



DEVELOPMENT OF VALUE-ADDED BEETROOT JAM WITH APPLE POMACE AND CHIA SEED AND ITS SENSORY EVALUATION

¹Saumya Maurya, ²Dr. Priyanka Shankar

¹M.Sc. Student, ²Assistant Professor, Department of Food and Nutrition, School of Home Science
Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India

Abstract: The innovatively prepared beetroot jam fortified with apple pomace and chia seed increases its nutritive values which were usually less found in other prepared jams due to processing. The addition of apple pomace and chia seed overcomes the loss of important nutrition during jam preparation and makes it more valuable in nutrition than other jams. It also acts as a health-promoting functional food. The prepared jam has 3.8 p^H and 65° brix which is desirable p^H of jam. The sensory evaluation was done to map out the acceptance of the product on a hedonic scale from 0 to 9 where 0 was disliked extremely and 9 was like extremely with different attributes like appearance, flavour/taste, aroma, texture, acceptability, and overall. The highest scored attributes were texture, appearance, and flavour/taste respectively and aroma does not seem good score in comparison with other attributes.

Keywords: Beetroot, Apple Pomace, Chia Seed, Sensory evaluation, jam, and Attributes.

I. INTRODUCTION

Nowadays, food preservation is becoming a more and more acceptable processing method of fruit and vegetable preservation. One of them is the preservation method of jam preservation (Jimenez, *et al*, 2021). Commercially, jams are made by thermal concentrating the mixture under normal or reduced pressure and this process produces a jam with a thick or gelled consistency (Fasogbon *et al*, 2013). The U.S. Code of Federal Regulations (CFR) has given definitions and standards for the jams in which the final TSS (Total Soluble Solids) of the jam shall be 65° Brix or 65% by weight (Zhao, Yanyun. 2007).

Beta vulgaris Linn, also known as beetroot, is a colourful and adaptable vegetable that belongs to the Chenopodiaceae family. It is known by several names, including Chukander, and is commonly consumed raw, as juice, baked, or boiled. The primary sugar found in red beets is sucrose. It has a bright crimson colour and an earthy taste and smell. While low in calories, beets are high in essential vitamins and minerals. Red beets are a low-fat vegetable high in carbohydrates, starch, soluble fibre, and protein. They also have a low-calorie count. There are also numerous phytochemicals with biological activity. Among them are betalains, which account for 70-100% of the phenolic content of beetroot (Mathangi and Balasaraswathi, 2019).

Beetroot also contains soluble fibre, a variety of minerals (such as calcium, magnesium, iron, potassium, phosphorus, salt, and zinc), and vitamins (such as biotin, folic acid, niacin, and vitamin B6) that are all beneficial to health [5].

Apple pomace is a significant byproduct produced during the processing of apple juice. Pomace, a byproduct of the apple juice processing industries, contains a wide range of nutritionally important compounds, including carbohydrates, phenolic compounds, dietary fibre, and minerals. These important compounds can be recovered from apple pomace, and apple pomace can even be used directly or after minimal processing in food systems. As a result, apple pomace can be used to improve the health benefits and commercial value of food products. Apple pomace

contained approximately 2.2-3.3% seeds, 0.5-0.9% stem, and 70.0-75% apple meat. The average dietary fibre content was 36.8% (**Vanajakshi et al, 2015**).

Chia seed, scientifically known as *Salvia hispanica* L., has significant therapeutic and nutritional benefits. A region extending from western Mexico to northern Guatemala is home to this annual plant. The 2mm long, mottled-colored seeds have shades of brown, grey, black, and white (**Cahill, 2003**). They are said to have anti-oxidative properties, control lipid metabolism, protect the cardiovascular system (**Alonso-Calderón et al, 2013**), exhibit anti-inflammatory properties, and improve athletic performance. It is also effective in patients with type II diabetes, at preventing strokes and heart attacks. It has a notable reduction in blood pressure, blood sugar, and body weight as well (**Ayerza and Coates, 2005**). It is needed to create a new product for competition which increase the market value (**Pelsmaker et al, 2015**).

The aim of this work was to introduce a new product and develop a value-added beetroot jam with apple pomace and chia seed to increase the nutritional composition and health benefits. Because, while preparing or processing of the jam its losses some nutritional value. The developed product was conducted for sensory evaluation to know about its acceptability for commercialization.

II. METHODOLOGY

2.1 Source of experimental materials

The present investigation based on standardization of value-added beetroot jam by using apple pomace and chia seed was carried out in Department of Food and Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow-226025, Uttar Pradesh. Beetroot, apple, and chia seed for the present study was purchased from the local market of South City, Lucknow area.

2.2 Preparation of Jam

Apple pomace was prepared by apple. For this procedure, the apple was brought from the local market of South City, Lucknow. The apple was then preceded for sorting and grading followed by thoroughly washing. Then it was peeled, cut into small, and weighed. After weighing, the apple was crushed and poured into a vinegar and water mixture for 30 minutes. Then it was spread on a tray of dehydrator for drying and it was ground into fine powder.

Chia seed was brought from the local market of Lucknow. It was then roasted and ground into fine powder respectively.

Beetroot was obtained from the local market near BBAU and was subjected to sorting and grading followed by thoroughly washing in order to remove dirt, dust, and other foreign materials from its surface. It was then peeled, cut into small pieces, and boiled in a pressure cooker for up to 2 whistles. The water was drained and beetroot was pulped with the help of a grinder. The pulp obtained was cooked for a few minutes and then sugar was added after that with continuous stirring. After a few minutes, apple pomace and chia seed powder were added. Then cinnamon powder and ginger juice were added. The pectin and citric acid were added and cooked until the TSS reached 65⁰-68⁰ Brix. The sugar was 40%, citric acid 0.5-0.6%, and pectin 0.8% was added to beetroot pulp.

The jam was prepared by using ingredients are:

S. No.	Ingredients
1.	Beetroot
2.	Apple pomace powder
3.	Chia seed powder
4.	Pectin
5.	Citric acid
6.	Cinnamon powder
7.	Ginger juice

Table 2.1: Standardization of jam

2.3 Sensory Evaluation

The prepared value-added jam was evaluated for its organoleptic attributes namely appearance, taste and flavour, aroma, texture, and acceptance by the semi-trained panel comprising 25 panelists drawn from staff, students, friends from BBAU, and family and neighbors. The "nine-point hedonic rating scale" was used to ask the panelists to record their observations where 9 represents like extremely and 0 represents dislike extremely.

III. RESULT AND DISCUSSION

The result of the present study has been discussed as follows:

3.1 Prepared Jam

The prepared jam was found TSS of the jam was 65⁰ Brix, the Sugar percentage was 40%, and the p^H was 3.8.

3.2 Sensory Evaluation

A sensory evaluation of value-added prepared jam was conducted and the result was obtained which is shown below. The sensory evaluation shows that the prepared value-added jam had good acceptability. The table below represents the attributes and the average score of the attributes whereas the figure represents the graph of sensory evaluation scores. The sensory evaluation of prepared jam was conducted on a hedonic scale from 0-9 scoring where 0 is dislike extremely and 9 is like extremely.

<i>Attributes</i>	<i>Scores</i>
<i>Appearance</i>	8.64
<i>Flavour/Taste</i>	8.48
<i>Aroma</i>	7.92
<i>Texture</i>	8.76
<i>Acceptability</i>	8.4
<i>Overall</i>	8.32
<i>Total</i>	8.42

Table 3.1: Average Score of Sensory result.

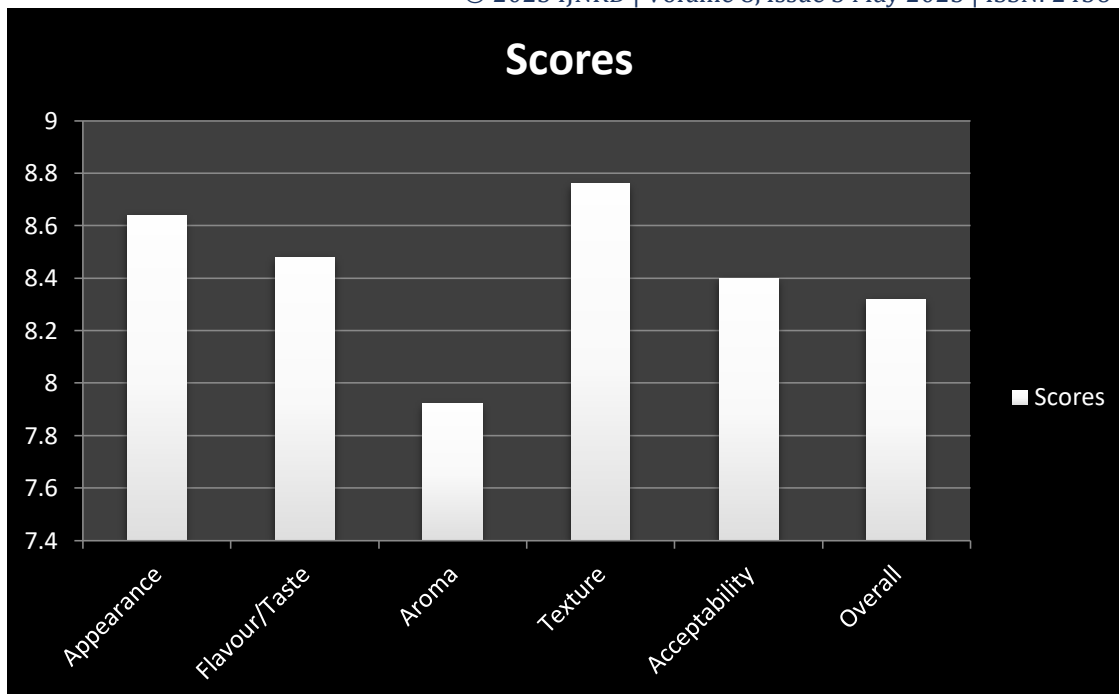


Figure 3.1: Graph of Sensory evaluation result.

IV. CONCLUSION

It was concluded that the prepared value-added jam has p^H 3.8 and TSS 65° brix. The value-added jam with apple pomace and chia seed was obtained as good acceptability which shows it can be a good product to consumers and will have good consumer acceptability. The texture was more acceptable in all parameters of sensory evaluation. Then the appearance got a good score. And flavor also scored a good value whereas the aroma does not have a higher value but comes under the acceptable product. So, the overall was that it is an acceptable novel product.

REFERENCES:

- [1] Jimenez, et al., 2021. Food preservation: Making tasty cooked Strawberry Jam. University of Florida. UF/IFAS Extension.
- [2] Fasogbon et al., 2013. Studies on the chemical and sensory properties of jam from osmotically dehydrated pineapple slices. British Journal of applied Science and Technology. 3(4):1327-1335.
- [3] Zhao, Yanyun. 2007. Berry fruit: Value-added Products for Health Promotion. Taylor & Francis Group LLC. Chapter 13: Berry jams and jellies. 368-386.
- [4] Mathangi S., and Balasaraswathi, M. 2019. Formulation of horsegram cake enriched with beetroot powder. International Journal of Applied Home Science. 6(1):61-65.
- [5] Vanajakshi, V., Vijayendra, S.V.N., Varadaraj, M.C., Venkateshwaran, G., and Agrawal, R. 2015. LWT. Food Sci. Tech. 63, 1268.
- [6] CARSON, K. J., COLLINS, J. L., & PENFIELD, M. P. 1994. Unrefined, Dried Apple Pomace as a Potential Food Ingredient. Journal of Food Science. 59(6), 1213–1215. doi:10.1111/j.1365-2621.1994.tb14679.x
- [7] Ayerza, R., and Coates, W. 2005. Chia: Rediscovering an ancient crop of the Aztecs. University of Arizona Tucson, Arizona, USA.
- [8] Pelsmaker, S. De., Gellynck, X., Delbaere, C., Declercq, N., & Dewettinck, K. 2015. Food Qual. Pref. 41,20.
- [9] Cahill, J. 2003. Ethnobotany of chia, *Salvia hispanica* L. (Lamiaceae). Economic Botany 57:604- 618.
- [10] Alonso-Calderón, A., Chávez-Bravo, E., Rivera, A., Montalvo-Paquini, C., ArroyoTapia, R., Monterrosas-Santamaria, M., Jiménez-Salgado, T., & Tapia-Hernández, A., 2013. Characterization of black chia seed (*Salvia hispanica* L) and oil and quantification of β -sitosterol. International Research Journal of Biological Sciences. 2(1), 70-72.