# Development and Quality Evaluation of Beetroot Apple Jam

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**ABSTRACT**

Jam is a semisolid food product made by boiling fruit pulp (not less than 45% by weight) with sufficient sugar (55% by weight) to a reasonably thick consistency, firm enough to hold the fruit tissues in position, and rich in carbohydrates, vitamins, and fiber. The objective of the present work was development and evaluation of the quality of enriched beetroot apple jam. The beetroot apple jam was prepared from 60% apple and 40% beetroot. It was found most acceptable by considering the sensory attributes. In a beetroot sugar concentration is low, it is not used for sugar production, and contrarily is grown for diverse food uses, in the forms of fresh vegetables, dehydrated or frozen products, or for food preparations, such as pickles or juices. Apple is rich in Vit. C, Iron, pectin -1-1.5% (unripe apple) Apples are helpful for the prevention of cancer treatment of anemia, for diabetes, and reducing high blood pressure. It is particularly provided with nutrition-rich jam. The developed beetroot apple jam was prepared with different formulations. The developed Beetroot Apple Jam was evaluated for Proximate composition. The analysis revealed that percentages of fat, moisture, TSS and Ash value of beetroot apple jam were 0.28%-, 27.80%- ,68.5-degree brix, and 0.45% respectively.

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**Keywords**- Beetroot, Apple, Jam, Quality evaluation, Sensory analysis.

## I. INTRODUCTION

The Fruit industry in India comprises organized and unorganized sectors. India is the world's second-largest producer of fruits and vegetables. India is the world's largest producer of ginger and okra, and the world's second-largest producer of potatoes, onions, cauliflowers, brinjal, and cabbages, according to APEDA data. It is the world's largest producer of bananas, papayas, and mangoes, among other fruits. There is a huge opportunity for fruits and vegetable processing in India in the form of frozen (IQF), dried, pulp, puree, paste, sauces, snacks, dressings, flakes, dice, dehydration pickles, juices, slices, chips, jams, and jelly.

Beetroot, also called red beet (Beta vulgaris. L.). Beetroot contains high amounts of biologically active substances, including battalions and inorganic nitrate, and contains many other health-benefiting compounds like soluble fiber, minerals (ex. calcium, magnesium, iron, potassium, phosphorus, sodium, and zinc), and vitamins (ex. biotin, folic acid, niacin, and vitamin B6). Beetroot is helpful in the flow of blood and increases exercise rate. Various clinical trials have recently revealed that beetroot juice help to reduce the negative impact of home quarantine on cardiovascular health (Volino-Souza et al. 2020).

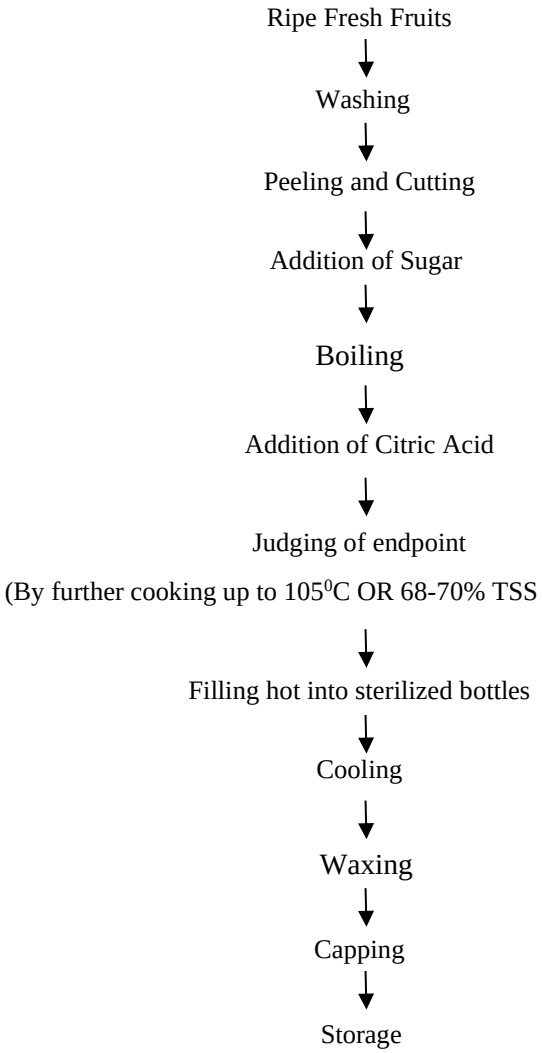
Apple is rich in Vit. c, Iron, pectin -1-1.5% (unripe apple) Apples are helpful for the prevention of cancer treatment of anemia, for diabetes and to reduce of high blood pressure. (Firdous, 2020).

## II. MATERIAL AND METHODOLOGY

The present study on the development of Beetroot Apple jam was conducted in the Department of Food Technology, Institute of Bioscience and Technology, MGM University, in the academic year 2022 -2023.

**Material:**
The following material used for making of jam was Apple, Beetroot, Citric acid, and Water. These all ingredients were purchased from the local market of Chhatrapati Sambhajinagar.

**Methodology:**
For the preparation of the Beetroot Apple Jam the following method was used: (Shrivastava and Kumar, 2002).




**Preparation of Sample**

Three trails of beetroot apple jam of different variations were attempted. First trail with 50% apple and 50% beetroot, the second trails with 60% apple and 40% beetroot, and the last trail with 40% apple and 60% apple. and all were exposed to sensory analysis.

**Sensory Evaluation:**

The developed Beetroot Apple jam was served with Bread, for evaluating color, consistency, flavor, taste, and overall acceptability on a 9-point hedonic scale with scores ranging from 9 to 1 which represents like extremely and dislike extremely respectively. The quality parameters were quantified and the mean scores of the three evaluations were calculated.

**Chemical Analysis**

1. Determination of Moisture:
   To find the moisture content, the following method will be used: weighing a 5g sample in a Petri plate and drying it in a hot air oven at 105 degrees C for 2 hours. Weight again after cooling until a constant weight drier is obtained. The final weight loss is calculated as moisture content. The moisture content of a sample is expressed in a g/100g sample.

$$\text{Moisture \%} = \frac{\text{Initial Weight} - \text{Final Weight}}{\text{Initial Weight of Sample Required}} \times 100$$

2. Determination of Fat:
   The fat content of the samples was determined using the modified version of the AOAC (1990) Method. 10g of sample was weighted into Soxhlet thimbles and placed into an extraction flask of a specific weight. Petroleum ether extraction lasted 1 hour. Evaporation on an electrical bath was used to remove the petroleum ether at the end. The leftover fat in the flask was dried after cooling for 10 min. the fat content percentage (%) was determined as follows

$$\text{Fat \%} = \frac{\text{Weight of Fat}}{\text{Weight of Sample}} \times 100$$

3. Determination of TSS:
   The total soluble solids (TSS) were determined at room temperature using a standard AOAC (2010) method, using a hand refractometer. Before operating, the temperature of the equipment was adjusted to room temperature. The samples were placed between the two lower prisms and then the connecting arm was rotated until the critical way cantered in the eyepiece, reading was taken directly in $^0$brix.

4. Determination Of Ash:
   According to AOAC weigh 5gm of jam sample in a crucible and place it in a temperature-controlled furnace preheated at $550^0$ C. Hold at this temperature for 2 hours. Transfer the crucible directly to the desiccator, cool, and weigh immediately, reporting the percent ash to the first decimal place.

$$\text{Ash \%} = \frac{\text{Weight of test portion} - \text{Weight on loss on ash}}{\text{Weight of test portion}} \times 100$$

## III. RESULT AND DISCUSSION

**Preparation of Sample:**

Three trails of beetroot apple jam of different variations were attempted. First trail with 50% apple and 50% beetroot, the second trails with 60% apple and 40% beetroot, and the last trail with 40% apple and 60% apple. and all were exposed to sensory analysis, the weight of beetroot and apple used in different variation for 250 gm.

**Sensory Evaluation:**

The sensory evaluation for the variation of the S2 gave the highest score for all the parameters by the panellist. The sensory table is as follows: (Figure 2)

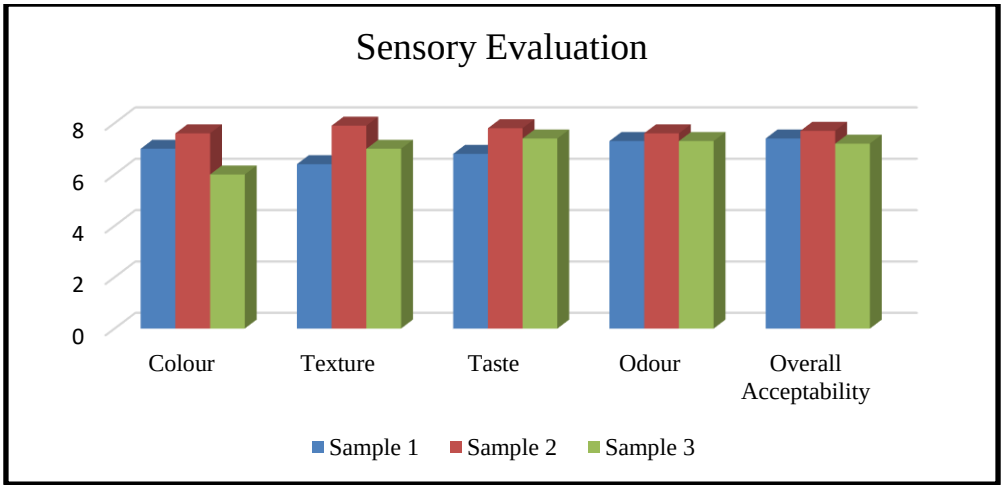



**Figure 1: Sensory Evaluation Table of Beetroot Apple Jam**

**Chemical Analysis:**

According to the standardized process product was prepared and exposed to the chemical analysis as follows:

| Sr. no. | Analysis | Results |
|---|---|---|
| 1. | Moisture | 27.80% |
| 2. | Fat | 0.84% |
| 3. | TSS | 68.5 $^{0}$ brix |
| 4. | Ash | 0.45% |

**Figure 2: Chemical Analysis of Beetroot Apple Jam**

## IV. CONCLUSION

A market survey revealed that various fruit products such as juices, concentrates, pulp, canned and dehydrated products, jams, pickles, and chutneys are available in the market. Among these, the jam was found to be particularly attractive to children. However, apple and beetroot combination in jam were not yet available in the market. To fill this gap, a study was conducted to develop and evaluate the quality of apple and beetroot jam, which also had the potential for scaling up as a new innovative product. Three samples of beetroot apple jam were formulated with varying compositions of beetroot and apple: S1 (50% apple-50% beetroot), S2 (60% apple-40% beetroot), and S3 (40% apple-60% beetroot). From 1 kg of fruits, a net weight of 720 gm of the final product was obtained. Sensory analysis was conducted, and the S2 sample was selected for further analysis based on its favourable results. The selected sample (S2) was analysed and found to contain 2.88% fat, 27.80% moisture, and 68.5-degree brix Total Soluble Solids (TSS). Subsequently, the selected sample was introduced into the market to assess its feasibility. Overall, the study successfully developed an apple and beetroot jam, which was well-received in the market. The chosen sample showed promising quality attributes and gained popularity among consumers, indicating potential for scaling up production and commercialization of this innovative fruit product.

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