

DEVELOPMENT OF BREAD FROM SAPOTA SEEDS

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ABSTRACT

Considerable amounts of organic waste are generated through the maintenance of farms and crops, as well as the industrialization of food products in the agricultural sector. In the case of Sapota cultivation, Sapota seeds obtained after processing is often considered as waste. The aim of this work is to reduce food waste by repurposing waste into a functional product. Even though the seed contains lot of nutrient values such as amino acids, dietary fibers, anthocyanin compounds, minerals, vitamin B and C complex, it remains underutilized. Due to lack of research in sapota seeds it became challenging factor for the domestic and industries for its complete utilization. Bread, being one of the earliest known functional foods, has undergone thorough analysis in various research studies to better understand its impact on human health. Wheat and Maida bread can cause adverse reaction to individuals with gluten sensitivity, lack sufficient fiber content which creates a need for low gluten functional bread. The production of gluten-free bread using sapota seed flour is the main goal of this work. Sapota seed bread have less gluten than the other flour-based breads. Also, it possesses the high nutritious value due to the presence of functional compounds. After washing, drying of seeds was carried out for 6 hours at an equal interval of 30 minutes at 60°C and drying kinetic to be done. The dried seeds were milled into flour for which the optimization studies were carried out and different formulations was done. After the development of bread and it can be further analyzed for its characteristics like Texture analysis, proximate analysis, Microbial analysis, sensory analysis and shelf-life studies are will be done.

Keyword: Food Waste, Sapota seed, Dietary fiber, Gluten less, Value added products.

1. INTRODUCTION

An estimated large amount of all food meant for human consumption is wasted, which is a serious problem on a global scale. The use of food waste to use products has great potential. However, it requires efficient systems for sorting, collecting and processing waste, as well as sustainable techniques and technologies for conversion processes. Extensive research, supportive policy frameworks and societal acceptance are key to a successful transition from food waste to product recovery. Waste utilization refers to the process of converting waste materials into useful products or energy sources. This concept is driven by the availability of cheap raw materials, which often involve waste or disposal problems. Converting food waste into useful products is a key strategy in waste management, promotes sustainable development and reduces the ecological footprint. Manilkara Sapota, commonly known as sapota and it is a tropical fruit native to Central America. Sapota seeds are an excellent source of fiber and protein. However, they are often thrown away because people don't know how to use them. consuming sapota results in a significant amount of waste, especially in the form of its seeds. The project focuses on the development of bread made from sapota seed flour. Sapota seeds can increase the nutritional value of bread. Sapota Seed Powder

is gluten-free and suitable for people with gluten sensitivity. The use of Sapota seeds supports local farmers and creates economic opportunities. Sapota seed bread is a unique and innovative baked product that incorporates sapota (also known as chikoo) seeds into the bread making process. Sapota is a tropical fruit with a sweet and grainy texture. Sapota Seed Bread utilizes these often-overlooked seeds by grinding them into a fine powder and incorporating them into the bread dough.

1.1 Objectives

The objective is to produce a bread product that is nourishing and delectable with the distinctive nutty flavor of sapota seeds, enhancing the nutritional profile of the bread and providing consumers with a cutting-edge and environmentally friendly alternative to conventional bread variations. This entails adding necessary elements to the bread, such as important fatty acids, proteins, vitamins, and minerals.

- **Protein Enrichment:** The major source of protein in the bread will be sapota seed flour, which contains all nine essential amino acids necessary for preserving good health.
- **Nutrient variety:** The use of sapota seed flour will increase the bread's nutritional variety by adding essential vitamins and minerals including iron, calcium, and B vitamins, which will further improve general health.
- **Extended Shelf Life:** The bread manufactured with sapota seed flour will be made to have a respectable shelf life, guaranteeing its safety and nutritional value up until eating. In order to acknowledge how crucial it is to have access to nutrient-rich food, this is being done.
- **Consumer Health:** By providing a nutritious and well-balanced bread substitute that can reduce the health risks brought on by dietary deficiencies, the ultimate objective is to promote consumer health and wellbeing.

1.2 Scope of the project

This strategy has the ability to turn waste into valuable resources while minimizing the negative environmental effects of food production. A recent market survey found that 59.2% of consumers eat sapota fruit every day, 60% throw away sapota seeds because they do not know their purpose, and 54.5 % Bread of respondents. The survey also found that health benefits (70.2%) and taste/taste (77%) were the main factors influencing food purchasing decisions. Additionally, the survey found that 43.5% of consumers actively seek out foods with potential health benefits, 43% are still trying new baked goods, and 60% are trying new baked goods out of curiosity. This shows that there is a demand for new and innovative baked goods. The project focuses on the development of bread made from sapota seed flour. Manilkara Sapota, commonly known as sapota and it is a tropical fruit native to Central America. Sapota seeds are an excellent source of fiber and protein. However, they are often thrown away because people don't know how to use them. consuming sapota results in a significant amount of waste, especially in the form of its seeds. Recently, attention has been paid to the utilization of sapota seed waste as a potential resource due to its beneficial properties. Sapota seeds are rich in oil content, with studies showing that they contain about 19-24% oil. This makes sapota seeds an attractive raw material for the production of biofuels, especially biodiesel, contributing to sustainable energy sources.

2. MATERIALS AND METHODOLOGY

The process of making bread from sapota seed flour is time consuming and creative, combining the use of special ingredients with the bread making process. The process includes several key steps, starting with the selection and cleaning of sapota seeds, which are then successfully processed to produce sapota food. Then sapota seed powder is delicately mixed with rice flour, yeast and other necessary ingredients. Then the dough is complete, leavened and baked to perfection. During this process, many combinations of ingredients, methods and cooking times will be researched and tested to create the tastiest and healthiest bread, and the quality and baking ability of sapota seed powder will be demonstrated. There are various procedures involved in making sapota seed flour bread in order to produce a tasty and wholesome bread product from sapota seeds. In this project, sapota seeds will be used to create a distinctive and nutritious bread. Here is the methodology for making bread with sapota seeds.

Table – 1: Ingredients

Ingredients	Properties
Sapota Seed Flour (Main Ingredient) and Wheat and Maida	Base Flours
Yeast	Leavening Agent
Water	Liquid
Oil / Butter	Fat
Sugar	Sweetener
Salt	Flavor Enhancer and Yeast Regulator

2.1 Procedure

Preparation of sapota seed flour:

- Sapota seeds should be collected and thoroughly cleaned to remove any impurities.
- Roast the sapota seeds in a dry pan over medium heat of 120°C for 15 minutes, until they are golden brown and fragrant. Both their flavor and moisture content have improved.
- Roasted seeds are dried in tray drier at 60 ± 2 °C for 7 hours.
- Let the dried sapota seeds cool to room temperature.
- Powder up the dried sapota seeds using a blender or food processor. This sapota seed flour will be used extensively in the bread recipe

Bread dough preparation:

- Combine the sapota seed flour, wheat flour, yeast, sugar, and salt in a mixing dish. Combine them entirely.
- To create a smooth, elastic dough, gradually add water and extra virgin olive oil to the dry ingredients. For the required consistency, adjust the water amount as needed.
- You can, at your discretion, add herbs, spices, nuts, or seeds to the bread to improve its flavor and nutritional content.

Rise and bake:

- Wrap the dough in a bowl with laminating film and set it aside in a warm, draft-free area for the designated amount of time to rise until it doubles in size. A crucial phase in the baking process is fermentation, which is required for the yeast to function.
- Correctly adjust the oven's temperature.
- Spoon the dough that has risen onto baking sheets or loaf pans and shape it as necessary.
- Bake the bread in the preheated oven for 15 to 20 minutes at 195°C, until it is golden brown and hollow within. The specifics of the recipe will determine the baking time and temperature.

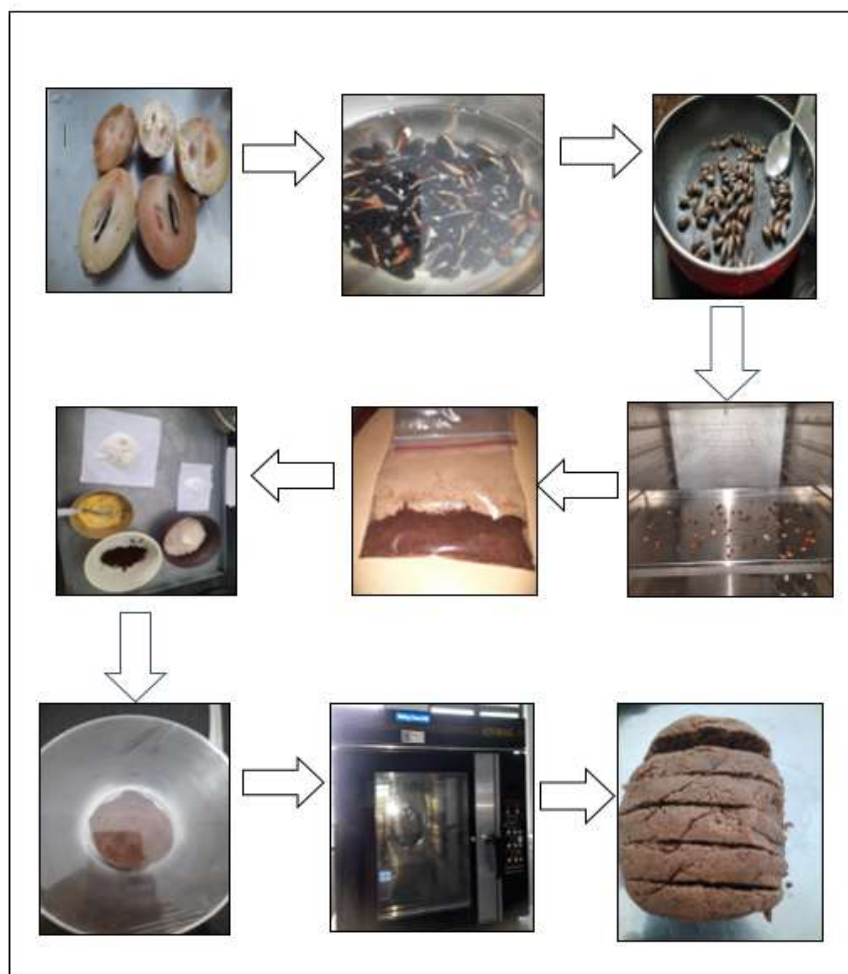


Fig-1: Process flow of sapota seed bread preparation

2.2 Testing Methods for Nutritional Analysis

- Kjeldahl method for protein analysis
- Soxhlet apparatus for fat determination
- Moisture analyzer for moisture analysis
- Muffle furnace for analyzing mineral content
- Ph meter for testing Ph
- Determination of water activity using water activity meter

3. RESULT AND DISSCUSION

The yield of sapota seed flour was established by the followed procedures. The weight of the sapota seeds was initially 57 grams, but after cleaning them of dirt and dust, the net weight dropped to 54 grams, indicating that there were impurities in the initial weight. After that, roasting was done to lessen moisture and improve flavor. The seeds were then dried and ground into flour following this procedure. The sapota seed flour's final weight was determined to be 33.5 grams. The weight loss during roasting and the elimination of inedible components, which led to the final product of edible sapota seed flour, are indicated by the decrease in weight from the roasted seeds to the flour. The experiment was designed to measure how raw seeds are converted into a viable product, emphasizing how moisture content is reduced and undesirable components are eliminated. The nutritional properties of prepared sapota seed flour are revealed by chemical analysis. This flour's low moisture content of 4.53% and water activity of 0.3% prevent microbial growth and allow for a longer shelf life. It contains 28.25% protein, which makes it a good source of dietary protein, and 18.6% fat, which gives it flavor and nutritional richness. With a high crude fiber content of 37.5%, it supports a feeling of satiety and digestive health. Additionally, the 2.3% ash concentration indicates that important minerals are present. Together, these results suggest that sapota seed flour may find use in a range of food products due to its nutritional properties and storage stability.






 <p>FIGURE 1</p>	<p>FIGURE 1: Represents a sample of sapota seed powder has a moisture content of 4.53%. This keeps the product from spoiling.</p>
 <p>FIGURE 2</p>	<p>FIGURE 2: Represents a water activity in the sample of sapota seed powder is 0.3aw. It extends the shelf life and restricts microbial development.</p>
 <p>FIGURE 3</p>	<p>FIGURE 3: Represents a the sapota seed powder sample contains moisture content of $L^*=25.65$, $a^*=12.89$, $b^*=18.39$ To ensure that the flour has a good color and is not discolored.</p>
 <p>FIGURE 4</p>	<p>FIGURE 4: Represents the sapota seed powder sample contains pH of 6.96 . To ensure that the flour is not too acidic or alkaline, which would affect the taste and baking properties of the flour.</p>
 <p>FIGURE 5</p>	<p>FIGURE 5: Represents the sapota seed powder sample contains ash content of 2.3%g . To ensure that the flour is not contaminated with mineral matter.</p>

Fig – 2: Analysis for sapota seed flour

Wheat bread is usually made from wheat flour, water, yeast, salt, and occasionally sugar or other ingredients. It is the basis of many diets. Its signature quality is the soft, fluffy texture that comes from the gluten in the wheat flour. Since this bread has a mild flavor, it can be used as a base for a variety of toppings, from sweet jams to savory spreads. (fig) Normal bread mostly consists of carbohydrates and fiber, which support good digestion and give you long-lasting energy. Depending on the type of wheat flour used, it also contains vital vitamins and minerals that contribute to the overall nutrient intake. In comparison, sapote bread explores the universe of alternative bread options. Its primary ingredient, sapota seed flour, is made from the seeds of the sapodilla fruit. Sapota seed bread has a distinct flavor profile that can have nutty or earthy undertones because sapota seeds are used.

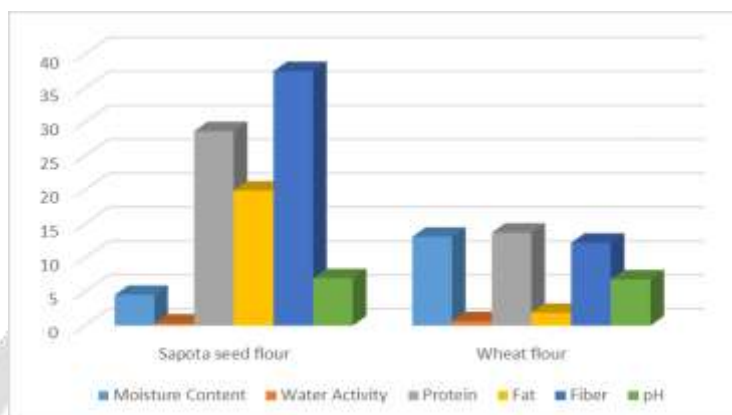


Chart -1: Nutritional comparison of sapota seed and wheat flour

Depending on how coarse the seed flour is, the texture of sapota seed bread can vary, bringing a new element to the bread-eating experience. The nutritional appeal of sapota seed bread is very strong. Sapota seeds are added to increase the amount of protein, making it an excellent source of this important macronutrient. Compared to classic wheat bread, it has a higher percentage of good fats, which helps it to have a more varied nutritional profile. The fiber content of sapota seed bread is also noteworthy as it supports digestive health and fullness. The key difference between the two forms of bread is compatibility with dietary restrictions and allergies. Gluten, a protein found in bread, can cause allergies or intolerances in people who are sensitive to it, such as those with celiac disease or non-celiac gluten sensitivity. However, if properly prepared, sapota seed bread has the potential to be gluten-free, making it safe for anyone with gluten issues. In order to remain gluten-free, it is essential to ensure that cross-contamination is avoided during the manufacturing process. Regular bread offers convenience, adaptability and a nutritional composition that is well balanced. Sapota seed bread, on the other hand, appeals to people who are looking for unusual tastes and possible nutritional benefits, especially if they need gluten-free options or want to diversify their diet. Ultimately, both varieties of bread expand the wide range of culinary options offered to customers.

4. CONCLUSIONS

The bakery business has a lot to gain from using sapota seed flour in place of wheat flour for baking bread. Due to the declining price of wheat flour, this innovative method is not only cost-effective but also environmentally good because it reduces the waste produced by wasted sapota seeds. Leveraging sapota seeds' high protein and carbohydrate content is a great idea given the growing demand for economical, sustainable, and wholesome food options. The creation and promotion of sapota seed bread would reduce food waste, maybe give sapota farmers a new source of income, and give consumers a better and more sustainable food option. To improve the flavor and texture of sapota seed bread, additional research may be required.

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