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SHORT COMMUNICATION

Development and quality evaluation of aonla mouth freshner

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Abstract Nutritive and palatable mouth freshners were prepared from dehydrated aonla (*Emblica officinalis* Gaertn) pulp of 'Desi' and 'Banarsi' cultivars by mixing carboxy methyl cellulose, gums, arecanut, cardamom, sugar and milk powder at different proportions as a substitute for *pan masala*, tobacco and *gutka*. Mouth fresheners developed were packed in high density polyethylene pouches (HDPE, 100 gauge), stored at ambient conditions (8–20 °C, 60%RH) and analysed for physico-chemical and sensory quality attributes at different storage intervals. During storage for 6 months, ascorbic acid and overall acceptability of mouth freshener decreased ($p \leq 0.05$) and moisture content increased. The equivalent relative humidity of mouth freshener was 49% and 53% in 'Desi' and 'Banarsi' cultivars, respectively. Despite the changes observed in various physico- chemical and sensory attributes, the overall sensory quality attributes of mouth freshners remained acceptable.

Keywords Aonla · Mouth freshener · Ascorbic acid · Sensory acceptability

Aonla (*Emblica officinalis* Gaertn) also known as Indian gooseberry is used as a major constituent in several Ayurvedic preparations like Chyavanprash, which promotes health and longevity (Rajkumar et al. 2001). It is one of the richest sources of vitamin C among cultivated fruits except Barbados cherry. The pulp of fresh fruit contains 200–900 mg/100 g of vitamin C and as dehydrated aonla pulp retains as much as 1,699.09 mg/100 g of vitamin C on dry weight basis (Kalra 1988). The fruit is highly perishable in nature and is available for short period from October to January (Ghorai and Sethi 1996). Moreover, because of its highly acidic and astringent nature, consumers do not relish this fruit in fresh form (Goyal et al. 2008). Aonla fruit is processed into *murabbas*, candy, dried chips, jelly, sauce, pickle, squash and syrup (Kalra 1988; Goyal et al. 2008). The fruit is used as an antiscorbic, diuretic and laxative (Singh and Pathak 1987), curing common cold, gastric troubles, acidity and scurvy (Tandon et al. 2003), dysentery and bronchitis, diabetes, diarrhoea, jaundice and dyspepsia (Bhosale et al. 2000).

Consumption of *pan masala*, tobacco and *gutaka* have increased manifold despite statutory warning about their threat to human health. Aonla *supari* available in the market suffers huge processing losses in vitamin C and other nutrients. This defeats the purpose of producing the product. Since dehydrated aonla pulp retains sufficient amount of vitamin C, there is a need to develop an alternate chewing product with health promoting nutrients. Therefore, present study was undertaken to develop aonla mouth freshner which can prove to be a novel innovative product that can provide a better substitute.

Materials and methods

Mature aonla (*Emblica officinalis* Gaertn) fruits of 'Desi' and 'Banarsi cultivars were procured from grain market, Sector - 26, Chandigarh, India. The fruits were washed, cleaned and blanched separately for 4–5 min. Blanched fruits were manually destoned and the flesh was boiled for 15 min with 10% water and then passed through pulper. Extracted aonla pulps (865 g) were dehydrated by mixing carboxy methyl cellulose (5 g), gum Arabic (5 g) and milk powder (125 g) at 60 °C for 8±1 h. Mouth freshner was prepared using different

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Table 1 Standardization of recipe for the preparation of mouth freshener

Ingredients	Recipes			
	R_1	R_2	R_3	R_4
Dried aonla pulp, g	10	10	10	10
Fennel, g	5	4	3	2
Arecanut, g	1.0	1.5	2.0	2.5
Cardamom, g	2.5	2.0	1.5	1.0
Sugar powder, g	2	3	4	5
Pepper mint, mg	10	10	10	10

ingredients (Table 1). Sugar, arecanut, fennel, cardamom and peppermint were coarsely ground and mixed properly with dehydrated aonla pulp. Ingredients were chosen after preliminary screening based on acceptability of consumers. The mouth freshners prepared from both cultivars were packed in high density polyethylene pouches (HDPE, 100 gauge) and stored at ambient conditions (8–20 °C, 60% RH).

Analyses Physico-chemical characteristics of aonla mouth freshners were evaluated on preparation day (0 day) and after 60, 120 and 180 days intervals. Ascorbic acid, moisture content and equilibrium relative humidity (ERH) were determined as per Ranganna (1986) methods.

Sensory evaluation A panel of 20 semi-trained judges evaluated sensory overall acceptability of mouth freshners using 9-point Hedonic scale (Amerine et al. 1965).

Statistical analysis Complete randomized design was used to analyze the data of quantitative estimation of moisture and ascorbic acid content, while the data for overall acceptability was analyzed by randomized block design (Panse and Sukhatme 1967).

Results and discussion

Table 2 reveals that on preparation day, R_3 samples had highest overall acceptability mean score of 7.3 and 7.7 for 'Desi' and 'Banarsi' cultivars, respectively. All the recipes obtained sensory overall acceptability score above 6 (like slightly) of 'Desi' cultivar whereas in 'Banarsi' cultivar, the

Table 2 Effect of storage (s) (0–180 days) on overall sensory acceptability, moisture and ascorbic acid of aonla mouth freshener

Recipe(R)	'Desi'					'Banarsi'				
	0	60	120	180	Mean	0	60	120	180	Mean
Overall sensory acceptability[a]										
R_1	6.2	6.2	6.1	6.1	6.2	6.0	6.0	6.0	5.9	6.0
R_2	7.0	7.0	6.9	6.9	7.0	7.2	7.2	7.1	7.1	7.2
R_3	7.3	7.3	7.2	7.2	7.3	7.7	7.7	7.6	7.6	7.7
R_4	6.5	6.5	6.4	6.4	6.5	6.6	7.6	7.5	7.5	7.3
Mean	6.8	6.7	6.6	6.7	6.7	6.9	6.1	7.1	7.0	7.0
R=0.01, *S*=0.01, *V*=0.01, R × S=0.01, R × V=0.01, S × V=0.01, R × S × V=0.02 (CD=0.05)										
Moisture, %										
R_1	9.1	11.6	12.4	13.2	11.6	9.1	10.8	12.2	13.9	11.5
R_2	9.1	11.8	12.6	13.3	11.7	9.1	10.6	12.0	12.8	11.1
R_3	9.1	11.6	12.5	13.3	11.6	9.1	10.9	12.5	13.7	11.5
R_4	9.1	11.6	12.5	13.3	11.6	9.2	11.1	13.1	14.0	11.8
Mean	9.1	11.7	12.5	13.3	11.6	9.1	10.8	12.4	13.6	11.5
R=0.08, *S*=0.15, *V*=0.10, R × S=0.30 R × V=0.21, S × V=0.21, R × S × V=0.43 (CD=0.05)										
Ascorbic acid, mg/ 100 g										
R_1	114.5	109.1	79.8	52.5	88.8	108.4	88.1	66.6	51.5	78.6
R_2	111.1	104.5	73.0	51.0	85.0	107.3	84.0	63.0	49.0	75.8
R_3	109.6	92.3	66.5	48.7	79.3	104.4	83.3	67.1	48.3	74.3
R_4	109.9	96.3	67.0	51.2	81.1	107.8	87.8	66.3	51.2	78.2
Mean	111.2	100.5	71.5	50.8	83.5	106.9	85.8	64.4	49.9	76.8
R=0.05, *S*=0.05, *V* = NS, R × S=0.03, R × V=0.06, S × V=0.01, R × S × V=0.13 (CD=0.05)										

V variety of cultivars

[a] Rating on a 9-point Hedonic scale, R_1- R_4: As in Table 1

Table 3 Equilibrium relative humidity (ERH) of best mouth freshener

EMC, %	RH, %	[a]Days	Remarks
'Desi'			
5.12	10	14	No change in colour and texture
7.20	20	14	No change in colour and texture
10.78	30	13	No change in colour and texture
12.57	40	12	No change in colour and texture
13.75	50	10	No change in colour and texture
15.50	60	06	Browning
17.92	70	06	Severe browning
27.50	80	04	Fungus growth after 15 days
36.02	90	04	Fungus growth after 12 days
42.96	100	03	Fungus growth after 10 days
'Banarsi'			
5.10	10	16	No change in colour and texture
7.85	20	16	No change in colour and texture
9.20	30	15	No change in colour and texture
12.82	40	14	No change in colour and texture
13.96	50	12	No change in colour and texture
15.50	60	09	Browning
18.20	70	08	Severe browning
28.76	80	06	Fungus growth after 16 days
35.90	90	05	Fungus growth after 13 days
42.55	100	04	Fungus growth after 10 days

EMC equilibrium moisture content, *RH* relative humidity

[a] Days required to reach equilibrium

mean score was above 7 (like moderately) for R_2, R_3 and R_4 (Table 2). However, decrease in score of overall acceptability during storage was recorded in mouth fresheners of both cultivars, though remained within acceptable limits. Reduction in overall acceptability scores in osmo-air dried papaya and aonla during storage were also reported by Ahmed and Choudhary (1995) and Pragati et al. (2003), respectively.

Moisture content of aonla mouth fresheners of both cultivars increased during storage (Table 2). However, cultivars could not influence the moisture content of aonla mouth fresheners. Almost the same trend in moisture content had been observed in dehydrated 'Dashehari' mango slices (Sagar and Khurdiya 1999) and in dehydrated aonla powder (Sharma et al. 2002).

Ascorbic acid content in aonla mouth freshners varied from 48.7 to 114.5 and 48.3 to 108.4 mg/100 g in 'Desi' and 'Banarsi' cultivars, respectively (Table 2). Maximum ascorbic acid was on the preparation day. Mean value of ascorbic acid content in mouth freshners decreased from 111.2 to 83.5 mg/100 g in 'Desi' and 106.9 to 76.8 mg/100 g in 'Banarsi' cultivars during storage for 6 months irrespective of recipes. Similar trend in reduction of ascorbic acid content in aonla candy, shreds and powder during storage was also reported by various workers (Sharma et al. 2002; Singh et al. 2003).

The mouth freshners of 'Desi' cultivar remained acceptable at 50% RH. The moisture gained by mouth freshners at 50% RH was 13.8% and no change in appearance and texture was observed (Table 3). The critical point during study was noticed at 60% RH in mouth freshners of 'Desi' cultivar. However, beyond 50% RH, the mouth freshner turned dark and soft. The ERH for mouth freshner of 'Desi' cultivar was 49%. Similarly, mouth freshner prepared from 'Banarsi' cultivar remained acceptable up to 50% of RH (Table 3) with 14% EMC. The optimum ERH of 'Banarsi' cultivar was 53%.

Conclusion

Mouth freshener prepared with 50% dehydrated aonla pulp, 15% fennel, 10% arecanut and 20% sugar was adjudged best on the basis of overall sensory acceptability attributes during storage for 180 days, irrespective of cultivars. The mouth freshener developed had herbal formulation having potential health benefits.

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