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Value addition of Aonla (*Emblica officinalis* Gaertn.) by preparation of health drink after blending with guava pulp and *Aloe vera* juice

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Abstract

Study entitled “Value addition of aonla (*Emblica officinalis* Gaertn.) by preparation of health drink after blending with guava pulp and *Aloe vera* juice” was conducted at the PHT A Laboratory, Department of Post Harvest Technology, College of Horticulture and Forestry, Jhalawar during May, 2022 to August, 2022 with a view to find out the organoleptic acceptability of blend of aonla with guava and *Aloe vera* in ratios of 100:0; 75:25, 50:50, 75:25, 50:50, 50:25:25, 33.33:33.33:33.33 for preparation of health drink and also to find out most superior blend among them, keeping 20 percent pulp/ juice, 15°B TSS and 0.3 percent acidity. The experiment was laid out in completely randomized design. Among different combinations blending of aonla with guava pulp in 50:50 T₃ and aonla with guava and *Aloe vera* in 50:25:25 (T₆) were found superior since T₃ was found best with respect aroma, taste, TSS, pH, total sugar, reducing sugar, total and third best in ascorbic acid while T₆ was found best in colour and overall acceptability up to 3 months of storage.

Keywords: Aonla, blended health drink, Guava, *Aloe vera*

Introduction

Aonla also called as Indian gooseberry (*Emblica officinalis* Gaertn.) belongs to family Euphorbiaceae and is a native to tropical Asia. India ranks first in the world in area and production of aonla. Its cultivation is concentrated mainly in Uttar Pradesh, Maharashtra, Gujarat, Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu. Aonla is rich source of vitamins C (400-600 mg/100 g). Aonla is valued for its antiscorbutic, diuretic, laxative, antibiotic, hypoglycaemic, hypolipidemic and cooling properties (Mishra *et al.*, 2009) [8]. A lot of work has been done on blending of aonla juice with other fruit juice, having strong flavour for preparation of beverages (Jain and Khurdiya, 2004) [5]. Guava (*Psidium guajava* L.) fruit due to its pleasant aroma and taste is a strong candidate for blending with other fruits for development of beverages. Further, it also possesses high nutritional properties as it is a rich source of ascorbic acid, polyphenols, carotenoids, fibers, carbohydrates, organic acids, flavonoids and minerals like calcium, phosphorus, iron etc. (Uzzaman *et al.*, 2018) [19]. On the other hand, *aloe* commonly known as Gheegwar/Ghritkumari is ‘bitter’ in taste but known for its medicinal properties. There are more than 300 species of *Aloe* and of these only 4 or 5 are commonly used in medicines. The most widely used species of *Aloe* is *Barbadensis millar* (Banjare, 2014) [1]. Health drink can be one of the refreshing drinks having zero carbonation, relatively low or zero preservative and excellent source of several important vitamins and minerals. The health drink can be prepared in the form of nectar. As per FPO, nectar is fruit beverage that contain at least 20 percent of fruit juice or pulp, 15 percent of soluble solids and 0.3% percent of acid. It is not diluted before serving (Raj, 2012) [10]. The blended fruit beverages are far superior to synthetic beverages in terms of quality. They are easily digestible, highly refreshing, thirst-quenching, appetizing and nutritionally far superior than many synthetic and aerated drinks (Srivastava, 2004) [15].

Materials and Methods

The study was conducted at Post-harvest Technology laboratory, College of Horticulture & Forestry, Jhalawar (Rajasthan) during the year 2022-23. The blended Aonla -Guava-*Aloe vera* health drink during storage prepared has 7 treatments with 3 replications and stored for 90 days. Fully matured and fresh fruits of aonla and guava were procured from the fruit orchard

of Krishi Vigyan Kendra, Jhalawar, while fresh *Aloe vera* slips was harvested from herbal garden of the college. Aonla juice was extracted from fruits by using centrifugal juice extractor. Guava pulp was extracted from fruits by using fruit pulper extractor. *Aloe vera* juice was extracted from fruits by using crusher type juice extractor. These juices were used fresh to prepare blended health drink for preparation of blended health drink, the juice/pulp of guava and *Aloe vera* was mixed with aonla in different ratios (Table -1). After evaluating the blends for TSS and acidity, the health drink was prepared to maintain 20 percent juice/ pulp, 15° Brix TSS and 0.3 percent acidity in the final product using standard process. The syrup was cooled and strained through muslin cloth. Then, the measured quantity of blended pulp/ juice was mixed with syrup and the mixture was homogenized properly. The prepared health drink was pasteurized by heating up to 90° C temperature in an open pan and holding at this temperature for 1 minute before filling and sealing in 200 ml glass bottles. The prepared health drink was filled into pre-sterilized glass bottles of 200 ml and sealed air tight with crown caps. The bottles were kept at cool and dry place for 3 months storage period to study the qualitative changes with respect to physico- chemical, nutritional and microbial attributes. The product was evaluated immediately after preparation, and then at monthly interval.

Physico chemical analysis

The TSS, acidity, ascorbic acid, were determined by standard methods as suggested by (Ranganna, 1986) [12]. Total sugars, reducing sugars of guava fruit samples were estimated by (Lane and Eynon, 1934) [6].

Sensory evaluation

After the preparation of blended Aonla health drink and replications were presented to a panel of judges for organoleptic evaluation based on 9-point Hedonic scale (Ranganna, 1986) [12].

Statistical analysis

The data recorded during the course of investigation were subjected to statistical analysis using CRD (Complete Randomized Design) as per the method of "Analysis of variance" technique (Panse and Sukhatme, 1978) [10].

Table 1: Treatment details

Treatment notations	Treatment combinations
T1	Aonla juice 100%
T2	Aonla 75%+ Guava 25%
T3	Aonla 50%+ Guava 50%
T4	Aonla 75%+ <i>Aloe vera</i> 25%
T5	Aonla 50%+ <i>Aloe vera</i> 50%
T6	Aonla 50%+ Guava 25%+ <i>Aloe vera</i> 25%
T7	Aonla 33.33+ Guava 33.33+ <i>Aloe vera</i> 33.33%

Results and Discussion

Colour

The data pertaining to sensory score for colour as influenced significantly by different treatments are presented in Table 2. It is evident from the data that initially, the maximum colour value (8.67) was found in T6 followed by 8.17 in T5 while, minimum colour value (7.50) was recorded in T3. Fresh blended health drink beverages had high colour values

initially but with the advancement of storage period, a decrease in colour value was observed in all the treatments during storage period. This decrease in colour value may be due to browning reactions in the health drink. After 3 months of storage, the maximum colour rating (7.83) was again observed in T6 followed by in T5 (7.77), while minimum (6.67) was observed in T3. Similar finding have also been reported by Gaikwad *et al.*, (2013) [3] in aonla ginger blended RTS,

Aroma

The changes in sensory score for aroma of blended health drink are presented in Table 2. Initially, the maximum score for aroma (8.67) was found in T3 followed by in which T6 (8.17), while minimum score (7.17) was recorded in T1. Higher sensory for aroma in aonla juice: Guava pulp blended (50:50) health drink may be due to positive combined effect of volatiles of the two fruits. During storage, a decreasing trend in organoleptic score for aroma was observed irrespective of the treatments. After 3 months of storage, the maximum aroma rating (8.00) was observed in T3 followed by in which T6 (7.60) while minimum score (6.67) was observed in T1. The decrease in score for aroma during storage may be attributed to increase of temperature in ambient condition Tiwari and Deen, (2015) [18] in bael -*Aloe vera* blended RTS beverages. Apart from this, certain enzymatic or biochemical changes might have resulted in production of slight off-flavour.

Taste

The sensory score for taste (Table 3) was found maximum (8.75) in T3 followed by 8.67 in T2, while minimum taste value (7.33) was recorded in T1, at the start of the storage. Higher score for taste in T₃ This could be due to excellent flavour of the guava juice and resultant appropriate TSS: acid ratio of the blend. A decrease in sensory score for taste was observed in all the treatments as the storage period advanced. At the end of storage period, the maximum taste value (8.17) was recorded both in T₃ followed by 8.00 in T₂ while, minimum taste value (6.5) was found in T1. The results are analogous to the findings of Das *et al.*, (2021) [2] in kinnow - aonla blends RTS.

Overall

Similar to other sensory attributes, the overall acceptability of blended health drink was also significantly affected by different proportions of fruits (Table 3). In freshly prepared blended health drink highest score 8.38 for overall acceptability was observed in T6 which was followed by 8.30 in T3 while minimum score (7.38) was found in T1. The overall acceptability of the blended aonla health drink decreased with the advancement of storage period. At the end of the storage period, the highest overall acceptance value ((7.68) was obtained in T6, closely followed by 7.61 in T3 whereas, minimum (6.72) was obtained in T1. The present findings are in conformity with the view of Rathod *et al.*, (2014) [13] in bael pulp and aonla juice blends RTS.

TSS

An increase in TSS content during storage of blended health drink was observed (Table 4). Different treatments had significant effect on the TSS content of the blended health drink after storage for 1, 2 and 3 months at ambient condition.

After 3 months of storage maximum (16.26°B) TSS was found in T3 which was found at par with in T2 (16.00° B), while minimum (15.66°B) was found in T7. The increase in TSS content in nectar might be due to solubilisation of pulp constituents and degradation of starch, pectin and other polysaccharides in to soluble sugars. The results are in conformity to those of Thakre *et al.*, (2013) [17] in papaya - banana blended nectar.

Acidity: Titratable acidity of blended nectars differ significantly with treatments (Table 4). Initially, the acidity content of the aonla based blended health drink prepared from aonla juice blended with guava pulp and *Aloe vera* juice in different proportions was 0.3 percent in all the treatments as per standardized recipe, and obviously there was non-significant difference among the treatments. The acidity in all the treatments decreased gradually up to 3 months of storage. This might due to hydrolysis of polysaccharides and non-reducing sugar where acid is utilized for converting them to hexose sugars. Similar findings have been reported Syamal *et al.*, (2011) [16] in stored aonla -bael blended nectar, after 90 days of storage also, maximum acidity ((0.26%) was found in T1 (i.e. aonla at 100%) followed by 0.24 percent in T6 (i.e. aonla: *Aloe vera*: guava at 50:25:25). while minimum (0.19%) was observed in T3.

Total sugars

Total sugars content of blended health drink exhibited significant variation due to different treatments (Table 5). Initially, the maximum total sugars content (13.67%) was observed in T3 whereas minimum (10.53%) was observed in T7. The total sugars content of blended health drink got increased as the storage period progressed. After 3 months of storage, maximum total sugars (14.20%) was found in T3 and minimum in T7. This increase in total sugar might be attributed to the hydrolysis of polysaccharides like pectin, starch etc., into simple sugars as also reported by Mall and Tandon, (2007) [7] in guava- aonla blended juice.

Reducing sugars: Various treatments had a significant effect on the reducing sugar content of blended health drink (Table 5). The reducing sugar content in blended health drink increased gradually with increasing period of storage. Initially, the maximum reducing sugar content (5.69%) was observed in T3, whereas minimum (3.85%) was observed in T7. Similarly, after 90 days of storage maximum reducing sugars (6.95%) was found in T3 and minimum value (6.63%) was found in T7. The increase in reducing sugar during storage may be attributed to gradual inversion of non-reducing sugars to reducing sugar by the hydrolysis process. Nidhi *et al.*, (2008) [9] in bale-guava blends RTS.

pH

pH content of blended aonla health drink was also significantly affected by different proportions of fruits (Table 6). Initially, the highest pH content (4.00) was observed in T₃, whereas minimum (3.80) was observed in T₄. The pH content in health drink got decreased with the advancement of storage period. After 90 days of storage again maximum (4.60) pH was found in T₃ and minimum (4.25) was observed in T₁. The pH gradually increased with the storage period. This may be due to corresponding decrease in acidity of products during storage. Similar result reported by Thakre *et al.*, (2013) [17] in

papaya -banana nectar blends during the storage.

Ascorbic acid: The ascorbic acid content of blended aonla health drink was also significantly affected by different proportions of fruits (Table 6). Initially, the highest ascorbic acid content (35.40 mg/100 ml) was observed in T₁, whereas minimum (28.00 mg/100 ml) was observed in T₇. The ascorbic acid content in health drink got decreased with the advancement of storage period. After 90 days of storage again maximum (30.67 mg/ 100 ml) ascorbic acid was found in T₂ and minimum (23.67) was observed in T₅. The decrease in ascorbic acid content in health drink may be due to oxidation or irreversible conversion of L-ascorbic acid into dehydro ascorbic acid in the presence of enzyme ascorbic acid oxidase (ascorbinase) caused by trapped or residual oxygen in the glass bottle Hossain *et al.*, (2017) [4] in jack fruit and *Aloe vera* blends RTS.

Table 2: Colour and aroma (score out of 9) of the blended health drink as affected by ratio of blending different fruit juice/pulp with aonla juice.

Treatment	Colour (score out of 9)				Aroma (score out of 9)			
	0 days (Initial)	30 days	60 days	90 days	0 days (Initial)	30 days	60 days	90 days
T ₁	7.67	7.50	7.40	7.00	7.17	7.00	6.83	6.67
T ₂	7.60	7.43	7.33	6.83	7.70	7.67	7.50	7.33
T ₃	7.50	7.20	7.17	6.67	8.67	8.67	8.33	8.00
T ₄	7.83	7.67	7.50	7.17	7.50	7.33	7.23	7.00
T ₅	8.17	8.00	7.83	7.77	7.33	7.17	7.00	6.73
T ₆	8.67	8.33	8.00	7.83	8.17	8.00	7.83	7.60
T ₇	8.00	7.83	7.67	7.27	7.53	7.50	7.33	7.17
S.Em (±)	0.18	0.12	0.17	0.16	0.27	0.22	0.20	0.18
CD (5%)	0.559	0.382	0.518	0.495	0.838	0.688	0.626	0.570

Table 3: Taste and overall acceptability (score out of 9) of the blended nectar as affected by ratio of blending different fruit juice/pulp with aonla juice.

Treatment	Taste (score out of 9)				Overall (score out of 9)			
	0 days (Initial)	30 days	60 days	90 days	0 days (Initial)	30 days	60 days	90 days
T ₁	7.33	7.00	6.83	6.50	7.38	7.11	7.02	6.72
T ₂	8.67	8.33	8.17	8.00	7.99	7.81	7.66	7.39
T ₃	8.75	8.50	8.33	8.17	8.30	8.09	7.94	7.61
T ₄	7.67	7.33	7.17	7.00	7.66	7.44	7.30	7.05
T ₅	7.43	7.10	7.00	6.60	7.64	7.42	7.28	7.03
T ₆	8.33	8.00	7.67	7.60	8.38	8.11	7.83	7.68
T ₇	7.80	7.67	7.33	7.23	7.78	7.66	7.44	7.22
S.Em (±)	0.30	0.24	0.24	0.19	0.11	0.13	0.15	0.08
CD (5%)	0.913	0.748	0.740	0.594	0.335	0.423	0.482	0.250

Table 4: Total soluble solids and acidity of the blended health drink as affected by ratio of blending different fruit juice/pulp with aonla juice

Treatment	Total soluble solid (° Brix)				Acidity (%)			
	0 days (Initial)	30 days	60 days	90 days	0 days (Initial)	30 days	60 days	90 days
T ₁	15.00	15.50	15.83	15.90	0.30	0.29	0.28	0.26
T ₂	15.00	15.60	15.90	16.00	0.30	0.28	0.26	0.20
T ₃	15.00	15.63	16.00	16.26	0.30	0.27	0.26	0.19
T ₄	15.00	15.43	15.73	15.83	0.30	0.29	0.27	0.21
T ₅	15.00	15.43	15.76	15.86	0.30	0.28	0.27	0.22
T ₆	15.00	15.40	15.70	15.73	0.30	0.26	0.26	0.24
T ₇	15.00	15.36	15.63	15.66	0.30	0.25	0.25	0.23
S.Em (±)	0.087	0.050	0.060	0.089	0.004	0.005	0.005	0.004
CD (5%)	NS	0.152	0.202	0.270	NS	0.01	0.017	0.012

Table 5: Total sugars and reducing sugars of the blended health drink as affected by ratio of blending different fruit juice/pulp with aonla juice.

Treatment	Total sugars (%)				reducing sugars (%)			
	0 days (Initial)	30 days	60 days	90 days	0 days (Initial)	30 days	60 days	90 days
T ₁	12.24	12.38	12.54	12.87	4.84	5.00	5.18	5.58
T ₂	12.56	12.88	13.07	13.59	5.09	5.58	5.83	6.63
T ₃	13.67	13.58	13.78	14.2	5.69	5.94	6.84	6.95
T ₄	11.73	12.05	12.37	12.69	4.61	5.09	5.47	5.93
T ₅	11.57	11.89	12.65	12.37	4.36	5.09	5.27	5.71
T ₆	11.03	11.57	11.89	12.05	4.07	4.91	5.37	5.58
T ₇	10.53	10.77	11.43	11.73	3.85	4.52	5.27	5.47
S.Em (±)	0.296	0.243	0.276	0.284	0.172	0.127	0.127	0.126
CD (5%)	0.897	0.737	0.838	0.862	0.522	0.387	0.387	0.383

Table 6: pH and Ascorbic acid of the blended health drink as affected by ratio of blending different fruit juice/ pulp with aonla juice.

Treatment	pH				Ascorbic acid (mg/ 100 ml)			
	0 days (Initial)	30 days	60 days	90 days	0 days (Initial)	30 days	60 days	90 days
T ₁	3.87	3.89	4.00	4.25	35.40	33.00	31.67	30.33
T ₂	3.93	3.99	4.16	4.48	33.00	31.33	31.00	30.67
T ₃	4.00	4.10	4.11	4.60	32.00	30.00	29.67	29.33
T ₄	3.80	3.85	4.07	4.39	28.07	27.07	26.73	26.00
T ₅	3.81	3.86	4.08	4.33	25.17	24.17	24.17	23.67
T ₆	3.92	3.97	4.19	4.30	30.25	28.33	27.50	25.00
T ₇	3.95	4.05	4.22	4.27	28.00	26.33	25.67	25.33
S.Em (±)	0.038	0.007	0.029	0.05	0.07	0.200	0.288	0.259
CD (5%)	0.116	0.023	0.090	0.159	0.213	0.609	0.874	0.787

Conclusion

From the findings of the experiment entitled “Value addition of aonla (*Embllica officinalis*) by preparation of health drink after blending with guava pulp and *Aloe vera* juice”, it can be concluded that most acceptable health drink can be prepared by blending of aonla with guava in 50:50 ratio (T₃) and aonla with guava and *Aloe vera* in 50:25:25 ratio (T₆). Health drink prepared by blending aonla and guava pulp in 50:50 ratio (T₃) with respect to aroma, taste, TSS, pH, total sugar, reducing sugar, and third best in ascorbic acid up to 3 months of storage. While health drink prepared by blending aonla with guava and *Aloe vera* in 50:25:25 ratio (T₆) was found best in with respect to colour and overall acceptability up to 3 months of storage.

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