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RESEARCH PAPER

Standardization of processing and preservation technics for bael (*Aegle marmelos correa*) syrup

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Abstract : An experiment was conducted on Bael fruits to study the physical properties and chemical composition, to find out the suitable recipes for preparation of ideal syrup, also storage stability of syrup prepared from suitable recipes. Physical and chemical properties revealed that average weight (g)-510.25,Juice content(%)-75.28,TSS(%)-38.42,Total tritable acidity(%)-0.42,Ascorbic acid (mg/100g)-14.32 indicated the proper maturity stage of Bael for syrup preparation.In these study different recipes of Bael syrup was standardized to explore the processing potential of Bael, a minor fruit. There were five different possibilities of recipes. The syrup prepared from the recipes 26% pulp, 65% TSS and 1.4% Acidity gave highest organoleptic quality score grater consumer acceptabilities and retain good nutritional qualities followed by syrup prepared from 28% pulp, 68% TSS and 1.5% Acidity and the quality of the prepared syrup was maintained up to tenth months at ambient temperature.

Key Words : Bael syrup, Beverage, Processing, Storage stability

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INTRODUCTION

Bael (*Aegle marmelos* Correa) belongs to family *rutaceae* is indigenous to India. The importance of Bael fruit lies in its curative properties. Bael is a deciduous and hardy tree grown wild all over India. The Bael fruit is a hard shelled berry and the pulp contains tunnels which are filled with mucilage. The fruit is very nutritive and contains fair amount of vitamin-A,vitamin-B, vitamin-C, minerals and high carbohydrates content. The fruit is very rich in Riboflavin (Vitamin B_2). Bael fruit is not popular as a desert fruit due to its hardshell, mucilagenous texture and numerous seed. It has good processing attributes such as excellent flavour, nutritive and therapeutic values.

But the excellent nutritive and therapeutic values of fruits have great potentiality for processing in to various quality products.This can get position in national and international market. Keeping the above points in view this research problem was designed to find out a nutritious soft drink of consumer acceptability.

MATERIAL AND METHODS

Fruits free from bruises, cracks and white spot were harvested randomly from different plants of orchard. Five fruits replicated four times were used for assessing the physical characteristic (Table A). The flesh of five fruits

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(100g each) replicated three times was subjected to chemical analysis (Table A).The pulp from Bael was extracted according to the flow diagram (Fig. A).

Table A : Following five recipes each with three replications were tried

Treatments	Pulp (%)	TSS (%)	Acidity (%)
T_1	25	65	1.3
T_2	25	66	1.2
T_3	25	68	1.3
T_4	28	68	1.5
T_5	26	65	1.4

Fresh and matured bael fruits → Cleaned it throughly →Sliced with the help of slicer →The slices were kept in the cold water in such a manner that all slices were under the water (for half an hour) →The seed, mucilaginous matter and rind was removed from the slices using knife and fork→Slices were made into pieces and boiled with a little quantity of water for five minutes→The above material are put into a pulping machine (Addition of water in the ratio of 1:0.25) →Pulp was obtained in semi solid form→Pulp was filtered by strainer→Collected the clear pulp

Fig. A: Flow sheet for extraction of pulp from ripen bael fruits

Syrup was prepared as per the flow diagram in Fig. B given below:

Fruit pulp→Straining→Mixing with syrup according to recipe →Straining and cooling it→Addition of preservative according to recipe→Bottling→Crown Corking→labeling—storage at ambient condition

Fig. B : Flow sheet for the preparation of bael syrup

After that it was subjected to organoleptic evaluation, the results obtained were given in the table-4. Syrup prepared from ideal treatments was analyzed for chemical parameters initially and at an interval of one month upto sixth month of storage period and the results obtained was given in the table-4.

The TSS was estimated by hand refractometer. The acidity was determined by method of simple acid base titration method using phenalphthalein as indicator. The ascorbic acid content in the samples were measured by reduction of 2,6 dichlorphenol indophenol dye as given by Ranganna (1986). The reducing and non-reducing and total sugars were estimated by Lane and Eynon (1923). Non-enzymatic browning was estimated by the method of Ranganna (1986). The organoleptic evaluation of RTS prepared under different treatment was carried out by a panel of six judges using hedonic rating scale given by (Amerine *et al.*, 1965).

The analysis of variance of the date was carried out by the technique as described by Raghuramula *et al.* (1983).

RESULTS AND DISCUSSION

The data on organoleptic quality of various recipes of syrup is presented in Table 4. Results indicated that the recipe containing 26 per cent pulp, 65 per cent TSS and 1.4 per cent acidity was found ideal followed by the recipe containing 28 per cent pulp, 68 per cent TSS and 1.5 per cent acidity. There was significant difference in the organoleptic scores of these two recipes. The differences among the organoleptic scores of recipes No. 1, 2 and 4 were however, statistically insignificant.

Studies on changes during storage of Syrup indicated that TSS increased slightly after three month of storage. It is due to the conversion of polysaccharides in to sugars. Similar observation was recorded by Khurdiya (1979) in phalsa beverages. Total acidity of syrup did not change up to three months of storage, then gradually increases the acidity of fruit products. (Conn and Stumf, 1976), the present findings are also in agreement with

Table 1 : Physical characters of bael fruits

Sr. No.	Characters	Average value
1.	Average weight (g)	510.25
2.	Volume (ml)	575
3.	Specific gravity (g/cc)	0.887
4.	Overall length (cm)	10.2
5.	Maximum width (cm)	8.3
6.	Juice content (%)	75.28
7.	Sphericity (%)	250
8.	Bulk density (kg/m^3)	450
9.	True density (kg/m^3)	852
10.	Moisture content (%)	64.22

Table 2 : Chemical composition of bael fruits

Sr. No.	Characters	Average value
1.	Total Soluble Solids (%)	38.42
2.	Total Titrable acidity (%)	0.42
3.	Ascorbic acid (mg/100g)	14.32
4.	Reducing Sugar (%)	4.82
5.	Total carbohydrates (g%)	12.84

Table 4 : (Changes in Chemical Characters during storage of Bael Syrup.)

Sr. No.	Characters	Storage period in months											
		0	1	2	3	4	5	6	7	8	9	10	11
1.	TSS%	65.00	65.00	65.00	65.85	66.00	66.25	66.74	67.20	67.28	67.49	68.00	68.21
2.	Acidity(%)	1.40	1.40	1.40	1.40	1.41	1.42	1.43	1.45	1.47	1.48	1.49	1.50
3.	Ascorbic acid (mg/100g)	18.40	18.21	18.17	18.00	17.82	17.64	17.47	17.23	17.00	16.85	16.45	16.21
4.	Browing(O.D)	0.58	0.58	0.59	0.62	0.64	0.64	0.68	0.69	0.71	0.72	0.74	0.75
5.	Reducing suger (%)	48.12	48.24	48.38	48.46	48.62	48.88	48.92	49.20	48.80	49.21	49.54	49.62
6.	Total carbohydrate(g%)	35.24	35.18	35.12	34.89	34.81	34.67	34.58	34.52	34.39	34.21	34.09	34.00
7.	Organoleptic quality	8.57	8.29	8.14	8.00	7.87	7.74	7.54	7.32	7.27	7.14	7.09	6.72

Table 3: Organoleptic quality of different recipes of Bael Syrup

Recipe No.	Pulp (%)	TSS (%)	Acidity (%)	Organoleptic quality	
				Score	Rating
1	25	65	1.30	7.24	Liked slightly
2	25	66	1.20	7.21	Liked moderately
3	25	68	1.30	6.20	Liked slightly
4	28	68	1.50	7.28	Liked moderately
5	26	65	1.40	8.57	Liked very much
CD at 5% level				0.26	
S.E.M ±				0.08	

the observation of several workers (Ashraf, 1987: Singh, 2000). Results indicated that ascorbic acid content of the syrup beverage decreased continuously during the entire period of storage. The reduction may be due to oxidation of ascorbic acid in to dehydro ascorbic acid by oxygen. Several authors (Roy and Singh, 1979; Singh, 2000) have also reported losses of ascorbic acid in fruit beverages during ambient storage .In the present study browning of syrup increased continuously throughout the entire period of storage. It may be due to non-enzymatic reactions, which occurs between nitrogenous compounds with sugar or organic acids with sugars. Increase in browning was observed by several workers (Siddappa *et al*., 1959). Reducing sugars increased continuously and total carbohydrate decreased continuously. The organoleptic scores of syrup decreased gradually during storage at room temperature. The acceptability of syrup was maintained up to fifth months. Similar findings were observed in different beverages by several workers.

Thus it may be concluded that syrup prepared from the recipe containing 26 % pulp,65 % TSS and 1.40 % acidity contain best eye peal, flavors, consistency, taste and nutritious as compared to the other recipes, and it may play an important role in food and nutritional security.

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