18.54	17.85	16.92	17.77
V_4	Chakaiya	18.32	17.48	16.11	17.30
V_5	Kanchan	17.96	17.11	15.78	16.95
S.Em. ±		0.27	0.39	0.39	
C.D. (P=0.05)		NS	NS	NS	
CV %		2.94	4.45	4.80	

Table 4: Changes in taste (score out of 25) of various aonla candy during the storage periods

Treatments		Storage periods			
		0 Month	3 Months	6 Months	Mean
V_1	Gujarat aonla-1	18.43	17.42	16.55	17.47
V_2	Krishna	20.38	18.73	18.33	19.15
V_3	NA-7	20.87	19.07	18.76	19.57
V_4	Chakaiya	18.80	17.70	17.50	18.00
V_5	Kanchan	17.94	16.97	16.32	17.08
S.Em. ±		0.39	0.46	0.47	
C.D. (P=0.05)		1.17	1.40	1.41	
CV %		4.05	5.16	5.34	

Table 5: Changes in overall acceptability (score out of 100) of various aonla candy during the storage periods

Treatments		Storage periods			
		0 Month	3 Months	6 Months	Mean
V_1	Gujarat aonla-1	71.56	70.56	67.32	69.81
V_2	Krishna	75.00	72.43	70.23	72.55
V_3	NA-7	83.43	79.99	76.61	80.01
V_4	Chakaiya	79.35	76.18	71.59	75.71
V_5	Kanchan	74.15	70.19	66.87	70.40
S.Em. ±		1.00	0.56	0.67	
C.D. (P=0.05)		3.02	1.68	2.00	
CV %		2.61	1.51	1.89	

acceptability score remained highest. This observation was also supported by Tripathi *et al.* (1988) in aonla preserve, Singh *et al.* (2008) for aonla candy. Perusal of the result presented in Table 5 in respect of colour, texture, flavour and taste at 0, 3 and 6 months storage periods showed that at 0 hr the highest score value observed in V_3 (NA-7) and it was at par with V_4 and V_2 at initial stage. During the 3 and 6 months of storage it decreased and remained (76.61) maximum. While, the lowest overall acceptability was recorded in V_5 (Kanchan) and V_1 (Gujarat aonla-1) at initial stage and during the 3 and 6 months of storage study decreased score value and remained significantly lowest (66.87) and (67.32), respectively. A general trend was observed in reduction of overall acceptability score during storage which may be attributed change in chemical composition of the product and loss of colour and flavour during the storage. This kind of observation was also observed by Singh *et al.* (2008) in study of aonla candy, Naik and Chundawat (1996) in aonla dehydrated product.

Conclusion :

In sensory evaluation of new aonla candy product, it can be elucidated that the V_3 (NA-7) had highest overall acceptability of the aonla candy product than the rest of the varieties *viz* V_2 (Krishna), V_4 (Chakaiya) and V_5 (Kanchan). This aonla candy product remained highest in organoleptic evaluation at initial status and remained acceptable during the 6 months of storage with similar status.

The candy of five varieties were dipped in 70^0 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 were 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 equally good in Gujarat aonla-1 than rest of the varieties which were equally good in for nutritional status.

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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