Studies on development and evaluation of bael-mango chutney

Shafaly Sharma, Rakesh Gehlot, Rattan Singh, Rekha and Ritu Sindhu

Abstract

The bael-mango chutney was developed and evaluated for changes in its chemical constituents and sensory quality parameters at monthly interval for three months storage period. Total soluble solids and acidity increased significantly, while total carotenoids decreased significantly in chutney with the advancement in storage period. The colour and appearance, flavour, taste, mouthfeel and overall acceptability of bael-mango chutney decreased significantly during three months storage duration, however, the products was found acceptable even after three months storage. Chutney prepared with 60 bael:40 mango pulp ratio was found most acceptable.

Keywords: Bael, mango, blends, chutney, chemical constituents, sensory quality, storage

Introduction

*Aegle marmelos* is commonly called as bael or bel or Bengal quince or wood apple. The tree belongs to the Rutaceae family, the family to which citrus fruits belong. The tree bears its origin in Western Ghats of India and is found in tropical and sub-tropical regions. The tree holds a sacred value among Hindus and its leaves are presented to the deities. It is also found in many South East Asian countries including Pakistan, Sri Lanka, Nepal, Myanmar, Bangladesh, Vietnam, Cambodia, Thailand, Malaysia, Java, Philippines and Fiji. The trees are of great importance to the environment as they act as climatic purifier that is they release greater percentage of oxygen in comparison to other trees. The pulp of fruit contains many functional and bioactive compounds such as carotenoids, phenolics, alkaloids, coumarins, flavonoids, terpenoids and other antioxidants, which may protect against chronic diseases. The fruit is aromatic, cooling and laxative. The ripe bael fruit is a tonic, restorative, laxative and is good for heart and brain, whereas mature bael fruit is astringent, digestive, stomachic and is used for the treatment of diarrhoea and dysentery. Bael fruit is not consumed as a table fruit although, it has a great potential for processing into several products viz., ready-to-serve drink, nectar, squash, preserve, candy, cheese and toffee.

*Mango* (*Magnifera indica*) belongs to family Anacardiaceae. It is known as ‘King of Indian Fruit’ because of its high palatability, excellent taste and exemplary nutritive value. It is the most popular fruit and is very much relished for its succulence, exotic flavour and delicious taste. It is commonly eaten fresh and depending upon the cultivar, it may be consumed either at an immature stage or when fully ripe. In addition, the pulp may be cooked, dried, preserved, frozen or powdered. Mango is rich in a variety of phytochemicals and nutrients. The fruit pulp is high in dietary fibre, vitamin A and C, polyphenols and carotenoids. Recently, it has been found to be high in anticancer antioxidants. Mango pulp can be incorporated into beverages, desserts, ice cream, preserves, jellies, fruit salads, chutneys, pickles, cheese, canned in syrup, pureed and dried (Janick and Paull, 2008) [3].

Blending of pulp/ juice from two or more fruits could be an economic requisite to utilize profitably some fruits for processing, which may not otherwise have favourable characteristics like colour, flavour, aroma, taste and mouthfeel. People have less preference for bael fruits due to its peculiar taste and flavour. However, blending of mango pulp with bael pulp may improve colour and appearance, taste, flavour, mouthfeel, texture, overall acceptability and nutrition of its blended products. Keeping all these aspects in view, the present research work was planned with the objectives to standardize appropriate combination of Bael-Mango blends for preparation of chutney and also to evaluate the storage quality of blended product.
Materials and Methods
The present investigation was carried out in Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar during the year 2015-16. Uniformly ripe bael and mango fruits were procured from local market of Hisar. Bael fruits were washed thoroughly in running water and broken by striking against hard surface. The fruit pulp along with its seeds and fibres was scooped with the help of a stainless steel spoon. An equal amount of water to the weight of pulp was mixed with the pulp. The mixture of pulp and water was kneaded, heated at 80°C and passed through fruit pulper to obtain homogeneous pulp free from seeds and fibres. Sodium benzoate @ 1 g/kg pulp was mixed with the pulp. The pulp was then packed in polypropylene jars and stored in deep freezer.

Mango fruits were washed thoroughly in clean running water and peeled off. The pulp was separated from the stone with the help of a stainless steel knife and blended in a mixer to obtain fine pulp. Sodium benzoate @ 1 g/kg pulp was mixed with the pulp. The pulp was then packed in polypropylene jars and stored in deep freezer.

Chutney was prepared by cooking 1 kg pulp with 400 g sugar, 200 g onion paste, 20 g ginger paste, 10 g garlic paste, 15 g common salt, 15 g black salt, 2.5 g red chilli powder, 7.5 g hot spice mix and 5 ml glacial acetic acid. Chutney was filled hot in clean, 150 g capacity sterilized glass bottles, screw capped properly, cooled in air, labelled and stored at room temperature for three months (Fig. 1).

Bael-Mango pulp
\[\rightarrow\]
Addition of sugar
\[\rightarrow\]
Cooking with occasional stirring

Adding spices and ingredients
(Mixing of onion/ginger/garlic paste and red chilli powder)
\[\rightarrow\]
Cooking until desired consistency (50% TSS)
\[\rightarrow\]
Mixing of hot spice mix, salt and glacial acetic acid
\[\rightarrow\]
Cooking (2 minutes)
\[\rightarrow\]
Filling hot in sterilized glass bottles
\[\rightarrow\]
Sealing with cap
\[\rightarrow\]
Cooling
\[\rightarrow\]
Labelling
\[\rightarrow\]
Storing

Fig 1: Flow sheet for preparation of bael-mango chutney

Bael-Mango chutney was analyzed for changes in chemical constituents and sensory quality at monthly interval for three months. Total soluble solids (TSS) were estimated at ambient temperature by hand refractometer (28-62%) for bael-mango chutney. Acidity was determined by method of Ranganna (2014) [5]. Total carotenoids were analyzed by Rodriguez-Amaya method (1999). The overall acceptability of bael-mango chutney was based on mean scores obtained for all the sensory characters i.e., colour and appearance, flavour, texture, taste and mouthfeel. The characters with mean scores of 6 and above out of 9 were considered acceptable (Ranganna, 2014) [5]. The treatments were replicated thrice and the data were analyzed statistically using completely randomized design. The critical difference value at 5 per cent level was used for making comparison among different treatments during storage.

Results and Discussion
The perusal of data (Table 1) reveals that there was a significant increase in total soluble solids (TSS) of bael-mango chutney with the advancement in storage period. The increase in TSS during storage might be due to acid hydrolysis of polysachharides like pectin and starch. The results are in agreement with those of Mishra et al. (2011) [4] in ready-to-eat amla chutney.

Acidity increased significantly in bael-mango chutney during three months storage. This might be due to rise in the concentration of weakly ionized acids by degradation of polysaccharides and oxidation of reducing sugars or by break down of pectic substances and uronic acid. Similar observations were reported by Mishra et al. (2011) [4] in ready-to-eat amla chutney, Chaudhary and Verma (2012) [1] in amla chutney.

Total carotenoids decreased significantly in bael-mango chutney during three months storage period. This might be due to auto-oxidation of β-carotene leading to loss of total carotenoids and also due to its highly unsaturated chemical structure, which made the constituent very susceptible to thermal degradation and oxidation. The results are in accordance with those of Dien et al. (2014) [2] in gac powder.

Chutney prepared with 60 bael: 40 mango pulp ratio was found most acceptable. The colour and appearance, flavour, texture, taste and mouth feel and overall acceptability of bael-mango chutney decreased significantly during three months storage period. Similar results were reported by Mishra et al. (2011) [4] in ready-to-eat amla chutney.
Table 1: Changes in chemical constituents and sensory quality of bael-mango chutney during storage

<table>
<thead>
<tr>
<th>Treatments*</th>
<th>Storage period (months)</th>
<th>Total soluble solids (%)</th>
<th>Acidity (%)</th>
<th>Total carotenoids (mg/100 g)</th>
<th>Colour and appearance (score out of 9)</th>
<th>Texture (score out of 9)</th>
<th>Taste (score out of 9)</th>
<th>Flavour (score out of 9)</th>
<th>Mouth feel (score out of 9)</th>
<th>Overall acceptability (score out of 9)</th>
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<td>7.80</td>
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<td>1.16</td>
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<td>1.07</td>
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<td>0.45</td>
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*Recipe- 1 kg blended pulp, 400 g sugar, 200 g onion paste, 20 g ginger paste, 10 g garlic paste, 15 g common salt, 15 g black salt, 2.5 g red chilli powder, 7.5 g hot spice mix and 5 ml glacial acetic acid

References