

Studies on development of low calorie pineapple RTS beverage by using artificial sweeteners

B. MANSOOR, A.R. SAWATE, B.M. PATIL AND R.B. KSHIRSAGAR

In present investigation efforts have been made to prepare low calorie pineapple RTS beverage by using different combination of artificial sweeteners (aspartame and sucralose) and sugar (sucrose). Further the effect of artificial sweeteners on chemical characteristics and sensory acceptability of low calorie pineapple RTS beverage was evaluated. The study revealed that good quality and organoleptically acceptable low calorie pineapple RTS beverage can be prepared by using 50 % sucrose+50 % sucralose.

Key Words : Pineapple, Aspartame, Sucralose, RTS beverage

How to cite this article : Mansoor, B., Sawate, A.R., Patil, B.M. and Kshirsagar, R.B. (2017). Studies on development of low calorie pineapple RTS beverage by using artificial sweeteners. *Food Sci. Res. J.*, 8(1): 59-63, DOI : 10.15740/HAS/FSRJ/8.1/59-63.

INTRODUCTION

Fruits and their value added products play a crucial role in human diet because they provide most of the vital nutrients especially vitamins, carbohydrates, protein and minerals required for normal growth and development of the human body which leads to maintain healthy physique and mind. Normal consumption of fruits significantly reduces the risk of heart diseases, stress, and premature aging due to the antioxidant properties of fruits (Sindumathi and Premalatha, 2013).

Pineapple has long been one of the most popular of the non-citrus tropical and subtropical fruit, largely because of its attractive flavour and refreshing sugar-acid balance pineapple juice is largely consumed around the world, mostly as a canning industry by product, in the

form of single strength, reconstituted or concentrated and in the blend composition to obtain new flavours in beverages. Pineapple juice is a non-alcoholic drink and the demand continues to rise mainly due to increasing consumer awareness of its health benefits. It is an important source of sugars, organic acids and some essential minerals for human nutrition and its quality of good flavour, aroma, juiciness and sweetness is well known and appreciated by consumers. Its pulp is juicy and fleshy with the stem serving as supporting fibrous core. It is an excellent source of antioxidant, vitamin C which is required for the collagen synthesis in the body. It contains micronutrients and it protects against cancer and this micro-nutrient break up blood clots is beneficial to the heart (Tochi *et al.*, 2008).

Today's consumers expect more and more pleasure from food. They want it to be lower in fat, sugar and calories and to be able to maintain or improve their health conditions. These facts resulted in development of sugar free or low calorie sweeteners. Presently, low calorie sweeteners are being used in a wide variety of foods and other items such as jams, pickles, sauces, fruit preserves, soft drinks, ice creams.

MEMBERS OF RESEARCH FORUM

Author for correspondence :

B. MANSOOR, Department of Food Engineering, College of Food Technology, Vasant Rao Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA
Email : mansoor.f.tech@gmail.com

Associate Authors' :

A.R. SAWATE, B.M. PATIL AND R.B. KSHIRSAGAR, Department of Food Engineering, College of Food Technology, Vasant Rao Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA

The usage of sugar substitutes in fruit beverages preparation is an innovative area of research and therefore an investigation was carried out to standardize RTS beverage preparation using sugar substitutes.

METHODOLOGY

The present investigation was carried out in Department of Food Engineering with collaboration of Department of Food Chemistry and Nutrition in College of Food Technology, VNMKV, Parbhani during year 2014-16. Pineapple and sweeteners were obtained from the market area of the Parbhani.

Preparation of pineapple juice :

Ripe pineapples were selected, the crown and stem portion were removed and the fruit was washed in tap water. The pineapples were peeled with knives, eyes were removed and sliced. The prepared slices were crushed in a mixer and the juice was recovered by pressing the crushed mass in a hydraulic press. The juice was filtered through muslin cloth.

Preparation of low calorie pineapple RTS beverage:

RTS was prepared as per the procedure shown in (Fig. A) by mixing calculated amount of the juice, sugar, sweeteners, citric acid and water according to different blending ratio. The recipe of RTS beverage with 15 per cent juice, 14 per cent sugar (sucrose) and 0.3 per cent citric acid was used as standard control recipe However, sugar substitutes were used in place of sugar (based on sugar equivalents) for preparation of RTS beverages. The treatments include RTS beverage with aspartame, sucralose, 50 % sucrose+50 % sucralose, 50 % sucrose+50 % sucralose.

The following blending ratios were tested for preparation of low calorie pineapple RTS and evaluated their organoleptic quality.

- Control- With addition of sugar (sucrose)
- A - Aspartame (0.3 %)
- B - Sucralose (0.2%)
- C - 50% sucrose+ 50% aspartame
- D - 50% sucrose+50% sucralose

Low calorie pineapple RTS beverage was prepared as per the method adopted by Amaravathi *et al.* (2014).

Proximate analysis:

The proximate analysis of RTS beverages were done

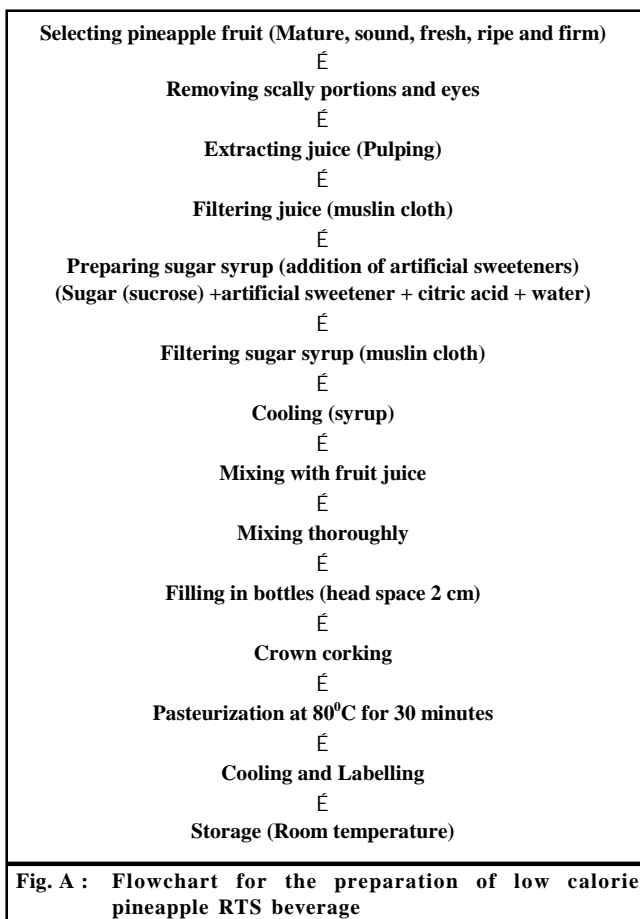


Fig. A : Flowchart for the preparation of low calorie pineapple RTS beverage

for different parameter the prepared beverage was analysed for TSS, pH, titrable acidity and ascorbic acid content. TSS was measured by Abbe refractometer, The pH of each sample measured by digital pH meter, titrable acidity and ascorbic acid as per given by Ranganna (1986).

Sensory evaluation:

Sensory evaluation was made through panel of 10 semi trained judges. The panel evaluated the acceptable level of beverage for colour, flavour, taste and overall acceptability. A 9 point hedonic scale was used for this purpose. The data obtained were subjected to statistical analysis. The data obtained was analyzed statistically by Completely Randomized Design (CRD) as per the procedure given by (Panse and Sukhatme, 1967). The analysis of variance revealed at significance of $P < 0.05$ level, S.E. and C.D. at 5 per cent level is mentioned wherever required.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Chemical characteristics of pineapple juice :

The chemical characteristics of pineapple juice *viz.*, total soluble solids, pH, acidity, ascorbic acid were determined and results obtained are presented in Table 1.

Effect of addition of different sweeteners on low calorie pineapple RTS beverages:

The physico-chemical properties of beverage such as TSS, pH, acidity and ascorbic acid were affected significantly by changing the ingredients. Selected sweeteners like aspartame and sucralose are low caloric and it slightly effect on TSS of RTS beverage therefore it was suitable for preparation of Low calorie pineapple beverage.

Total soluble solids (TSS):

Perusal of data in Table 2 reveals a significant difference in TSS of different recipes. Highest TSS was found in with sugar (sucrose) followed by sample D, while least was in sample A. Increase in the proportion of sugar substitutes in place of sugar in RTS beverages decreased TSS content. This is attributed to the fact that sugar substitutes are used in very small quantities to sweeten

sweet orange RTS beverage and they do not possess carbohydrates/ sugars and thus have low soluble solids and calories. Similar results were reported in sweet orange RTS by Byanna and Gowda (2012).

pH :

The pH of control sample of RTS beverage was (pH 4.10) similarly sample A of (pH 3.42), Sample B (pH 3.45), Sample C (pH 3.52) and Sample D (pH 3.54) Control sample had the highest pH due to addition of sugar, while A had lowest pH among all samples. The pH of the sample A and B was found to be less than the control sample; it may be due to addition of sweeteners. The pH of the samples had slightly decreasing trend similar trend was reported by Sasikumar (2013).

Titratable acidity :

Acidity of control sample of RTS beverage was (0.24 %) similarly sample A of (0.25 %), Sample B (0.26 %), Sample C (0.27 %) and Sample D (0.27 %). Acidity of RTS beverage was increasing with the addition of sweeteners smillar increasing trend of acidity was found in low Calorie Herbal Aonla-Ginger RTS Beverage by Gaikwad *et al.* (2013).

Ascorbic acid :

The ascorbic acid content of the control samples were found to be highest (4.6mg/100ml) followed by sample D (4.5mg/100ml), while it was lowest in sample

Table 1 : Chemical characteristics of pineapple juice

Sr. No.	Constituents	Pineapple juice
1.	TSS(^o Bx)	11
2.	pH	4.2
3.	Acidity (%)	0.71
4.	Ascorbic acid (mg/100ml)	35.5

*Each value is average of three determinations

Table 2 : Effect of different sweeteners on low calorie pineapple RTS beverages

Sample	TSS (^o Bx)	pH	Acidity (%)	Ascorbic acid(mg/100ml)
Control	15	3.6	0.34	4.6
A	2.1	3.42	0.35	4.2
B	2.3	3.45	0.36	4.2
C	9.7	3.52	0.37	4.4
D	10	3.54	0.37	4.5
Mean	7.82	3.506	0.358	4.38
S.E.±	0.56364	0.07112	0.00667	0.06667
C.D. (P=0.05)	1.69672	0.21409	0.02007	0.20069

*Each value is average of three determinations

Table 3 : Effect of different sweeteners on sensory characteristics of pineapple RTS beverages

Samples	Sensory attribute			
	Colour	Flavour	Taste	Overall acceptability
Control	9.0	8.9	8.9	8.9
A	8	7.5	8	7.8
B	8.2	8	7.5	7.9
C	8.4	8.2	8.2	8.2
D	8.7	8.5	8.4	8.8
Mean	8.46	8.22	8.2	8.32
S.E±	0.10499	0.08743	0.14787	0.04807
C.D. (P=0.05)	0.31604	0.2632	0.44514	0.14472

*Each value is average of three determinations

Table 4 : Total energy value of low calorie pineapple RTS beverages

Sample	Carbohydrate (Kcal)	Protein (Kcal)	Fat (Kcal)	Total energy (Kcal/100 ml)
Control	60.8	0.24	0.09	61.1
Selected (D)	32.2	0.4	0.09	30.53

A (4.2mg/100ml) and B (4.2mg/100ml). The content of ascorbic acid is higher in control sample containing sucrose as compare to other sample containing alternative sweeteners A reducing trend was observed in ascorbic acid similar results was reported by Sasikumar and Vivek (2015). The sample D containing 50 % sucrose+50 % sucralose was found to be stastically significant over other samples. All the Sample are found to be stastically at par with each other in TSS, pH, acidity and ascorbic acid.

Effect of different sweeteners on sensory characteristics of pineapple RTS beverages:

Effect of different sweeteners on sensory characteristics of prepared RTS beverages were carried out by a ten semi trained panel members with respect to colour, flavour, taste and overall acceptability.

The data in the Table 3 showed that the maximum score was recorded for control sample (8.9) followed by sample D (8.8). It was indicated from Table 3 that RTS beverage prepared with sugar record high sensory score in all quality attributes as compared to beverage prepared with addition of aspartame and sucralose sweeteners.

From the Table 3 it was clear that the sample D (8.8) with added 50 % sucrose+50 % sucralose ranked best among all sample after control sample. RTS with 50 % sucrose+50 % sucralose were rated superior in terms of overall acceptability and taste and thus rated as best recipes. Similar results on sensory acceptability of product were investigated by Byanna and Gowda (2012).

It can be concluded from the Table 4 that 100 ml of

low calorie pineapple RTS beverage (30.53 Kcal) which was almost half than that provided by control sample. In the preparation of low calorie RTS and squash half amount of the sugar can be successfully substituted by alternative sweeteners without impairing the quality of beverage Singh *et al.* (2014).

Conclusion:

It can be finally concluded that a good quality organoleptically acceptable low calorie pineapple RTS beverage can be prepared by using 50 % sucrose + 50 % sucralose. The prepared low calorie pineapple RTS beverage provide almost half calories than that provided by control sample.

LITERATURE CITED

- Amaravathi, T., Vennila, P., Hemalatha, G. and Parimalam, P. (2014). Spiced pineapple ready-to-serve beverages. *Indian J. Sci. & Technol.*, **7** : 1827–183.
- Byanna, C.N. and Gowda, Doreyappa I.N. (2012). Standardization of recipe for the preparation of ready-to-serve (RTS) beverage from sweet orange (*Citrus sinensis* Osbeck) var. sathgudi using sugar substitutes and its storage. *Crop Res.*, **3** : 356-362.
- Gaikwad, K.K., Singh, S. and Shakya, B.R. (2013). Studies on the development and shelf-life of low calorie herbal aonla-ginger RTS beverage by using artificial sweeteners. *J. Food Process. Technol.*, **4** : 1-4.
- Panse, V.S. and Sukhatme, P.V. (1967). *Statistical method for agricultural workers*. ICAR, NEW DELHI, INDIA.

- Ranganna, S. (1986).** *Manual of analysis of fruit and vegetable products*. Tata McGraw Hill Publishing Company Limited, NEW DELHI, INDIA.
- Sasikumar, R. (2013).** Effect of processing on physiochemical and sensory parameters of low calorie therapeutic RTS beverage blend of Aloe vera and aonla fruit using artificial sweeteners. *As. J. Food Ag-Ind.*, **6** : 337-346.
- Sasikumar, R. and Vivek, K. (2015).** Process development of therapeutic RTS beverage from blend of Aloe vera and pine apple. *J. Agric. Technol.*, **2** : 7-12.
- Sindumathi, G. and Premalatha, M.R. (2013).** Development and storage studies of naturally flavored papaya-pineapple blended ready-to-serve (RTS) beverages. *Internat. J. Sci. & Res.*, **2** : 856-860.
- Singh, Om, Singh, Richa and Singh, Pratiksha (2014).** Studies on preparation of aonla based blended RTS and squash from different fruits using stevia for low calorie. *Asian J. Hort.*, **9** : 328-333.
- Tochi, Bitange Nipa, Zhang, Wang, Shi -Ying, Xu and Wenbin, Zhang (2008).** Therapeutic application of pineapple protease (*Bromelain*): a review. *Pakistan J. Nutr.*, **4**: 513-520.

Received : 02.12.2016; Revised: 26.02.2017; Accepted : 08.03.2017