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Innovative Product Development of Melon Coconut Macaroons: A Sensory and Consumer Evaluation

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Abstract

This study focused on the development and evaluation of melon coconut macaroons as an innovative bakery and confectionery product. The study aimed to determine the sensory characteristics of the developed product in terms of appearance, aroma, taste, and texture; assess its level of acceptability; and propose an innovative recipe based on the findings. The product utilized melon juice and melon pulp residue as additional ingredients to the traditional coconut macaroon formulation in order to introduce a unique flavor profile while promoting the utilization of fruit residues and sustainable food practices.

The study employed a developmental and descriptive research design. A total of twenty-five (25) respondents composed of students, teachers, and consumers participated in the sensory evaluation of the developed product. Data were gathered using researcher-made survey questionnaires through Quantitative Descriptive Analysis and Acceptability Score Sheets utilizing a 5-point Likert Scale. Weighted mean was used to analyze and interpret the gathered data.

Findings revealed that the developed melon coconut macaroons obtained an overall weighted mean of 4.50, verbally interpreted as "Excellent," in terms of sensory characteristics. Among the indicators, taste received the highest weighted mean of 4.68, followed by appearance (4.52), texture (4.44), and aroma (4.36). In terms of acceptability, the product achieved an overall weighted mean of 4.54, verbally interpreted as "Highly Acceptable." Taste again obtained the highest weighted mean of 4.72, followed by appearance (4.56), texture (4.48), and aroma (4.40).

The study concluded that melon juice and melon pulp residue can be effectively incorporated into coconut macaroons without negatively affecting product quality. The developed product demonstrated desirable sensory characteristics and high consumer acceptability. Furthermore, the study showed that melon-based ingredients can serve as value-added components in bakery products while supporting sustainability through the utilization of fruit residues. An innovative recipe for melon coconut macaroons was therefore proposed based on the findings of the study.

CHAPTER 1
INTRODUCTION

Introduction

Food innovation plays a significant role in the development of new food products that respond to the changing needs and preferences of consumers. Today, consumers not only seek products that are enjoyable but also those that provide additional nutritional benefits and contribute to sustainability. In recent years, food researchers have explored the incorporation of functional ingredients into traditional food products

in order to enhance their nutritional value while also promoting sustainable food practices. According to Zuñiga-Martínez et al. (2022), agro-industrial fruit by-products are increasingly utilized as functional ingredients in baked products because they contain valuable nutrients such as dietary fiber, proteins, antioxidants, and essential minerals. The integration of these fruit by-products into baked goods has been shown to enhance both the nutritional value and functional properties of food.

Melon (*Cucumis melo*) is a widely cultivated fruit in many tropical and subtropical countries, including the Philippines, where it is commonly consumed fresh or used in beverages and desserts. With its distinct aromatic flavor and sweet orange or yellow flesh, melon is widely available in public markets and supermarkets across the country. However, despite its popularity in food and beverage preparation, the processing and consumption of melon often generate a considerable amount of waste, particularly the seeds and peels that are usually discarded during preparation. Research has shown that these fruit residues contain valuable nutrients such as dietary fiber, protein, and bioactive compounds that can be utilized in food production. Cunha et al. (2020) and Silva et al. (2024) reported that melon residues can be processed into flour through drying and milling methods, allowing them to be incorporated into various food formulations. In addition, melon juice has also been explored in food product development because of its distinct sweetness, aroma, and potential nutritional value. Yerenova et al. (2016) developed melon-based juices and reported that melon contributes favorable organoleptic characteristics, particularly in terms of taste, aroma, color, and consistency.

Several studies have explored the use of melon-based ingredients in baked products, particularly in cookies and biscuits, demonstrating improvements in nutritional value such as increased fiber and mineral content without compromising taste or texture. Despite the growing body of research on melon-enriched bakery products, limited attention has been given to the application of melon ingredients in other confectionery products. Coconut macaroons, a popular sweet baked product made primarily from shredded coconut, egg whites, sugar, and condensed milk, are widely enjoyed due to their rich flavor and chewy texture. However, traditional macaroons are often high in sugar and contain limited additional nutrients. Incorporating melon-based ingredients into coconut macaroons presents an opportunity to enhance their nutritional content while introducing a unique flavor profile.

In the context of this study, the melon flesh is utilized primarily in the form of juice and pulp residue as valuable components for product development. The melon juice contributes natural sweetness, moisture, and aroma that can complement the flavor of coconut macaroons, while the remaining pulp residue may provide additional texture and nutrients that can enhance the overall quality of the product. The utilization of these melon components also supports sustainable food practices by maximizing the use of the fruit and reducing potential food waste during processing.

Given these considerations, the development of melon coconut macaroons represents a promising approach to combining traditional confectionery with functional ingredients derived from fruit. By integrating melon juice and selected melon components into a familiar baked product, this innovation may provide enhanced nutritional value, a distinctive flavor, and potential environmental benefits. Therefore, this study aims to develop and evaluate melon coconut macaroons and assess their potential as a novel food product that integrates nutritional improvement and sustainable food innovation.

Statement of the Problem

This study aims to develop and evaluate melon coconut macaroons as a food innovation product. Specifically, it seeks to answer the following questions:

1. What are the sensory characteristics of the developed melon coconut macaroons in terms of:

a. Appearance
b. Aroma
c. Taste
d. Texture

2. What is the level of acceptability of the developed melon coconut macaroons in terms of:

a. Appearance
b. Aroma
c. Taste
d. Texture

3. What innovative recipe for melon coconut macaroons can be proposed based on the findings of the study?

Objectives of the Study

This study aims to develop and evaluate melon coconut macaroons as a food innovation product. Specifically, it seeks to:

1. Determine the sensory characteristics of the developed melon coconut macaroons in terms of appearance, aroma, taste, and texture.
2. Assess the level of acceptability of the developed melon coconut macaroons in terms of appearance, aroma, taste, and texture.
3. Propose an innovative recipe for melon coconut macaroons based on the findings of the study.

Significance of the Study

This study is significant because it focuses on the development of melon coconut macaroons as an innovative food product that combines the familiar qualities of traditional coconut macaroons with the unique flavor and potential nutritional contribution of melon. The findings of the study may provide useful insights to the following:

Bakers and Small Food Entrepreneurs.

The primary beneficiaries of this study are bakers and small food entrepreneurs, as the findings may provide them with a new product idea that can be developed and offered to consumers. The proposed melon coconut macaroon recipe may serve as a basis for creating a value-added bakery product with a distinct flavor, which can help expand product offerings and attract customers looking for unique and locally inspired food items.

Hospitality and Food Service Students.

Hospitality and food service students may benefit from this study by gaining insights into food innovation, recipe development, and sensory evaluation. The study may help them understand how traditional food products can be modified using locally available ingredients to create new and improved food products.

Consumers.

Consumers may benefit from this study through the introduction of a new variation of coconut macaroons with a distinctive melon flavor, aroma, and texture. The developed product may provide an alternative snack or dessert option for individuals who enjoy innovative baked goods.

Local Fruit Producers and Vendors.

Local fruit producers and vendors may benefit from this study as it promotes the use of locally available melon in food product development. By presenting melon as a valuable ingredient for confectionery products, the study may help increase interest in the use and market potential of melon beyond fresh consumption and beverages.

Students and Future Researchers.
Students and future researchers may use this study as a reference for research related to food innovation, product development, sensory evaluation, and the use of fruit-based ingredients in baked products. The findings may also serve as a foundation for future studies involving nutritional analysis, shelf-life testing, packaging development, cost analysis, and market feasibility of melon-based bakery products.

Scope and Delimitation of the Study
This study focuses on the development and evaluation of melon coconut macaroons as a food innovation product. Specifically, it examines the sensory characteristics and level of acceptability of the developed product in terms of appearance, aroma, taste, and texture. The study also aims to propose an innovative recipe for melon coconut macaroons based on the findings.
The study is limited to the use of melon juice and pulp residue as the primary melon-based ingredients incorporated into coconut macaroons. It does not include other parts of the melon such as the seeds or outer peel. The study is also limited to the preparation of coconut macaroons and does not cover other baked products such as cookies, cakes, biscuits, or pastries.
The sensory evaluation will focus only on selected attributes, namely appearance, aroma, taste, and texture. Other factors such as nutritional composition, microbial analysis, shelf-life stability, packaging design, cost analysis, and market feasibility are not included in the scope of the study unless further research is conducted.
The respondents of the study will be limited to selected evaluators who will assess the product based on the given sensory evaluation criteria. The findings will therefore reflect the perceptions and acceptability ratings of the respondents involved in the study and may not represent the preferences of all consumers.
Overall, the study is delimited to determining the sensory qualities and acceptability of melon coconut macaroons and proposing an improved recipe based on the results of the evaluation.

Definition of Terms
The following terms are defined operationally to provide a clearer understanding of how they are used in this study.
Acceptability. The degree to which the developed melon coconut macaroons are liked or approved by the respondents based on appearance, aroma, taste, and texture.
Appearance. The visual quality of the melon coconut macaroons, including color, shape, size, and overall presentation as evaluated by the respondents.
Aroma. The smell of the melon coconut macaroons, particularly the pleasantness and presence of melon and coconut scent.
Coconut Macaroons. A sweet baked product commonly made from shredded coconut, eggs or egg whites, sugar, and condensed milk, serving as the base product in this study.
Food Innovation. The development or improvement of food products through new ingredients, formulations, or preparation methods. In this study, it involves the development of melon coconut macaroons.
Melon. *Cucumis melo*, a fruit known for its sweet taste, distinct aroma, and yellow to orange flesh. In this study, melon is used in the form of juice and pulp residue.
Melon Coconut Macaroons. The developed food product made from traditional coconut macaroon ingredients with the addition of melon juice and pulp residue.
Melon Juice. The liquid extracted from melon flesh and incorporated into the macaroon mixture to provide natural sweetness, moisture, flavor, and aroma.

Pulp Residue. The remaining fibrous portion of melon flesh after juice extraction. In this study, it is incorporated into the macaroon mixture to add texture and maximize fruit utilization.

Sensory Characteristics. The qualities of the melon coconut macaroons evaluated through the senses, specifically appearance, aroma, taste, and texture.

Taste. The flavor of the melon coconut macaroons as perceived by the respondents, particularly the balance between coconut sweetness and melon flavor.

Texture. The mouthfeel and consistency of the melon coconut macaroons, including softness, chewiness, moistness, and firmness.

NOTES

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Chapter 2
RELATED LITERATURE AND STUDIES

Related Literature

This chapter presents the review of related literature and studies relevant to the development and evaluation of melon coconut macaroons as a food innovation product. The discussion is organized into thematic sections focusing on fruit-based ingredients in food innovation, melon as a potential ingredient for product development, melon-derived ingredients in bakery products, melon juice and pulp residue utilization, sensory characteristics and acceptability, and coconut macaroons as a product for innovation. The reviewed literature provides support for the use of melon juice and pulp residue as value-added ingredients in developing an innovative confectionery product.

Fruit-Based Ingredients in Food Innovation

Food innovation has become an important area in the development of new food products, especially as consumers increasingly seek food items that are enjoyable, unique, and potentially beneficial in terms of nutritional value. In bakery and confectionery products, traditional formulations are often modified through the addition of fruit-based ingredients that may contribute natural flavor, aroma, color, moisture, fiber, minerals, antioxidants, and other functional compounds. This approach also supports sustainability because fruit components that are usually discarded or underutilized may be transformed into useful ingredients.

Zuñiga-Martínez et al. (2022) emphasized that agro-industrial fruit by-products can be used as health-promoting ingredients in baked food products because they contain dietary fiber, bioactive compounds,

antioxidants, minerals, and other nutrients. Their review showed that fruit residues have potential to improve the nutritional quality of baked products while also contributing to waste reduction and sustainable food production. Similarly, studies on fruit residue flours in cookie development have shown that fruit by-products may influence the physicochemical, nutritional, technological, and sensory characteristics of baked goods. These findings support the use of fruit-derived ingredients in food innovation, particularly in products that are commonly consumed but may still be improved in terms of flavor, texture, and value.

In the context of the present study, the incorporation of melon juice and pulp residue in coconut macaroons follows the same direction of food innovation. Rather than relying solely on the traditional formulation of coconut macaroons, melon components are added to introduce a distinct fruit flavor, enhance aroma, contribute moisture, and maximize the use of the fruit. Although previous studies did not directly examine melon coconut macaroons, they provide relevant support for exploring fruit-based ingredients in the development of new bakery and confectionery products.

Melon in the Philippine and Food Product Development Context

Melon (*Cucumis melo* L.) is a fruit known for its sweet taste, refreshing quality, and distinct aroma. It is commonly consumed fresh or prepared as a drink, dessert, or ingredient in fruit-based refreshments. Its naturally pleasant flavor and aromatic profile make it a suitable ingredient for food products that require a mild fruit taste and appealing sensory characteristics.

In the Philippine context, melon is a familiar fruit used in refreshments and desserts. Local agricultural studies also support the possibility of cultivating and studying melon under Philippine conditions. Aquino and Mabesa (2002), for instance, examined off-season production of honeydew melon using mulch and row cover. Although their study focused on production rather than food processing, it provides local support that *Cucumis melo* can be cultivated and studied in the Philippine agricultural setting. This strengthens the relevance of using melon as an ingredient in locally developed food products.

Aside from its availability and sensory appeal, melon also has potential as a value-added food ingredient. Berdiyev et al. (2009) studied dried melon as a traditional food product and examined its nutritional, microbiological, and sensory properties. Their findings suggest that melon can retain desirable qualities after processing. Although dried melon differs from the melon juice and pulp residue used in the present study, the research supports the broader idea that melon can be processed into food products while maintaining sensory value.

Melon-Derived Ingredients in Bakery Products

Several studies have explored the use of melon-derived ingredients in bakery products such as cakes, cookies, biscuits, and bread. These studies commonly use melon components in the form of pulp flour, seed flour, peel flour, or other processed residues. While these forms are different from the melon juice and pulp residue used in the present study, they provide evidence that melon-derived ingredients can be incorporated into baked products and may influence nutritional and sensory quality.

De Medeiros et al. (2024) examined alternative flours produced from melon pulp and evaluated their physical, chemical, technological, and bakery applications. Their study used melon pulp flour in cake formulations and found that its incorporation affected the nutritional composition and characteristics of the product. This is relevant to the present study because it demonstrates that melon pulp-based ingredients can be used in baked products and may contribute to the development of value-added bakery items.

Cunha et al. (2020) developed flour from cantaloupe melon seed residues and investigated its application in cake production. Their study reported that melon seed flour contained protein, lipids, ash, and dietary

fiber, and that cake formulations containing melon seed flour were acceptable in sensory evaluation. Although the present study does not use melon seed flour, this research demonstrates that melon residues can be transformed into functional ingredients and incorporated into baked products.

Cosme-Linares et al. also developed food products using melon seed flour, including cookies, salpor, and a horchata-type beverage. Their work supports the potential of melon seed flour as an alternative ingredient in food product development. Likewise, studies on muskmelon seed flour in biscuits suggest that melon seed-based ingredients may contribute to the nutritional improvement of baked products when incorporated at suitable levels. These studies show that melon-derived ingredients have potential applications in bakery and food product innovation.

Melon Peel, Pulp, and Residues as Functional Ingredients

Although the present study focuses specifically on melon juice and pulp residue, studies on melon peel, seed, and other residues remain useful because they demonstrate the potential of underutilized melon components. These studies show that parts of the melon that are often discarded may still contain nutrients or functional properties that can be useful in food formulation.

Silva et al. (2024) investigated melon peel flour as a functional ingredient and reported that it contains minerals, amino acids, and other nutrients that may contribute to healthier food formulations. This supports the idea that melon residues may have nutritional value and may be used in product development when properly processed. Similarly, Amiza et al. (2022) examined bread incorporated with Melon Manis Terengganu peel powder and evaluated its physicochemical and sensory properties. Their study found that the addition of melon peel powder affected the nutritional and sensory characteristics of bread, particularly in relation to crude fiber and moisture content.

Studies on fruit residue flours, including melon by-products, also indicate that these ingredients may affect technological characteristics such as water absorption, texture, color, and product quality. This is relevant to the present study because melon pulp residue may also influence the moisture, texture, and overall quality of coconut macaroons. However, because each product has a different formulation, the findings from bread, cakes, biscuits, and cookies should be applied with caution.

These studies support the principle that melon components should be carefully incorporated into food products. While melon residues may improve nutritional value and sustainability, they may also affect color, texture, taste, aroma, and acceptability. Therefore, sensory evaluation is necessary to determine whether the developed melon coconut macaroons are acceptable to consumers.

Melon Juice and Pulp Residue in Product Development

In the present study, melon is utilized mainly in the form of juice and pulp residue. Melon juice may contribute natural sweetness, moisture, aroma, and flavor to coconut macaroons, while pulp residue may add body, texture, and possible fiber content. This approach allows the product to capture the sensory qualities of melon while also maximizing the use of the fruit after juice extraction.

Yerenova et al. (2016) developed melon-based juices enriched with herbal supplements and evaluated their organoleptic characteristics, food value, and biological value. Their study showed that melon can contribute desirable sensory qualities such as taste, aroma, color, and consistency in beverage development. Although their study focused on melon-based juice rather than bakery products, it supports the sensory potential of melon juice as a food ingredient.

The use of pulp residue is also consistent with the concept of fruit utilization in food innovation. After extracting juice, the remaining pulp may still contain moisture, flavor-related compounds, and possible fiber that can contribute to the characteristics of food products. In melon coconut macaroons, the pulp

residue may influence texture and moisture, while the juice may enhance aroma and flavor. However, because coconut macaroons require a specific balance of sweetness, moisture, coconut texture, and binding ingredients, the use of melon juice and pulp residue must be carefully evaluated.

Sensory Characteristics and Acceptability of Melon-Enriched Products

Sensory evaluation is an essential part of food product development because consumer acceptance determines whether an innovative product has practical potential. A food product may offer nutritional or sustainability benefits, but it must still be acceptable in terms of appearance, aroma, taste, texture, and overall acceptability. This is especially important for confectionery products such as coconut macaroons, where consumers usually expect a pleasant color, sweet flavor, appealing aroma, and chewy texture.

Abraham et al. (2025) evaluated cookies enriched with sweet melon peel and seed flours and examined their sensory properties. Their study supports the idea that melon-derived ingredients can be incorporated into baked products and evaluated based on consumer acceptability. However, the findings must be applied cautiously because cookies differ from coconut macaroons in formulation, structure, and texture.

Ertaş and Aslan (2020) studied the potential of melon wastes in biscuit production and found that melon residues can influence the characteristics of baked products. Their work supports the need to evaluate sensory quality when melon-based ingredients are added, since changes in formulation may affect appearance, texture, flavor, and overall acceptability. Likewise, de Medeiros et al. (2024) included sensory evaluation in bakery products containing melon pulp flour, showing that consumer response is an important factor in determining the feasibility of melon-based bakery innovations.

These studies suggest that the success of melon coconut macaroons depends not only on the use of melon ingredients but also on how the product is perceived by evaluators. Therefore, the present study focuses on sensory characteristics and acceptability in terms of appearance, aroma, taste, texture, and overall acceptability.

Coconut Macaroons as a Product for Innovation

Coconut macaroons are sweet baked confectionery products commonly made with desiccated coconut, condensed milk, sugar, eggs, and other binding ingredients. They are known for their chewy texture, sweet taste, coconut aroma, and golden-brown appearance. Because of their simple formulation and familiar taste, coconut macaroons provide a suitable base for product innovation.

The addition of melon juice and pulp residue may introduce a new flavor profile while maintaining the basic characteristics expected from coconut macaroons. Melon juice may enhance aroma and mild sweetness, while pulp residue may contribute moisture and texture. However, the addition of fruit-based ingredients may also affect the balance of the product, particularly its sweetness, chewiness, moisture, and overall structure. For this reason, the developed product must be evaluated to determine whether the incorporation of melon improves or negatively affects the sensory characteristics of coconut macaroons.

The innovation proposed in this study is therefore anchored on the idea of improving a familiar confectionery product through the use of locally relevant fruit ingredients. By incorporating melon juice and pulp residue, the study seeks to develop a product that is unique, acceptable, and potentially useful as a value-added food innovation.

Synthesis of the State of the Art

The reviewed literature shows that fruit-based ingredients and fruit by-products have gained increasing attention in food innovation, particularly in bakery and confectionery product development. Previous studies emphasize that fruit residues and underutilized fruit components may serve as valuable ingredients because they can contribute natural flavor, aroma, color, moisture, dietary fiber, minerals, antioxidants,

and other functional compounds. These findings support the growing direction of developing food products that are not only acceptable to consumers but also aligned with value addition and sustainability. Studies on melon (*Cucumis melo* L.) further indicate that the fruit has potential for product development because of its natural sweetness, refreshing quality, distinct aroma, and sensory appeal. Research on processed melon products, such as dried melon and melon-based juices, demonstrates that melon can retain desirable qualities after processing. This supports the possibility of using melon not only as a fresh fruit or beverage ingredient but also as a component in developed food products.

In bakery applications, several studies have explored the use of melon-derived ingredients such as pulp flour, seed flour, peel flour, and other residues in cakes, cookies, biscuits, and bread. These studies suggest that melon-based ingredients may influence nutritional composition, moisture, texture, color, flavor, and sensory acceptability. However, the effects vary depending on the type of melon component used, the level of incorporation, and the nature of the product. This means that melon ingredients must be carefully tested in each specific formulation.

The literature also highlights the importance of sensory evaluation in food product development. Even if fruit-based ingredients may offer nutritional or sustainability benefits, the final product must still be acceptable in terms of appearance, aroma, taste, texture, and overall acceptability. This is particularly important for coconut macaroons, which are expected to have a sweet taste, pleasant aroma, golden appearance, and chewy texture.

However, most existing studies focus on the use of melon-derived ingredients in products such as cakes, cookies, biscuits, bread, beverages, and dried melon products. There is limited literature directly examining the use of melon juice and pulp residue in coconut-based confectionery products, particularly coconut macaroons. This presents a gap that the present study seeks to address.

Therefore, the present study builds on previous research by applying the concept of fruit-based food innovation to the development of melon coconut macaroons. By using melon juice and pulp residue, the study aims to determine whether melon can enhance the sensory qualities of coconut macaroons while also promoting fuller utilization of the fruit. In this way, the study contributes to the existing body of knowledge by exploring a new application of melon in confectionery product development.

Theoretical Framework

This study is anchored on Sensory Theory, adapted from Laird (1985), and supported by the Expectancy-Disconfirmation Theory by Oliver (1980). Sensory Theory emphasizes that human perception is influenced by the use of the senses, particularly sight, smell, taste, and touch. In food product development, these senses are important because consumers commonly evaluate food based on how it looks, smells, tastes, and feels when eaten.

In the context of this study, Sensory Theory provides the basis for evaluating the developed melon coconut macaroons in terms of appearance, aroma, taste, and texture. Appearance is associated with the sense of sight, aroma with the sense of smell, taste with the sense of taste, and texture with the sense of touch or mouthfeel. These sensory attributes serve as the basis for determining the sensory characteristics of the developed product.

The study is further supported by Oliver's Expectancy-Disconfirmation Theory, which explains that consumer satisfaction is influenced by the comparison between prior expectations and actual product performance (Oliver, 1980). In this study, respondents may have existing expectations of traditional coconut macaroons in terms of sweetness, coconut flavor, aroma, and chewy texture. The developed melon coconut macaroons will be evaluated based on whether the addition of melon juice and pulp residue meets,

exceeds, or fails to meet these expectations.

The framework is relevant to the study because melon juice and pulp residue may influence the sensory qualities of coconut macaroons. Melon juice may contribute natural sweetness, aroma, and moisture, while pulp residue may affect the product's texture and mouthfeel. However, shredded coconut remains the primary ingredient of the macaroons, while melon components are incorporated only as additional ingredients to create an innovative variation.

Therefore, Sensory Theory and Expectancy-Disconfirmation Theory support the study by explaining how respondents perceive and evaluate the developed product. Through the assessment of appearance, aroma, taste, and texture, the study can determine the sensory characteristics and acceptability of melon coconut macaroons. The findings will serve as the basis for proposing an innovative recipe for melon coconut macaroons.

Theoretical Paradigm

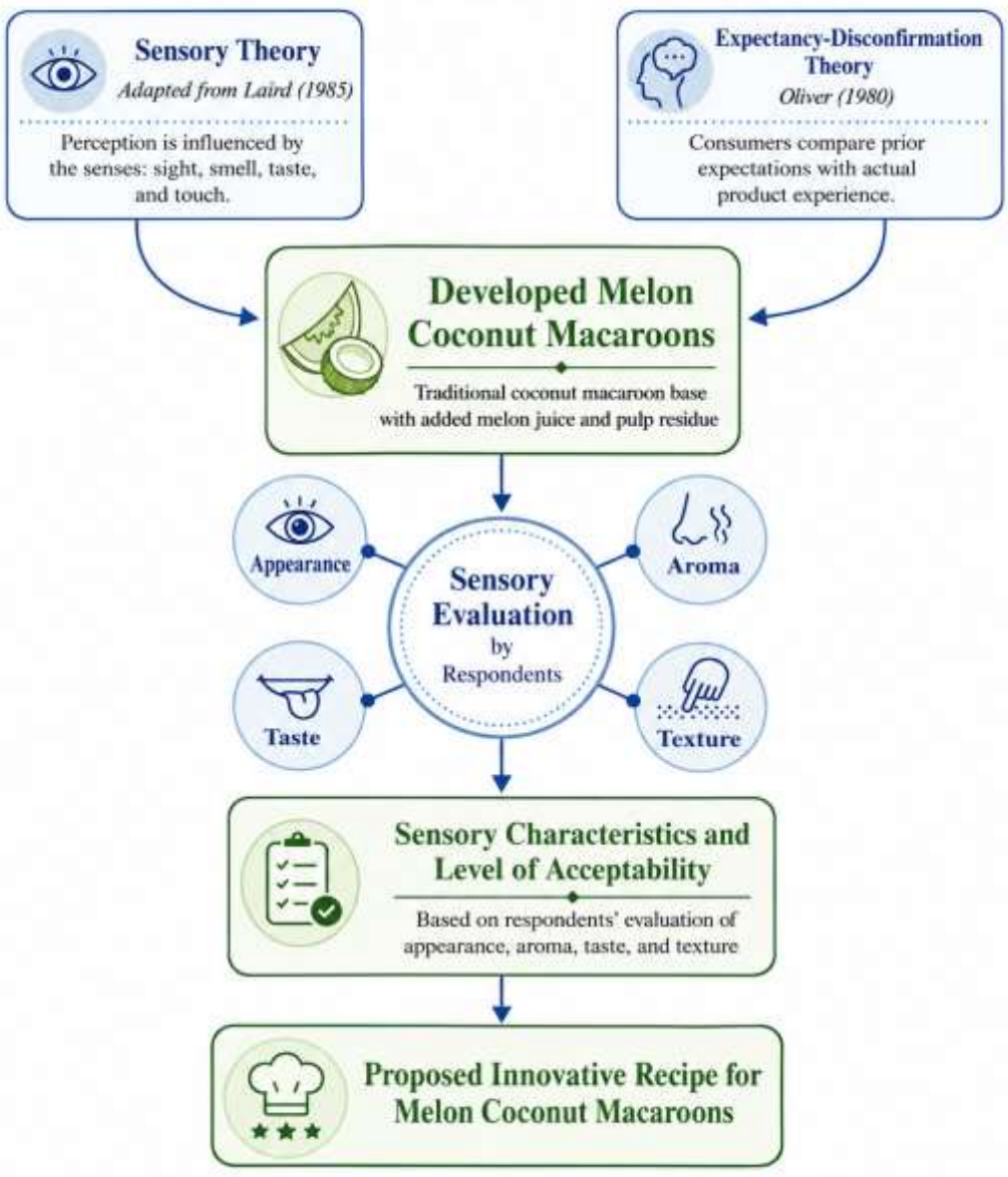

Figure 1

Theoretical Paradigm

Sensory Theory of Laird (1985) and Expectancy Disinformation Theory of Oliver (1980

Conceptual Framework

This study is guided by the Input–Process–Output (IPO) Model, which presents the flow of the research from product development to evaluation and final recipe proposal. The framework helps explain how melon juice and pulp residue are incorporated into coconut macaroons and how the developed product will be evaluated based on sensory characteristics and acceptability.

The input of the study includes the raw materials needed to prepare the melon coconut macaroons. These include the traditional coconut macaroon ingredients such as shredded coconut, eggs, sugar, condensed milk, and other necessary ingredients, with the addition of melon juice and melon pulp residue. The melon components are not intended to replace the shredded coconut; rather, they are added to create a melon-flavored variation of the traditional coconut macaroon. The necessary tools, equipment, and sensory evaluation instruments are also part of the input.

The process involves the actual preparation and development of the melon coconut macaroons. After the product is prepared, it will undergo sensory evaluation by selected respondents. The respondents will assess the product in terms of appearance, aroma, taste, and texture. The level of acceptability of the product will also be determined using an evaluation sheet. The gathered data will then be tabulated, analyzed, and interpreted to identify the sensory qualities and acceptability of the developed product.

The output of the study is the proposed innovative recipe for melon coconut macaroons based on the results of the sensory evaluation and acceptability assessment. The findings may also provide suggestions for improving the product formulation, particularly in terms of flavor, aroma, texture, and overall quality.

The feedback component of the framework indicates that the results of the evaluation may be used to refine or improve the product. This allows the researchers to adjust the formulation and develop a more acceptable version of melon coconut macaroons.

Conceptual Paradigm

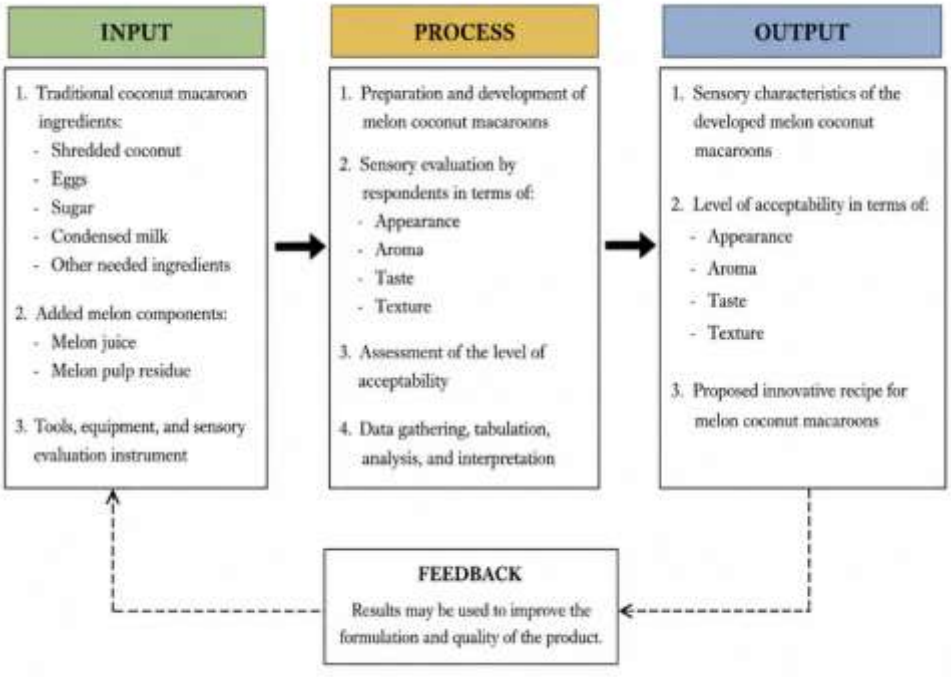

Figure 2.

Conceptual Framework

NOTES

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CHAPTER III
RESEARCH METHODOLOGY

In this chapter, the researchers detail the research methodologies employed in their study, including information on the participants and the sampling procedure. The research design chosen for the study is described, along with the reasons for its selection. Additionally, the instrument used for data collection is discussed, as well as the procedures for carrying out the study. The researchers also supply insight into the statistical treatment and tools used to analyze the data collected.

Research Design

In this study, researchers used developmental and descriptive methods to determine the sensory characteristics and level of acceptability of peanut pie.

Developmental Method. The study employed a developmental approach to enhance the existing product and develop an acceptable recipe for peanut pie. As stated by Güldiken et al. (2021), the field of food innovation leverages developmental methods to conceive novel and improved food products, which often entail the incorporation of new ingredients.

The developmental method is a crucial aspect of product development, which ensures that the appropriate procedures are implemented. In the study, three samples of peanut pie were formulated and then subjected to sensory evaluation and acceptability testing, this approach guarantees that only the most acceptable recipe of peanut pie is offered to customers while adhering to the highest standards of product development.

Descriptive method. According to Mohanty, Tiwari, and Nair (2022), descriptive methods are used in food innovation to evaluate the sensory characteristics of food products. In this study, the researchers created a Quantitative descriptive analysis questionnaire and used descriptive terms to describe the sensory attributes of a product in terms of its appearance, aroma, taste, and texture and respondents will evaluate whether it is acceptable or not.

Locale of the Study

The research took place at the Camarines Sur Polytechnic College, located in San Miguel Nabua, Camarines Sur. The College has experts in the field of Hospitality Management particularly in food and beverage, also students of the same course.

Research Respondents

The respondents of the study consisted of 25 individuals, composed of students, teachers, and consumers. A mixed group of respondents was selected to obtain varied perspectives regarding the acceptability of the product.

Sampling Technique

The study utilized *non-probability sampling*, specifically convenience sampling. This technique was chosen because it allowed the researchers to easily gather data from respondents who were readily availa-

ble and willing to participate in the sensory evaluation.

Research Instrument

For this study, a revised questionnaire was adopted as the primary research instrument. The questionnaire was specifically designed to ensure that all necessary responses from the respondents were gathered based on the statement of the problem. The researchers utilized two types of questionnaires, namely, Quantitative Descriptive Analysis and Acceptability Score sheets.

Data Gathering Procedure

The data gathering was conducted in three phases:

Phase I – Product Preparation. The Melon Coconut Macaroons were prepared using standardized procedures. Shredded Melon and a minimal amount of desiccated coconut were incorporated into the batter to enhance the create a unique flavor.

Phase II – Sensory Evaluation. The sensory evaluation was conducted within the campus and outside the campus. Respondents were given samples of the Melon Coconut Macaroons and were instructed to evaluate the product based on the given criteria.

Phase III – Data Collection. After tasting the product, respondents completed the evaluation questionnaire. All responses were collected, tabulated, and prepared for analysis.

Statistical Test

To assess that the results are correct and true, this study used various statistical tools to analyze and interpret the data.

Statistical Tools

The data that the researchers gathered from the questionnaire was organized, tabulated, treated statistically, and interpreted following the purpose of the study. The data gathered from the respondents would be treated, analyzed, and interpreted using certain statistical tools. The following statistical tools were used to interpret the responses from respondents.

Weighted Mean. Used to find and interpret the sensory characteristics and level of acceptability of the three samples of peanut pie in terms of appearance, aroma, taste, and texture.

The formula of Weighted Mean is:

$$WM = \frac{TWF}{N}$$

Where:

TWF = Total Weighted Frequency

N = Number of Responses

WM = Weighted Mean

Likert Scale. Is a rating system that is employed in surveys and is intended to gauge respondents' attitudes, views, or perceptions. In this study, a Likert scale with a five-point option was used to determine the sensory characteristics and the level of acceptability of peanut pie in terms of appearance, aroma, taste, and texture. Based on this rating system, the participants have indicated their top choice by selecting and verifying its corresponding numerical value.

Scale Categories for Quantitative Descriptive Analysis (Sensory Characteristics)

The sensory characteristics of the developed melon coconut macaroons were evaluated through Quantitative Descriptive Analysis using a 5-point Likert Scale. The respondents assessed the product based on appearance, aroma, taste, and texture to determine the quality and desirability of its sensory

attributes. Higher weighted mean values indicate more favorable sensory evaluations of the developed product.

Table 1: Melon Coconut's Sensory Characteristic

Scale Range	Verbal Interpretation	Description
4.21 – 5.00	Excellent	The sensory characteristic is highly desirable, strongly liked, and reflects outstanding product quality.
3.41 – 4.20	Very Good	The sensory characteristic is desirable, liked, and considered acceptable by the respondents.
2.61 – 3.40	Good	The sensory characteristic is moderately liked but may require improvement in quality or formulation.
1.81 – 2.60	Fair	The sensory characteristic is less preferred and indicates the need for improvement.
1.00 – 1.80	Poor	The sensory characteristic is disliked and considered unsatisfactory by the respondents.

Scale Categories for the Level of Acceptability

The level of acceptability of the developed melon coconut macaroons was determined using a 5-point Likert Scale. The respondents evaluated the product in terms of appearance, aroma, taste, and texture. The scale was used to identify the degree of consumer acceptance of the developed food innovation product. Higher weighted mean values indicate greater acceptability of the melon coconut macaroons among the respondents.

Table 1: Melon Coconut's Level of Acceptability

Scale Range	Verbal Interpretation	Description
4.21 – 5.00	Highly Acceptable	The product attribute is highly liked by the respondents and demonstrates excellent consumer acceptance.

3.41 – 4.20	Acceptable	The product attribute is liked and considered satisfactory and acceptable by the respondents.
2.61 – 3.40	Moderately Acceptable	The product attribute is fairly accepted but may require minor improvement to increase consumer preference.
1.81 – 2.60	Slightly Acceptable	The product attribute is less preferred and requires improvement to enhance acceptability.
1.00 – 1.80	Not Acceptable	The product attribute is disliked and not acceptable to the respondents

The study utilized a five-point Likert Scale to evaluate the sensory characteristics and level of acceptability of the developed melon coconut macaroons. Although both variables used the same scale and range distribution, they differed in terms of verbal interpretation. In both tables, a rating of five (5) represented the highest evaluation, while one (1) represented the lowest evaluation. Similarly, the range of 4.21–5.00 indicated the highest level of evaluation, whereas 1.00–1.80 represented the lowest level.

For the sensory characteristics, the respondents evaluated the product in terms of appearance, aroma, taste, and texture using descriptive interpretations such as Excellent, Very Good, Good, Fair, and Poor. Each interpretation described the quality and desirability of the product's sensory attributes. This allowed the researchers to determine how well the developed melon coconut macaroons performed in terms of sensory quality and product characteristics.

On the other hand, the level of acceptability used a single set of interpretations ranging from Highly Acceptable to Not Acceptable. This scale measured the overall degree of consumer acceptance of the developed product. Despite having the same numerical scale and range as the sensory characteristics, the acceptability table focused specifically on the respondents' preference and willingness to accept the product as a food innovation item.

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CHAPTER VI
RESULTS AND DISCUSSIONS

This chapter presents the interpretation and analysis of the data gathered in the study. The tables show the weighted mean obtained from the twenty-five (25) respondents who evaluated the developed melon coconut macaroons. The data collected through the survey questionnaires were carefully analyzed and interpreted to determine the sensory characteristics and level of acceptability of the product in terms of appearance, aroma, taste, and texture. The findings served as the basis for proposing an innovative recipe for melon coconut macaroons as a food innovation product.

Sensory characteristics of the developed melon coconut macaroons

Table 3: Sensory Characteristics of the Developed Melon Coconut Macaroons

Indicators	**Weighted Mean**	**Verbal Interpretation**
Appearance	4.52	Excellent
Aroma	4.36	Very Good
Taste	4.68	Excellent
Texture	4.44	Very Good
Overall Mean	**4.50**	**Excellent**

Table 1 presents the sensory characteristics of the developed melon coconut macaroons as evaluated by the 25 respondents in terms of appearance, aroma, taste, and texture. The findings revealed that the product

obtained an overall weighted mean of 4.50, verbally interpreted as "Excellent." Among the indicators, Taste received the highest weighted mean of 4.68, followed by Appearance with 4.52, while Texture and Aroma obtained weighted means of 4.44 and 4.36 respectively. The results indicate that the respondents positively evaluated the sensory qualities of the developed product. This suggests that the incorporation of melon juice and pulp residue contributed desirable characteristics to the coconut macaroons, particularly in flavor and overall appeal.

The findings support the literature of Yerenova et al. (2016), who emphasized that melon-based ingredients contribute desirable organoleptic qualities such as taste, aroma, color, and consistency in food products. In the present study, the high rating obtained by Taste indicates that the natural sweetness and fruity flavor of melon blended well with the traditional coconut macaroon formulation. Likewise, the excellent rating for Appearance may be attributed to the attractive color and appealing presentation brought by the incorporation of melon components. These findings are also consistent with the study of de Medeiros et al. (2024), which reported that melon pulp-based ingredients can positively influence bakery product characteristics and contribute to the development of value-added food products.

Furthermore, the findings align with the studies of Cunha et al. (2020) and Masoud et al. (2024), which showed that melon-derived ingredients can be successfully incorporated into baked products while maintaining acceptable sensory qualities. Although their studies focused on melon seed flour in cakes and biscuits, the results similarly demonstrated that melon components may enhance product quality when used appropriately. The present study also supports the claims of Zuñiga-Martínez et al. (2022) and Toledo (2018), who highlighted the potential of fruit-based ingredients and by-products in improving the sensory and functional qualities of bakery products while promoting sustainability. The use of melon juice and pulp residue in the developed coconut macaroons demonstrates that underutilized fruit materials can be transformed into innovative food products with desirable sensory characteristics.

In addition, the findings are supported by the study of Ertaş and Aslan (2020), who explained that melon-based ingredients may significantly affect the flavor, texture, and overall quality of baked products. The very good rating obtained for Texture in the present study suggests that the moisture and fiber content from the melon pulp residue may have contributed to the soft and chewy consistency expected in coconut macaroons. Similarly, Garcia et al. (2017) stated that fruit residue flours may influence technological characteristics such as moisture retention and texture, which may explain the positive evaluation of the respondents regarding the product's consistency. Overall, the findings imply that the developed melon coconut macaroons possessed desirable sensory characteristics and have potential as an innovative bakery and confectionery product.

Level of acceptability of the developed melon coconut macaroons

Table 4: Level of Acceptability of the Developed Melon Coconut Macaroons

Indicators	Weighted Mean	Verbal Interpretation
Appearance	4.56	Highly Acceptable
Aroma	4.40	Highly Acceptable
Taste	4.72	Highly Acceptable
Texture	4.48	Highly Acceptable

Overall Mean	**4.54**	**Highly Acceptable**

Table 2 shows the level of acceptability of the developed melon coconut macaroons as evaluated by the 25 respondents. The product achieved an overall weighted mean of 4.54, verbally interpreted as "Highly Acceptable." Among the indicators, Taste received the highest weighted mean of 4.72, followed by Appearance with 4.56, Texture with 4.48, and Aroma with 4.40. The findings indicate that the respondents generally accepted the developed product and appreciated its overall quality. The high acceptability ratings suggest that the incorporation of melon juice and pulp residue did not negatively affect the traditional characteristics of coconut macaroons but instead enhanced the product's appeal.

The findings are supported by Abraham et al. (2025), who emphasized that melon-derived ingredients can be incorporated into baked products while maintaining consumer acceptability in terms of appearance, aroma, taste, and texture. Similar to their study on cookies enriched with melon peel and seed flour, the present study demonstrated that melon-based ingredients can contribute positively to the sensory appeal of a bakery product. The high acceptability rating for Taste further supports the claim of Yerenova et al. (2016) that melon ingredients possess desirable flavor and aroma characteristics that may enhance food products. This indicates that the fruity sweetness and natural aroma of melon complemented the coconut macaroon formulation and were appreciated by the respondents.

The results are also consistent with the study of de Medeiros et al. (2024), which highlighted the importance of sensory evaluation in determining the feasibility of bakery products containing melon-based ingredients. Their study revealed that consumer response plays a significant role in evaluating the success of food innovations, particularly those involving alternative fruit ingredients. In the present study, the highly acceptable ratings obtained in all indicators suggest that the respondents were receptive to the innovative use of melon juice and pulp residue in coconut macaroons. Similarly, Cunha et al. (2020) found that bakery products containing melon-derived ingredients remained acceptable to consumers despite modifications in formulation, which supports the acceptability results obtained in this study.

Moreover, the findings support the concept discussed by Zuñiga-Martínez et al. (2022) and Silva et al. (2024) regarding the utilization of fruit residues as sustainable and functional food ingredients. The use of melon pulp residue in the developed macaroons demonstrates that food by-products can be transformed into acceptable and innovative food products rather than being discarded as waste materials. The high acceptability ratings imply that sustainability-oriented food innovations can still satisfy consumer preferences when sensory quality is properly maintained. Therefore, the developed melon coconut macaroons may be considered a promising food innovation product with potential consumer acceptance in the bakery and confectionery market.

Proposed Innovative Recipe for Melon Coconut Macaroons

Based on the findings of the study, an innovative recipe for melon coconut macaroons was successfully proposed using melon juice and melon pulp residue as additional ingredients to the traditional coconut macaroon formulation. The proposed recipe was developed after the sensory evaluation and acceptability results showed that the product obtained high ratings in terms of appearance, aroma, taste, and texture. The overall findings revealed that the respondents positively evaluated the developed product, particularly in taste and appearance, indicating that the incorporation of melon components enhanced the sensory qualities of the coconut macaroons. Therefore, the study supports the development of a melon-enriched coconut macaroon recipe as an innovative bakery and confectionery product.

The proposed recipe promotes food innovation through the utilization of melon juice and pulp residue, which are commonly underutilized after juice extraction. This supports the literature of Zuñiga-Martínez et al. (2022), who emphasized that fruit by-products may be transformed into functional food ingredients that contribute to sustainability and waste reduction. Similarly, Toledo (2018) discussed that fruit residues may improve the sensory and nutritional qualities of baked products when properly incorporated into formulations. In the present study, the use of melon juice contributed natural sweetness, aroma, moisture, and flavor, while the pulp residue enhanced texture and maximized fruit utilization. This demonstrates that melon-based ingredients can provide both sensory and functional benefits in bakery product development.

The findings also align with the studies of de Medeiros et al. (2024), Cunha et al. (2020), and Masoud et al. (2024), which reported that melon-derived ingredients can be incorporated into bakery products while maintaining acceptable product quality and consumer acceptability. Although these studies focused on melon pulp flour and melon seed flour, the present study similarly demonstrated the feasibility of using melon components in confectionery products. Moreover, the highly acceptable ratings obtained by the developed melon coconut macaroons indicate that consumers are open to innovative products that combine traditional recipes with fruit-based ingredients. This suggests that the proposed recipe has potential for commercialization and may serve as an alternative product in the local bakery and snack industry.

Furthermore, the proposed recipe may contribute to sustainable food production by encouraging the practical use of melon pulp residue rather than discarding it as waste material. Silva et al. (2024) highlighted that melon residues contain nutrients and functional properties that may be beneficial in food formulations. The present study supports this principle by demonstrating that melon pulp residue can still contribute positively to product texture and overall quality. Therefore, the proposed melon coconut macaroon recipe not only offers an innovative and acceptable food product but also promotes resource utilization and sustainability in food processing.

Table 5: Example of Proposed Innovative Recipe

Proposed Melon Coconut Macaroons Recipe

Ingredients	**Quantity**
Desiccated Coconut	2 cups
Condensed Milk	1 cup
All-Purpose Flour	½ cup
Eggs	2 pieces
Butter (melted)	¼ cup
Melon Juice	½ cup
Melon Pulp Residue	½ cup
Sugar	¼ cup

Vanilla Extract	1 tsp

Procedure

a. Preheat the oven to 350°F (175°C).
b. In a bowl, combine condensed milk, melted butter, eggs, melon juice, and vanilla extract.
c. Add the desiccated coconut, flour, sugar, and melon pulp residue. Mix thoroughly until well combined.
d. Scoop the mixture into greased macaroon molds or cupcake liners.
e. Bake for 20–25 minutes or until golden brown.
f. Allow to cool before serving.

Proposed Product Description

The proposed melon coconut macaroons are sweet, moist, and chewy confectionery products enriched with melon juice and melon pulp residue. The product offers a distinct fruity aroma and flavor while maintaining the desirable texture and appearance of traditional coconut macaroons. The recipe also promotes sustainability through the utilization of melon residues as a value-added food ingredient.

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CHAPTER 5
SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study focused on the development and evaluation of melon coconut macaroons as a food innovation product. Specifically, the study aimed to determine the sensory characteristics of the developed product in terms of appearance, aroma, taste, and texture; evaluate its level of acceptability based on the same indicators; and propose an innovative recipe for melon coconut macaroons based on the findings of the study. The study utilized melon juice and melon pulp residue as additional ingredients in the traditional coconut macaroon formulation in order to introduce a unique flavor and aroma while promoting the utilization of fruit residues.

The study employed a descriptive research design using sensory evaluation to gather data from the respondents. A total of 25 respondents participated in the evaluation of the developed melon coconut macaroons. A researcher-made survey questionnaire using a 5-point Likert scale was utilized to assess the sensory characteristics and level of acceptability of the product. The data gathered were analyzed using frequency, weighted mean, and verbal interpretation.

The findings revealed that the developed melon coconut macaroons obtained high ratings in both sensory characteristics and level of acceptability. The product received positive evaluations in terms of appearance, aroma, taste, and texture, with taste obtaining the highest rating among all indicators. Based on the results, an innovative recipe for melon coconut macaroons was proposed. The study demonstrated that melon juice and melon pulp residue can be effectively incorporated into coconut macaroons to produce an innovative, acceptable, and sustainable food product.

Findings

Based on the data gathered and analyzed, the following findings were obtained:

1. The developed melon coconut macaroons obtained an overall weighted mean of 4.50, verbally interpreted as “Excellent,” in terms of sensory characteristics. Among the indicators, Taste received the highest weighted mean of 4.68, followed by Appearance with 4.52, Texture with 4.44, and Aroma with 4.36.
2. The developed melon coconut macaroons achieved an overall weighted mean of 4.54, verbally interpreted as “Highly Acceptable,” in terms of level of acceptability. Taste received the highest weighted mean of 4.72, followed by Appearance with 4.56, Texture with 4.48, and Aroma with 4.40.
3. The findings indicated that the incorporation of melon juice and melon pulp residue positively contributed to the sensory qualities and acceptability of the coconut macaroons.
4. The study successfully proposed an innovative recipe for melon coconut macaroons using melon juice and pulp residue as value-added ingredients in the traditional coconut macaroon formulation.
5. The study demonstrated that melon-based ingredients can be utilized in bakery and confectionery products while promoting sustainability through the use of fruit residues.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

1. The developed melon coconut macaroons possessed desirable sensory characteristics in terms of appearance, aroma, taste, and texture, as evidenced by the excellent ratings given by the respondents.
2. The developed product was highly acceptable to the respondents, indicating that melon juice and melon pulp residue can be effectively incorporated into coconut macaroons without negatively affecting product quality.

3. Taste was identified as the strongest quality of the developed product, suggesting that the natural sweetness and flavor of melon complemented the traditional coconut macaroon formulation.
4. The incorporation of melon juice and pulp residue contributed to food innovation by enhancing the product's sensory appeal while maximizing the utilization of melon components that may otherwise be discarded.
5. The proposed melon coconut macaroon recipe has potential as an innovative bakery and confectionery product that may appeal to consumers and support sustainable food production practices.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are offered:

1. Future researchers may conduct further studies using a larger number of respondents to obtain more comprehensive results regarding the sensory characteristics and acceptability of melon coconut macaroons.
2. Future studies may explore the nutritional content, shelf life, and storage stability of melon coconut macaroons to further determine the product's quality and market potential.
3. Researchers may also experiment with different proportions of melon juice and pulp residue to identify the most effective formulation for improving product quality and acceptability.
4. Bakery and food entrepreneurs may consider developing and commercializing melon coconut macaroons as an innovative and sustainable food product.
5. Food developers and researchers are encouraged to explore the use of other fruit residues and by-products in bakery and confectionery products to promote sustainability, reduce food waste, and create value-added products.

NOTES

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