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Studies on quality evaluation of bael-aonla ready-to-serve (RTS) drink during storage

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ABSTRACT : The bael-aonla ready-to-serve (RTS) drinks were analyzed for chemical constituents at monthly interval for six months storage period during 2012-13. Total soluble solids and acidity increased, while ascorbic acid decreased in the beverages with the increase in storage duration. Overall acceptability of beverages increased by blending bael pulp with aonla pulp in comparison to bael or aonla pulp used alone for the preparation of beverages. In RTS drink, maximum acceptability (8.9) was achieved with 10 per cent pulp (50 bael : 50 aonla), 11 per cent TSS and 0.20 per cent acidity.

KEY WORDS : Bael, Aonla, Blends, RTS drink, Quality evaluation, Storage

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Bael fruit (*Aegle marmelos* Correa) is an important indigenous fruit of India. It belongs to the family Rutaceae. Bael fruit is rich source of riboflavin, thiamine, niacin and minerals. Bael is the richest source of riboflavin. The ripe fruit is restorative, laxative and good for heart, brain and is usually recommended for control of diarrhoea and dysentery problem. Because of its hard shell mucilaginous texture and numerous seeds it is difficult to eat as table purposes hence, it is not popular as dessert fruit. Bael fruit are generally utilized for making of candy but its fruit lays untapped potentiality for making of beverages due to excellent colour, flavour, nutritive and medicinal value. Aonla (*Emblica officinalis* Gaertn) also known as "Indian Gooseberry" belongs to the family Euphorbiaceae. Aonla is one of the minor fruit crops of commercial significance. It is quite hardy and is highly remunerative even without much care. In India, it is more popular in Uttar Pradesh but now a day's its area is arising rapidly in many adjoining states like Rajasthan, Haryana, Punjab, Andhra Pradesh, Maharashtra, Madhya Pradesh etc. It is used in Ayurvedic and Unani systems of Indian medicines. This fruit is acrid, cooling, refrigerant, diuretic and laxative. It is useful in anaemia, artherosclerosis, cough, diarrhoea, dysentry, dyspepsia, hemorrhages, leucorrhea and jaundice. It possesses antibacterial, anticarcinogenic, antiemetic, antioxidative, antipyretic, antitumour, antiviral, cardiotonic, expectorant activities. The fruit is a rich source of ascorbic acid and contains about 20 times more vitamin C than the citrus fruits. The stability of ascorbic acid and presence of astringency in anola fruit is due to the presence of polyphenols and leucoanthocyanins. However, it is not consumed much as fresh fruit as it is highly acidic and astringent in taste. Therefore, it is necessary to convert the aonla juice into certain beverages before it can be consumed. Chauhan *et al.* (2005) stated that aonla has great potentiality for processing into a number of quality products owing to its excellent nutritive and therapeutic values, but aonla fruits are astringent and have no attractive colour and flavour therefore, as such it's not much suitable for making of ready-to-serve or other beverages. There is great possibility of obtaining excellent quality beverages, if aonla pulp is blended with bael fruit.

The present investigation was carried out in Krishi Vigyan Kendra, Ghazipur (U.P.). Two kg of mature aonla (cv. NA-7) fruits were taken in the month of December and were kept for storage at ambient temperature. Similarly 2 kg of ripe bael (cv. NB-7) fruits were taken in the month of April for preparation of bael pulp. RTS drink with 10 per cent pulp, 11 per cent total soluble solids (TSS) and 0.2 per cent acidity were prepared from the extracted bael and aonla pulp blended in ratio (50:50). The TSS and acidity in bael-aonla blends were first analyzed to know the amount of sugar and citric acid present in them. Total soluble solids were estimated at ambient room temperature by hand refractometer (0-32 %), and the values were expressed as per cent TSS after correcting at 20^0C temperature. Acidity was analyzed by titration against 0.1 N NaOH as described by Ranganna (2003). Based on this analysis, requisite quantities of sugar and citric acid dissolved in water were added to bael-aonla blends for the adjustment of required TSS and acidity in their beverage blends. RTS drink was then filled in sterilized RTS bottles of 200 ml capacity leaving 2.5 to 3.0 cm head space, sealed with crown corks and processed in boiling water on a false bottom for 25 to 30 minutes. The processed glass bottles were then cooled in air and stored at room temperature for six months. RTS drinks were analyzed for physico-chemical characteristics during six months storage. Bael-aonla beverage blends (ready-to-serve) drink were subjected to sensory evaluation soon after preparation and after 30, 60, 90, 120, 150, 180 days of storage by a panel of ten judges who scored following the hedonic rating scale as described by Ranganna (2003). The overall acceptability of beverages was based on the mean scores obtained from all the sensory characters. The characters with mean scores of 6 or more out of 9 were considered acceptable. The treatments were replicated thrice and the data were subjected to analysis of variance (ANOVA) using completely randomized design as described by Panse and Sukhatme (1985). The critical difference value at 1 per cent level was used for making comparison among different treatments during storage.

There was a gradual increase in total soluble solids of bael-aonla blended ready-to-serve drink during six months storage, which might be due to the hydrolysis of polysaccharides like pectin, starch etc. into simple sugar. Similar observations were recorded by Nagpal and Rajyalakshmi (2009) in RTS beverage prepared from bael and citrus fruit blends. However, total soluble solids of RTS did not alter upto one month of storage and thereafter, it increased slightly with the storage period. The increase in acidity during storage of bael-aonla beverage blends might be due to formation of organic acids by the degradation of ascorbic acid. The results are in conformity with findings of Sharma *et al.* (2012) and Joshi *et al.* (2012) in the preparation of tamarind RTS beverages. However, acidity of RTS did not change upto one month of storage and thereafter it increased slightly. Ascorbic acid content of RTS declined continuously during the storage. Ascorbic acid is sensitive to heat and oxidized quickly in the presence of oxygen. Hence, it might have been destroyed during processing and subsequently during storage of bael-aonla beverage blends due to its oxidation. Similar reduction in ascorbic acid was also reported by Nagpal and Rajyalakshmi (2009) in bael-citrus fruit blends. Sharma *et al.* (2012) in guava-jamun and Gehlot *et al.* (2012) in bael-mango ready-to-serve drink. However, browning showed a continuous increase in RTS drink. The overall acceptability of bael-aonla RTS drink decreased gradually with the storage period. However, the quality

Table 1 : Changes in chemical constituents and overall acceptability of bael-aonla RTS drink during storage

Storage period in months	TSS (%)	Acidity (%)	Ascorbic acid (mg/100g)	Non-enzymic browning (O.D.)	Organoleptic quality
0	12.00	0.30	152.00	0.01	8.90
1	12.00	0.30	150.00	0.02	8.82
2	12.20	0.31	144.00	0.03	8.58
3	12.30	0.32	139.00	0.05	8.20
4	12.45	0.34	137.20	0.07	8.00
5	12.60	0.35	135.00	0.09	7.80
6	12.70	0.36	132.00	0.11	7.50
C.D. (P=0.01)	NS	NS	6.50	NS	NS

NS=Non-significant

of RTS was found to be acceptable upto six months of storage (Table 1).

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