

# PREPARATION AND STORAGE OF BLENDED READY-TO-SERVE BEVERAGE FROM BAEI AND ALOE VERA

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## ABSTRACT

The RTS beverage prepared from blend consisting 75 % bael pulp and 25 % aloe vera gel was found the most acceptable than other blend combinations (0 and 100 %, 100 and 0 %, 50 and 50 % and 25 and 75 % bael pulp and aloe vera gel respectively). The RTS was organoleptically acceptable upto 3 months of storage at ambient temperature (24.4-38.5°C). During the storage studies total soluble solids, acidity, reducing sugar, total sugars and browning increased whereas, vitamin C, non-reducing sugar content and organoleptic score decreased with storage period. The overall acceptability score (organoleptic score) of blended RTS was decreased from 8.17 at first day of storage to 7.50 at last day of storage. This study indicated that bael and aloe vera can be utilized for valuable RTS beverage making which can be beneficial for the consumers in terms of taste, colour, flavour and medicinal properties.

## INTRODUCTION

Bael is a very important, underutilized, ancient and indigenous fruit of India which belongs to the family Rutaceae. It is called by many vernacular names as Bengal Quince, Shriphal, Bel. Fruit is very well known for its medicinal properties due to marmelosin content and are important ingredients of several Ayurvedic prescriptions (Jauhari and Singh, 1971). The fruits are richest source of Vitamin-B<sub>2</sub> as it contains 1191 mg/100g riboflavin. The processing of the ripe and unripe bael fruits into many quality value added products like Preserve (Singh *et al.*, 2014), candy, powder and beverages is only solution for its proper consumption (Chand *et al.*, 2007) because fruit is not popular as desert due to its mucilage content which makes fruit difficult to consume fresh without proper preservation.

The plant of Aloe vera has stiff, fleshy, grey-green, lance-shaped leaves containing clear gel in a central mucilaginous pulp. Photochemistry of Aloe vera gel have revealed the presence of more than 200 active substances including vitamins, minerals, enzymes, sugars, anthoquinones of phenol compounds, lignin, saponins, sterols, amino acids and salicylic acid. Aloe vera comes under food related products (Dubick and Michael, 1983) and is being used as an ingredient for functional foods, mainly in the development of health drinks and beverages like tea (Singh *et al.*, 2009). Aloe vera was also

incorporated in food products like jam and jelly (Niramon *et al.*, 1996), Yagurt (Shin-Yang *et al.*, 1995) and beverages of orange, grape, cranberry, strawberry, raspberry, pineapple (Malhotra *et al.*, 2010).

In India and other countries of the world the demand of fruit beverages are increasing regularly. This increasing trend is mainly due to the higher content of nutritional, medicinal and calorific properties over the non-fruit based beverages. Ready-to-Serve (RTS) is one of the best and commonly acceptable beverages.

Present dietary scenario necessitates exploring the possibility of incorporating novel ingredients in commonly consumed foods rather than developing new food product (Aleem Zakir *et al.*, 2012). Although, bael is rich in nutritional as well as pharmaceutical properties but being an underutilized fruit crop it's processing is negligible. Therefore, this is very important to standardize the suitable ratio of bael pulp and aloe vera gel for the preparation of a good blended RTS. This may be a better idea to popularize the bael and aloe vera. Hence the present study, standardization and preparation of Ready-to-Serve (RTS) bael beverage by incorporating aloe vera gel were used for the utilization of bael and aloe vera properties.

## MATERIALS AND METHODS

### Raw materials

The ripe fruits of bael cultivar Narendra Bael-9 and mature fleshy leaves of aloe vera were collected from the main experiment station of the University and were used for the RTS preparation.

#### Extraction of pulp and gel

The methods applied to extract the bael pulp and aloe vera gel are shown by flow sheets in Fig. 1 and Fig. 2, respectively.

#### Standardization of blends for RTS

The following ratios of bael pulp and aloe vera gel were evaluated to standardize the blend for the development of quality RTS:

##### Treatment-1

10% blend consisting 100% bael pulp + 0% aloe vera gel and adjusted to 12% TSS, 0.25% acidity and 70 ppm SO<sub>2</sub>.

##### Treatment-2

10% blend consisting 0% bael pulp + 100% aloe vera gel and adjusted to 12%TSS, 0.25% acidity and 70 ppm SO<sub>2</sub>.

##### Treatment-3

10% blend consisting 50% bael pulp + 50% aloe vera gel and adjusted to 12%TSS, 0.25% acidity and 70 ppm SO<sub>2</sub>.

##### Treatment-4

10% blend consisting 75% bael pulp + 25% aloe vera gel and adjusted to 12%TSS, 0.25% acidity and 70 ppm SO<sub>2</sub>.

##### Treatment-5

10% blend consisting 25% bael pulp + 75% aloe vera gel and adjusted to 12%TSS, 0.25% acidity and 70 ppm SO<sub>2</sub>.

#### Preparation of RTS

RTS consisting 10% blend, 12% TSS, 0.25% acidity and 70 ppm SO<sub>2</sub> were prepared by different treatments for each blend combination of bael pulp and aloe vera gel mentioned under table-1. These RTS were organoleptically evaluated on 9- point Hedonic scale to find out the best combination of blend. The technique used for RTS making is shown in Fig-3.

#### Storage studies

Finally 5 litres RTS was prepared from the best combination of blend (Treatment-4) and filled into RTS bottles of 200 ml. capacity leaving 2 cm head space, crown corked, pasteurized and kept for storage study at ambient temperature (24.4-38.5 °C). Observations were recorded for changes in TSS, acidity, browning (Rangana, 2010), vitamin C (AOAC, 2000), sugars (Lane and Eynon, 1923) and organoleptic quality (Amerine *et al.*, 1965) at monthly intervals during 3 months of storage period and are described as follows.

Total soluble solids was measured by using ERMA company

made hand refractometer at ambient temperature and corrected at 20 °C using reference table whereas, the acidity was determined by titrating known quantity of sample against 0.1 N sodium hydroxide solution using phenolphthalein as an indicator and expressed in per cent anhydrous citric acid. Vitamin C content was estimated by preparing sample in 3 per cent metaphosphoric acid solution and titrating against 2, 6 dichlorophenol indophenols dye solution till the appearance of light pink colour. The reducing, non-reducing and total sugars were analysed by using Fehling's solution A and B and methylene blue as an indicator whereas, non-enzymatic browning was determined by preparing sample in alcohol and measuring the optical density (OD) at 440 nm by ELICO made spectrophotometer. A panel of 9 semi trained judges evaluated RTS for its colour, flavour, taste, appearance and overall acceptability on 9-point Hedonic scale.

#### Statistical analysis

The data were collected in three replications and analysed using Complete Randomised Design (CRD) to test statistical significance at p d" 0.05 (Panse and Sukhatme, 1985).

## RESULTS AND DISCUSSION

#### Standardization of blends for RTS

In present study, Treatment-4 (10 per cent of blend containing 75 per cent bael pulp and 25 per cent aloe vera gel with 12 per cent sugar, 0.25 per cent acidity and 70 ppm SO<sub>2</sub>) was found best for the preparation of blended RTS beverage during organoleptic evaluation however, score given to the best combination of blends by the panel of judges was 8.00 (Table-1). Similarly, Boghani *et al.* (2012) prepared RTS with papaya and aloe Vera juice in different ratio and found that the sample with 5 and 10 percent of aloe Vera juice reached the highest hedonic scores. Our study is also very close to the study of Karanjalkar *et al.* (2013) they found that recipe with 70% guava nectar and 30% soymilk has the highest sensory scores. Mandal (2003) reported that blend consisting 75 per cent pineapple juice and 25 per cent phalsa juice was used for the preparation of blended RTS. In another finding Deka (2000) suggested that the blending of mango, lime, aonla, grape and pineapple pulp/juice in appropriate proportion could improved the quality of the RTS beverages.

#### Biochemical changes during storage

Data pertaining to biochemical changes during storage of RTS is presented in Table 2 which indicates that total soluble solids increased gradually after one month of storage from 12.00 °brix to 12.60 °brix. This change might be due to the conversion of polysaccharides into sugars. Similar increasing

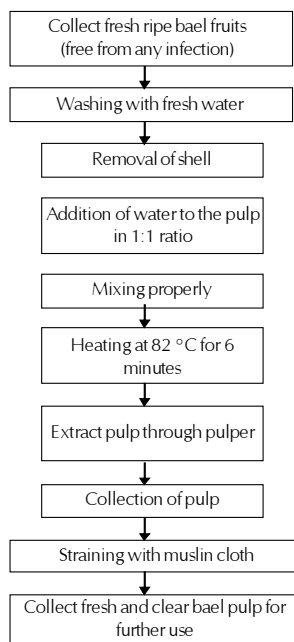
**Table 1: Organoleptic quality of RTS prepared from different blends of bael pulp and aloe vera gel**

Treatments	Different combinations of blends		Organoleptic quality Score	Rating
	Bael pulp (%)	Aloe vera gel (%)		
1	100	Nil	7.55	Like moderately
2	Nil	100	6.36	Like slightly
3	50	50	7.77	Like moderately
4	75	25	8.00	Like very much
5	25	75	6.77	Like slightly
CD at 5%	0.97			

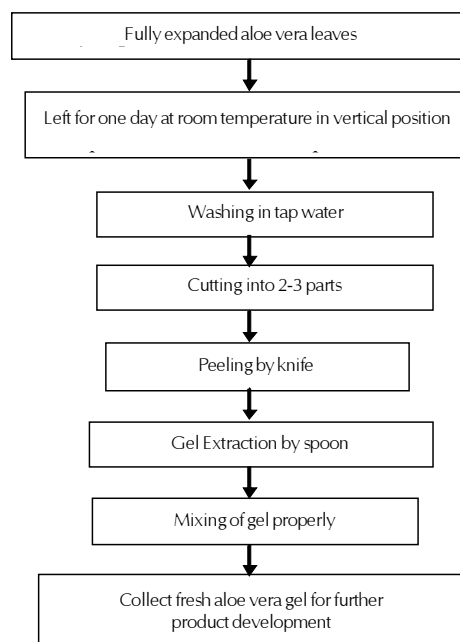
**Table 2: Biochemical and organoleptic changes during storage**

Storage period (months)	TSS(%)	Acidity (%)	Vitamin C(mg/100g)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugars(%)	Browning (OD)	Organoleptic quality Score	Rating
0	12.00	0.25	2.38	2.30	7.91	10.21	0.32	8.17	LVM
1	12.00	0.26	2.24	3.00	7.44	10.44	0.32	8.00	LVM
2	12.30	0.27	2.07	4.33	6.39	10.72	0.34	7.85	LM
3	12.60	0.30	1.93	5.29	5.83	11.12	0.35	7.50	LM
CD at 5%	NS	0.015	0.22	0.54	0.63	0.19	0.03	0.40	

LVM = like very much, LM = Like moderately

**Figure 1: Flow sheet for extraction method of bael pulp from ripe fruits**

trend in TSS during storage was reported in bael and guava blended RTS (Nidhi *et al.*, 2007) and in guava and pineapple blended RTS (Singh *et al.*, 2007) which are in agreement of present observations. The total acidity of RTS increased gradually during storage. Total acidity was increased from 0.25 per cent at initial day to 0.30 per cent at final day of storage. Degradation of pectic substances could be the reason to increase the acidity of processed fruit products (Conn and Stumpf, 1976). Vitamin C content was continuously decreased from the first day (2.38 mg/100g) to the end of storage (1.93 mg/100g) throughout the storage period. This decrease in vitamin C content might be due to the oxidation of ascorbic acid into dehydro ascorbic acid. The loss of vitamin C in RTS of different fruits based beverages during storage at ambient temperature was also reported in other studies (Mandal, 2003 and Tiwari, 2000). The reducing sugars and total sugars of blended RTS, increased continuously during entire period of storage and it was increased from 2.30 per cent to 5.29 per cent and 10.21 per cent to 11.12 per cent respectively. This finding was supported by Mandal (2003) and Nidhi *et al.* (2007) in blended RTS of phalsa-pineapple and in blended RTS of bael-guava, respectively. The increase in total and reducing sugars and decrease in non-reducing sugars could be due to inversion of non-reducing sugars into reducing sugars. This increment in sugars also may be due to hydrolysis

**Figure 2: Flow sheet for extraction method of aloe vera gel from leaves**

of some carbohydrates into sugars. Further similar trend in changes of sugars content with the advancement of storage period was observed in phalsa squash (Waskar and Khurdia, 1987), pomegranate juice (Waskar and Deshmukh, 1995) and in karonda squash (Deen and Singh, 2012) stored at room temperature. A progressive increase in browning in terms of OD was observed in storage studies of RTS beverages. The changes in browning could be mainly because of Maillard reaction between organic acids with sugars and amino acids which lead to the formation of brown pigment. The browning was also found to be increased in lime-aonla spiced RTS beverages during storage (Deka *et al.*, 2004).

#### Changes in organoleptic quality during storage

Organoleptic score decreased gradually with increase in storage period at room temperature (24.4-38.5°C) and acceptability of blended RTS under studies was maintained up to three months. The score was significantly decreased from 8.17 at first day to 7.50 at final day of storage. Similar findings were reported by Satkar *et al.* (2013) they observed that the bitter guard RTS was found to be more acceptable after 3 months of storage when stored in refrigerated system. Temperature plays an important role in biochemical changes that leads to development of off flavour as well as discolouration in the beverages. Reduction in organoleptic quality is obvious

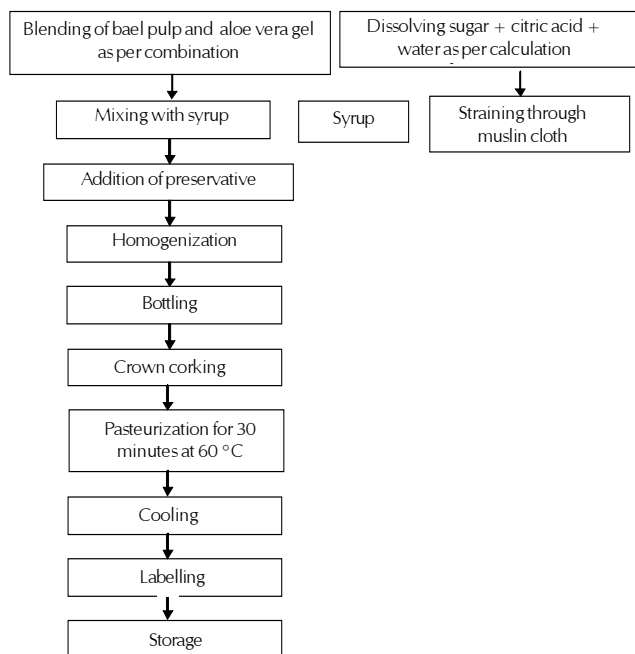


Figure 3: Flow sheet for preparation of bael + aloe vera blended RTS

and similar result was reported in storage of pomegranate juice (Waskar and Deshmukh, 1995).

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