



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2020; 8(1): 1224-1227

© 2020 IJCS

Received: 04-11-2019

Accepted: 06-12-2019

**NR Kadge**

Horticulture Section, College of  
Agriculture, Dr. Panjabrao  
Deshmukh Krishi Vidyapeeth,  
Akola, Maharashtra, India

**SR Dalal**

Horticulture Section, College of  
Agriculture, Dr. Panjabrao  
Deshmukh Krishi Vidyapeeth,  
Akola, Maharashtra, India

**RP Raut**

Horticulture Section, College of  
Agriculture, Dr. Panjabrao  
Deshmukh Krishi Vidyapeeth,  
Akola, Maharashtra, India

## Effect of lime blended bael syrup on quality and sensory evaluation

NR Kadge, SR Dalal and RP Raut

DOI: <https://doi.org/10.22271/chemi.2020.v8.i1q.8417>

**Abstract**

An investigation on “Effect of different recipes on storage of lime blended *Bael* syrup” was conducted at the Post-Harvest Technology Laboratory, Section of Horticulture, College of Agriculture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2014-2015 and with the objectives to assess the chemical changes of lime blended *Bael* syrup under ambient storage condition and to find out the suitable recipe for preparation of lime blended *Bael* syrup. The experiment was laid out in Completely Randomized Design with three replications and ten treatments. The lime blended *Bael* syrup was filled in 200 ml pre-sterilized glass bottles and stored at ambient storage conditions. From the finding it was observed that, there was decrease in ascorbic acid. Minimum changes in ascorbic acid in *Bael* syrup was observed when prepared with using 30 per cent *Bael* pulp blended with 10 per cent lime juice. The *Bael* syrup prepared with using 30 per cent *Bael* pulp blended with 10 per cent lime juice when stored at ambient storage condition remain better without spoilage upto 120 days. Similarly the *Bael* syrup prepared with using 30 per cent *Bael* pulp blended with 10 per cent lime juice and stored at ambient storage condition secured the highest score for colour, flavor, taste and overall acceptability as compared to other recipes.

**Keywords:** *Bael* syrup, lime juice, *Bael* pulp, ambient storage

**1. Introduction**

*Bael* (*Aegle marmelos* L. Correa) belongs to the family Rutaceae, It is an important indigenous fruit of India. The *Bael* fruit is one of the most nutritious fruits. According to Gopalan *et al.* (1971) [6], it contains 61.5 g water, 1.8 g protein, 0.39 mg fat, 1.7 g minerals, 31.8 g carbohydrates, 55 mg carotene, 0.13mg thiamine, 1.19 mg riboflavin, 1.1 mg niacin and 8 mg vitamin C per 100 g of edible portion. No other fruit has such a high content of riboflavin. A fair amount of pectin is found in *Bael*. The percentage of pectin on fresh fruit weight basis is 2.66 (Roy and Mujumdar, 1989) [14]. Marmelosin is most probably the therapeutically active principal of *Bael* fruit. It has been isolated as a colourless crystalline compound (Dixit and Dutta, 1932) [3].

The fresh form of *Bael* fruit is generally not consumed due to their high astringency and thus, fruit during their peak harvesting season go as waste due to limited usage. But, it has great potential in processed form. The work on processed form of *Bael* in this region is scanty. Thus scientific approach in preparation and preservation of *Bael* processed products like lime blended *Bael* syrup, ready to serve beverages, etc. is required. Earlier, workers have explored the possibilities of utilizing *Bael* fruit beverages for the preparation juice and syrup. Although alone *Bael* fruit syrup prepared, have poor consumer acceptance. Keeping all these views into consideration, the experiment was undertaken on “Effect of different recipes on storage of lime blended *Bael* syrup”. This would result in emerging suitable technology for utilization by the processing industries.

**2. Materials and Methods**

Well ripened *Bael* fruit will be harvested from the Main Garden, Department of Horticulture, Dr. P.D.K.V., Akola. The collected fruits were washed thoroughly with clean water. Pulp was extracted from fruits by scooping. Water was added to the pulp equal to the weight of the pulp followed by mixing, heating at 80 °C for 1 minute and then passing through muscline cloth to separate seeds and fiber. Thus extracted pulp was used for preparation of *Bael* syrup with following recipe.

**Corresponding Author:****NR Kadge**

Horticulture Section, College of  
Agriculture, Dr. Panjabrao  
Deshmukh Krishi Vidyapeeth,  
Akola, Maharashtra, India

*Bael* pulp: As per treatment  
 Lime juice: As per treatment  
 Sugar: 2.5 kg per kg of pulp  
 Sodium Benzoate: 250 ppm

*Bael* syrup was filled into the pre-sterilized bottles of 200ml capacity and sealed air tight using crown cork and it was stored as per treatment for further observations.

An experiment was conducted in Completely Randomized Design comprise ten different recipes of syrup as treatments. *Bael* syrup prepared as per treatments was filled in 200 ml pre-sterilized glass bottles and stored at ambient storage condition. These treatments were replicated three time. The prepared syrup was analyzed for physico-chemical characteristics and assessed for its acceptability by organoleptic evaluation at 120 days of storage. The observation on ascorbic acid, colour, flavor, taste and overall acceptability were recorded at initial, 90 and 120 days of storage.

Ascorbic acid content was estimated by using 2,6-dichlorophenol indophenols dye as reported by Ranganna (1986) [11]. *Bael* syrup was evaluated for sensory qualities viz. colour, flavour, taste and overall acceptability each attribute was given a separate score of 9 point hedonic scale according to the method reported by Amerine *et al.* (1965) [1].

### 3. Results and Discussion

#### 3.1 Ascorbic acid

The data in respect of ascorbic acid content of lime blended *Bael* syrup as influenced by different recipes at ambient storage condition was recorded upto 120 days of storage are presented in Table 1. There was decrease in ascorbic acid of

lime blended *Bael* syrup during storage. The decrease in ascorbic acid of lime blended *Bael* syrup during storage was probably due to the fact that ascorbic acid being sensitive to oxygen, light and heat was easily oxidized in presence of oxygen by both enzymatic and non-enzymatic catalyst. Minimum decrease (from 16.87 to 16.35%) in ascorbic acid at 120 days of storage was observed in treatment T<sub>7</sub> (30% *Bael* pulp + 10% lime juice). Similar result were also reported by Garg *et al.* (2014) [4] reported that, there was decrease in ascorbic acid in *Bael* wine during 12 month of storage period. Rathod *et al.* (2014) [13] reported that, there was decrease in ascorbic acid during advancement of storage period of *Bael* RTS blending with aonla.

#### 3.2 Colour

The data in respect of colour of lime blended *Bael* syrup as influenced by different recipes at ambient storage condition was recorded upto 120 days of storage are presented in Table 1. The data exhibited that, the colour score of lime blended *Bael* syrup was decreased during storage period. The decrease in colour of lime blended *Bael* syrup during storage can be attributed to catalytic effect of light on deteriorative changes as the bottles were transparent. Minimum decrease (from 9.4 to 8.9) in colour score was noticed in treatment T<sub>7</sub> (30% *Bael* pulp + 10% lime juice). The lime blended *Bael* syrup prepared with using 30 per cent *Bael* pulp blended with 10 per cent lime juice had highest colour score for ambient storage period. Similar results were reported by (Waskar and Khurdiya, 1987); Ranote *et al.* (1995) [15, 12] observed decline colour score for ambient storage as compared to cold storage due to catalytic effect of light on deteriorative changes as the pouches were transparent.

**Table 1:** Effect of storage conditions on ascorbic acid and colour score

Treatment	Ascorbic acid (mg/100 ml juice)			Change in ascorbic acid (mg/100 ml juice)	Colour score			Total change in colour score
	Storage period (days)				Storage period (days)			
	Initial	90 <sup>th</sup>	120 <sup>th</sup>		Initial	90 <sup>th</sup>	120 <sup>th</sup>	
T <sub>1</sub> 25% <i>Bael</i> Pulp + 5% lime Juice	15.87	14.77	14.59	01.28	9.0	*	*	1.1
T <sub>2</sub> 25% <i>Bael</i> Pulp + 7.5% Lime Juice	15.96	14.95	14.83	01.13	9.0	*	*	1.0
T <sub>3</sub> 25% <i>Bael</i> Pulp + 10% Lime Juice	16.52	16.07	15.98	0.54	9.3	9.0	8.6	0.7
T <sub>4</sub> 25% <i>Bael</i> Pulp + 12.5% Lime Juice	16.81	15.35	15.19	01.62	9.2	8.8	8.4	0.8
T <sub>5</sub> 30% <i>Bael</i> Pulp + 5% Lime Juice	15.95	15.23	15.09	0.86	9.1	*	*	0.9
T <sub>6</sub> 30% <i>Bael</i> Pulp + 7.5% Lime Juice	16.27	15.54	15.44	0.83	9.1	7.8	*	1.3
T <sub>7</sub> 30% <i>Bael</i> Pulp + 10.% Lime Juice	16.87	16.42	16.35	0.52	9.4	9.2	8.9	0.5
T <sub>8</sub> 30% <i>Bael</i> Pulp + 12.5% Lime Juice	16.95	15.92	15.78	01.17	9.3	8.7	8.4	0.9
T <sub>9</sub> 25% <i>Bael</i> Pulp	15.48	14.87	14.45	01.03	8.9	*	*	1.4
T <sub>10</sub> 30% <i>Bael</i> Pulp	15.57	14.90	14.47	01.10	8.9	*	*	1.5
'F' test	Sig	Sig	Sig	-				-
SE(m)±	0.010	0.014	0.014	-				-
CD at 5%	0.030	0.042	0.041	-				-

\* Spoilage

#### 3.3 Taste

The data in respect of taste score of lime blended *Bael* syrup as influenced by different recipes at ambient storage condition was recorded upto 120 days of storage are presented in Table 2. The data exhibited that, the taste score of lime blended *Bael* syrup was decrease during storage period. The decrease in taste score of lime blended *Bael* syrup during storage might be due to many factors which affect storage stability of products and temperature play important role among them. Minimum decrease (9.0 to 8.6) in taste score was noticed in treatment T<sub>7</sub> (30% *Bael* pulp + 10% lime juice). Similar results were reported by Bhatia *et al.* (1986) [2] observed taste retained under cold storage however, off taste and degraded

aroma were observed under room temperature. Decrease in taste score of stored guava pulp has been reported by Karla *et al.* (1987) [8].

#### 3.4 Flavour

The data in respect of flavour score of lime blended *Bael* syrup as influenced by different recipes at ambient storage condition was recorded upto 120 days of storage are presented in Table 2. The data exhibited that, the flavour score of lime blended *Bael* syrup was decrease during storage period. The storage temperature had significant effect on flavour of lime blended *Bael* syrup. Minimum decrease (from 9.0 to 8.7) in flavour score was noticed in treatment combination T<sub>7</sub> (30%

*Bael* pulp + 10% lime juice). Similar results were reported by Jain *et al.* (1986) [7] observed retention of flavour was better in all the three fruit squash stored at low temperature. Ghorai and Khurdiya (1998) [5] observed the storage temperature had significant effect on the flavour.

### 3.5 Overall acceptability

The data in respect of overall acceptability of lime blended *Bael* syrup as influenced by different recipes at ambient storage condition was recorded upto 120 days of storage are presented in Table 3. The data exhibited that, the overall acceptability of lime blended *Bael* syrup was decrease during

storage period. The storage temperature had significant effect on overall acceptability of lime blended *Bael* syrup. Minimum decrease (from 9.3 to 9.0) in overall acceptability was noticed in treatment T<sub>7</sub> (30% *Bael* pulp + 10% lime juice). Similar results were reported by Kotecha and Kadam (2003) [9] noted that, there was gradual decrease in the overall acceptability score of syrup stored at room temperature during the storage period of 180 days. Mishra *et al.* (2013) [10] observed that the organoleptic quality of *Bael* candy was extremely good in polythene pouches up to four months while only one month in glass jar.

**Table 2:** Effect of storage conditions on taste score and flavour score

Treatment	Taste Score			Total change in taste score	Flavour score			Total change in flavour score
	Storage period (days)				Storage period (days)			
	Initial	90 <sup>th</sup>	120 <sup>th</sup>		Initial	90 <sup>th</sup>	120 <sup>th</sup>	
T <sub>1</sub> 25% <i>Bael</i> Pulp + 5% lime Juice	8.9	*	*	0.7	8.8	*	*	0.7
T <sub>2</sub> 25% <i>Bael</i> Pulp + 7.5% Lime Juice	8.9	*	*	0.6	8.8	*	*	0.8
T <sub>3</sub> 25% <i>Bael</i> Pulp + 10% Lime Juice	9.0	8.8	8.5	0.5	8.9	8.7	8.5	0.4
T <sub>4</sub> 25% <i>Bael</i> Pulp + 12.5% Lime Juice	8.9	8.5	8.3	0.6	8.8	8.3	8.1	0.7
T <sub>5</sub> 30% <i>Bael</i> Pulp + 5% Lime Juice	8.8	*	*	0.8	8.7	*	*	0.9
T <sub>6</sub> 30% <i>Bael</i> Pulp + 7.5% Lime Juice	8.9	8.1	*	0.8	8.8	8.0	*	0.8
T <sub>7</sub> 30% <i>Bael</i> Pulp + 10% Lime Juice	9.0	8.9	8.6	0.4	9.0	8.8	8.7	0.3
T <sub>8</sub> 30% <i>Bael</i> Pulp + 12.5% Lime Juice	9.0	8.6	8.3	0.7	8.9	8.3	8.2	0.7
T <sub>9</sub> 25% <i>Bael</i> Pulp	8.8	*	*	0.9	8.7	*	*	1.3
T <sub>10</sub> 30% <i>Bael</i> Pulp	8.7	*	*	1.1	8.6	*	*	1.5

\* Spoilage

**Table 3:** Effect of storage conditions on overall acceptability

Treatment	Overall acceptability			Total change in overall acceptability
	Storage period (days)			
	Initial	90 <sup>th</sup>	120 <sup>th</sup>	
T <sub>1</sub> 25% <i>Bael</i> Pulp + 5% lime Juice	8.9	*	*	0.7
T <sub>2</sub> 25% <i>Bael</i> Pulp + 7.5% Lime Juice	9.1	*	*	0.7
T <sub>3</sub> 25% <i>Bael</i> Pulp + 10% Lime Juice	9.3	9.0	8.8	0.5
T <sub>4</sub> 25% <i>Bael</i> Pulp + 12.5% Lime Juice	9.2	8.8	8.6	0.6
T <sub>5</sub> 30% <i>Bael</i> Pulp + 5% Lime Juice	8.8	*	*	0.8
T <sub>6</sub> 30% <i>Bael</i> Pulp + 7.5% Lime Juice	9.1	8.3	*	0.8
T <sub>7</sub> 30% <i>Bael</i> Pulp + 10% Lime Juice	9.3	9.1	9.0	0.3
T <sub>8</sub> 30% <i>Bael</i> Pulp + 12.5% Lime Juice	9.2	8.3	8.2	0.7
T <sub>9</sub> 25% <i>Bael</i> Pulp	8.8	*	*	0.9
T <sub>10</sub> 30% <i>Bael</i> Pulp	8.6	*	*	1.0

\* Spoilage

### 4. Conclusion

For the investigation conducted on effect of different recipes on storage of lime blended *Bael* syrup following conclusions could be drawn.

The lime blended *Bael* syrup prepared with different recipes stored at ambient storage condition was found superior after 120 days of storage in ascorbic acid and sensory qualities. The minimum decrease found in ascorbic acid.

The *Bael* syrup prepared with 30 per cent *Bael* pulp blended with 10 per cent lime juice stored at ambient storage secured the highest score for colour, flavour, taste and overall acceptability as compared to other recipes.

### 5. Reference

- Amerine MA, Pangborn RM, Roesler EB. Principles of sensory evaluation of food. Academic press, New York, 1965.
- Bhatia BS, Siddappa GS, Girdharilal. Physico-chemical changes in jack fruit squash during storage. The Ind. J Agril. Sci. 1986; 24(4):405-413.
- Dixit BBK, Dutta S. J Indian Chem. Soc. 1932; 9:271-279.
- Garg N, Preeti Yadav, Sanjay Kumar, Abhay Dikshit. Screening of *Bael* selections for preparation of sweet wine. Ind. J Hort. 2014; 71(1):99-103.
- Ghorai K, Khurdiya DS. Storage of heat processed kinnow mandarin juice. J Food Sci. Tech. 1998; 35(5):422-424.
- Gopalan CBV, Rama Sastri, Balasubramanian. In: Nutritive value of Indian food. National Institute of Nutrition, ICMR, Hyderabad, India, 1971.
- Jain SP, Tripathi VK, Ram HB, Singh S. Effect of storage conditions on storage life of some important squashes, Part-II. Indian Food Packer. 1986; 30(3):25-27.
- Karla SK, Tandon DK, Lohabi HC. Prevention of discoloration in guava beverage during storage. Indian Food Packer. 1987; 41(1):21-25.
- Kotecha PM, Kadam SS. Preparation of ready-to-serve beverage, syrup and concentrate from tamarind. J Food Sci. Tech. 2003; 40(1):76-79.

10. Mishra DK, Saroj PL, Pathak S. Effect of packaging containers on storage stability of *Bael* (*Aegle marmelos* Correa) candy under ambient conditions. *Prog. Hort.* 2013; 45(1):122-125.
11. Ranganna S. Analytical methods and FPO specification in Handbook of Analysis and quality control for fruit and vegetable products. 2<sup>nd</sup> Ed. Tata Mcgraw – Hill Pub.Co., New Delhi, 1986, 1-101p.
12. Ranote PS, Saini SPS, Bawa AS. Evaluation of thermal process and shelf-life of Kinnow juice. *J. Food Sci. Tech.* 1995; 30(2):88-91.
13. Rathod AS, Shakya BR, Ade KD. Studies on Effect of Thermal Processing on Preparation of *Bael* Fruit RTS Blended with Aonla. *IJREAT.* 2014; 2(3):1-6.
14. Roy P, Mujumdar BC. Science and Cultivation. 1989; 55:110-111.
15. Waskar DP, Khurdiya DS. Processing and storage of phalsa beverages. *Indian Food Packer.* 1987; 41(5):7-23.