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Chemical composition and sensory analysis of fresh pineapple nectar

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Abstract
The ripen pineapple fruit is consumed fresh and juice as a source of essential minerals and minerals with some medicinal properties. Pineapple contains considerable calcium, potassium, fibre and vitamin C. Various food items like jam, jelly, nectar, pickles etc. are produce from pineapple. Study was conducted at Division of Food Science and Technology, Jammu University to prepare pineapple nectar. Pineapple harvested at optimum maturity was obtained from fruit Mandi Jammu and after sorting and proper washing fruits were sliced and converted into juice (±97 ºC). The juice was stored in amber glass bottles after pasteurizing at (97 ºC) for a period of 30 minutes. Different concentrations of sugar, water and citric acid were added to the juice to develop nectar of three different treatment combinations and these nectars were analyzed for various chemical parameters and sensory evaluation.

Keywords: Chemical composition, sensory analysis, fresh pineapple nectar

1. Introduction
Pineapple [*Ananas comosus* (L.) Merr. Family- Bromeliaceae] is one of the most important commercial fruit crops in the world. It is known as the queen of fruits due to its excellent flavour and taste. Pineapple is the third most important tropical fruit in the world after Banana and Citrus. Pineapples are consumed or served fresh, cooked, juiced and can be preserved. This fruit is highly perishable and seasonal. Mature fruit contains 14% of sugar; a protein digesting enzyme, bromelin, and good amount of citric acid, malic acid, vitamin A and B. Pineapple juice's composition varies depending on geography, season, process and time of harvest. Its balance of sugar and acid contributes to the fruit's refreshing flavor. Thailand, Philippines, Brazil and China are the main pineapple producers in the world supplying nearly 50% of the total output. Other important producers include India, Nigeria, Kenya, Indonesia, Mexico, Costa Rica and these countries provide most of the remaining fruit (Anonymous. 2014) [6]. Green pineapple is also used for making pickles. After extraction of its juice, the left over is used as livestock feed and also the tender leaves are used for the same purpose. Various food items like squash, syrup, jelly are produced from pineapple. Vinegar, alcohol, citric acid, calcium citrate etc. are also produced from pineapple (Carneiro *et al*., 2002) [8]. Pineapple is also recommended as medical diet for certain diseased persons. The U.S. National Library of Medicine lists bromelain as a proteolytic digestive enzyme. When taken with meals, bromelain aids in the digestion of proteins, working to break proteins down into amino acids.

Pineapple is a wonderful tropical fruit having exceptional juiciness, vibrant tropical flavor and immense health benefits. Pineapple contains considerable amount of calcium, potassium, vitamin C, carbohydrates, crude fibre, water and different minerals that is good for the digestive system and helps in maintaining ideal weight and balanced nutrition. Pineapple is a common fruit in Bangladesh and it has minimal fat and sodium. It contains 10-25 mg of vitamin. Pineapple composition has been investigated mainly in the edible portion. Pineapple contains 81.2 to 86.2% moisture, and 13-19% total solids, of which sucrose, glucose and fructose are the main components. Carbohydrates represent up to 85% of total solids whereas fibre makes up for 2-3%.

Of the organic acids, citric acid is the most abundant in it. The pulp has very low ash content, nitrogenous compounds and lipids (0.1%) (Bartolome *et al*., 1995) [7]

As a popular offering in health food stores and curative measure against numbers of diseases like diabetes, and oxidative stress *etc.* in supermarkets for a number of years, fruit nectar has gained a reputation of being healthier than many of the processed juices found in mainstream supermarkets. Looking to benefits of nectar in terms of health benefit and market value, it is therefore essential to prepare the fruit based nectar.

Processing of nectar is very easy and fruit products order (FPO) or Food Safety and Standards Authority of India (FSSAI) standard for nectar is 20 percent of fruit juice and 15 percent sugar and 0.3 percent acidity.

Material and Method

The experiment entitled "Chemical composition and sensory analysis of fresh pineapple nectar" was carried out at Division of Food Science and Technology, University of Jammu.

Raw materials

Pineapples were procured from the fruit mandi Jammu. Fresh fruits which were uniform in size and shape, free from transportation injuries, bruises, insect damage, diseases and uniformly ripened were selected.

Chemicals and additives

Most of the chemicals used in this investigation were of analytical grade. Sugar and citric acid was obtained from local market and used as main ingredients as well additives for the preparation of nectar.

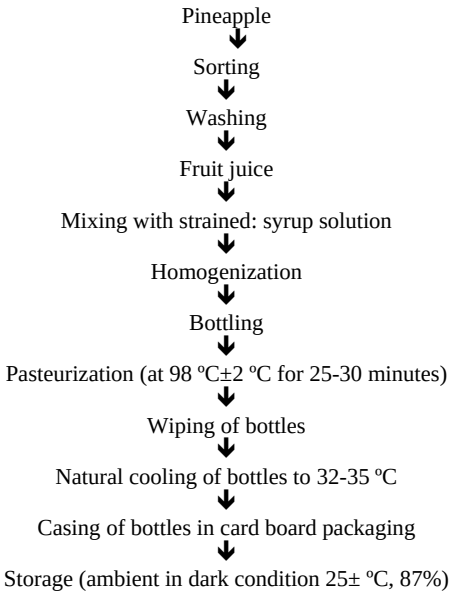
Equipment

An electrical heater, pulper, and other utensils were needed during the preparation of nectar.

Method for preparation for pineapple fruit nectar

Sound, healthy matured and ripe firm pineapple fruits were selected and then washed thoroughly under potable water and fruit peel was removed if necessary and then pulp was extracted by using laboratory pulper machine, pulp was strained through stainless steel sieve or muslin cloth to get clear juice. The total soluble solids (TSS) and acidity of strained juice was determined by using standard procedure as per Raganna, 1982 and to adjust the TSS and acidity of pineapple fruit nectar as per FPO specification, the additional required amount of sugar and acid was added. The prepared pineapple fruit nectar was pasteurized at 85 ^{0}C for 15 minutes and class II type preservative such as potassium metabisulphite @ 350 to 600 ppm was incorporated in final product and filled into the clean and sterilized either plain bottle or pouch. Then, the bottle was sealed with crown cork immediately. The filled bottle was exhausted in boiling water for 15 minutes and cooled then stored in room temperature.

Flow sheet for the preparation of nectar



Titratable acidity

For titratable acidity a known wt. of sample was boiled for 30 minutes with small quantity of distilled water, loss of water during evaporation was made up by addition of distilled water. The solution was filtered through Whatman No.4 filter paper and volume was made up to 100 ml. with previously boiled distilled water. A Known aliquot of the above extract was titrated against standard 0.01N. NaOH using phenolphthalein as indicator and acidity was calculated using equation 3.4.

$$\text{Titratable acidity (\% as citric acid)} = \frac{\text{Titre value} \times \text{Normality of alkali} \times \text{dilution} \times 67}{\text{Weight of sample} \times \text{aliquot taken} \times 1000} \times 100$$

Total soluble solids

The total soluble solids in nectar were determined with the help of a Hand refractometer (A.O.A.C. 1990) [1]. The drop of extracted juice was placed on the surface of the prism and the hinged part was placed back. The refractometer reading was taken and the average of reading was calculated (%) for each replication.

Sensory evaluation of nectar

The sensory evaluation of nectar was carried out according to the standard procedure Amerine *et al.* (1965) [3] on a 9 point Hedonic scale. The mean score of minimum 10 semi trained judges for each quality parameter viz., colour, appearance, texture, flavour and overall acceptability was calculated.

Statistical - Method for analysis of data

All experiments were carried out by using completely randomized design CRD. The data obtained in the preset investigation were analyzed for the statistical significance according to the process given by Panse *et al.* (1967) [9].

Results and Discussions

Total soluble solids of nectar

The total soluble solids of fresh pineapple were ranged from 11.0-16.0%. The treatment combination-T_3 had higher total solids content (16.00%) as compared to the other treatments and lowest total solids content was found in treatment combination T_1 (11.00%) there was a significant difference in TSS content between the different combinations of treatments (Table 1).

Acidity of pineapple nectar

The titrable acidity of nectar ranged from 0.031-0.030%. The treatment combination T_2 has acidity of 0.032 while the T_3 has lowest titrable acidity of 0.030%. There was a significant difference between the acidity content in various nectars prepared by different quantity of ingredient levels (Table 1).

Sensory evaluation of Nectar

The sensory evaluations of nectar were carried out according to the standard procedure Amerine *et al.* (1965) [3] on a 9 point hedonic scale. The mean score of minimum 6 semi-trained judges for each quality parameter via appearance, flavour, taste and overall acceptability was calculated. The sensory scores of nectar for parameters like appearance, flavour, taste and overall acceptability on 9 point hedonic scale.

Appearance

The results of appearance of fresh pineapple nectar are presented in below Table (2). The score for appearance was

recorded as 6.40, 7.20 and 6.80 for treatments T_1, T_2, and T_3 respectively. The nectar prepared by treatment T_2 scored highest (7.20), while nectar T_2 scored minimum score (6.4).

Taste

The results of taste score of pineapple nectar are presented Table (2). The average score for taste of pineapple nectar were in the range of 7.20, 7.60 and 6.80 for treatment T_1, T_2, and T_3. The pineapple nectar (T_2) scored maximum (7.60), while pineapple nectar scored minimum (6.80)

Flavour

The results of flavour of pineapple nectar are presented in Table 2. Flavour score for pineapple nectar ranged from 6.00 to 7.60. The treatment T_1 scored maximum (7.60), while treatment T_2 scored minimum (6.00)

Overall acceptability

The results of overall acceptability score of fresh pineapple nectar are presented Table 2. The nectar of treatment T_1 recorded maximum (7.06) followed by treatment T_3 (6.94) and T_2 (6.93) respectively. This might be due to better appearance, texture and flavour at different level of ingredients in juice.

Table 1: Physico chemical evaluation of nectar

Treatments	TSS (%)	Acidity (%)
T_1 (Pineapple juice 400ml:Sugar 100gm:Water 600ml:Citric acid 1gm)	11.00	0.031
T_2 (Pineapple juice 400ml:Sugar 120gm:Water 600ml:Citric acid 1gm)	13.20	0.032
T_3 (Pineapple juice 400ml:Sugar 150gm:Water 600ml:Citric acid 1gm)	16.00	0.030
Mean	13.40	0.031
C.D (at 5%)	0.011	0.001

Table 2: Sensory evaluation of pineapple nectar

Treatments	Appearance	Taste	Flavour	Overall acceptability
T_1 (Pineapple juice 400ml:Sugar 100gm:Water 600ml:Citric acid 1gm)	6.40	7.20	7.60	7.06
T_2 (Pineapple juice 400ml:Sugar 120gm:Water 600ml:Citric acid 1gm)	7.20	7.60	6.00	6.93
T_3 (Pineapple juice 400ml:Sugar 150gm:Water 600ml:Citric acid 1gm)	6.80	6.80	7.20	6.94
Mean	6.80	7.20	6.93	6.97

Conclusion

The results are obtained on laboratory scale. Further investigations on preparation of nectar on pilot scale and acceptability by consumer studies need to be undertaken for better utilization of pineapple nectar and for neutraceutical food products since the fruit found to have enough nutritional potential. This will open new avenue for commercial utilization of over ripened pineapple fruit.

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