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SENSORY DESCRIPTION AND CONSUMER HEDONIC PERCEPTION OF LEMONGRASS (*Cymbopogon citratus*) AND WIREGRASS (*Eleusine indica*) AS APPLIED TO FILIPINO CONFECTIONS

Sunshine C. Rosete[1] and Ronie G. Torres, Ph.D.[2]

[1] *San Guillermo Vocational and Industrial High School, Department of Education, Isabela, Philippines*
[2] *Isabela State University-Angadanan Campus, Philippines*

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ABSTRACT

This study explored the incorporation of lemongrass and wiregrass into Filipino confections, evaluating their nutritional profiles, sensory attributes, and shelf life. Nutritional analysis revealed diverse profiles, with pastillas high in protein and polvoron higher in fat. Sensory evaluation showed the confections were *"Liked Extremely"* across all attributes, with adults and teenagers providing the highest ratings, though aroma characteristics exhibited statistically significant differences between variants. Shelf-life studies indicated one month for powdered ingredients and 10-11 days for the confections. The findings demonstrate strong consumer acceptance, highlighting the market potential of these botanically-infused treats, and provide recommendations to enhance aroma further, extend shelf life, and target specific consumer groups for product development and commercialization.

Keywords: *Lemongrass, Wiregrass, Filipino confections, Sensory evaluation, Shelf life*

INTRODUCTION

The Philippines boasts a rich culinary heritage characterized by a diverse array of traditional sweets and confections that have delighted the palates of generations. Pastillas and polvoron have gained popularity among these cherished treats for their unique flavors, textures, and cultural significance. Despite their enduring presence in

Filipino cuisine, these confections have remained relatively conventional, with little innovation in flavor profiles (De Leon, 2018; Fernandez, 2019).

Filipino cuisine is known for its fusion of flavors, blending indigenous ingredients with influences from various Asian cultures and the Spanish colonial era. Within this culinary landscape, Filipino confections hold a special place. These confections, typically composed of coconut and rice flour, are often infused with regional ingredients such as jackfruit, pandan, and yam, resulting in a delightful interplay of flavors and textures (Garcia, 2020). While beloved for their cultural significance, these treats remain traditional, lacking the innovative touches seen in other culinary domains. To innovate Filipino confections, it is essential to consider sensory science and consumer perception. The culinary world is increasingly exploring unique and indigenous flavors, and the confectionery domain is no exception (Sanchez, 2021).

Lemongrass, known for its citrusy aroma and refreshing taste, has long been cherished in Filipino cooking for its aromatic essence and subtle tanginess. Traditionally used in soups, stews, and teas, lemongrass imparts a distinctively bright and zesty flavor that enhances savory and sweet dishes (Smith, 2016). Similarly, wiregrass, though often overlooked, possesses a unique flavor profile characterized by subtle earthiness and herbal notes. Widely used in local delicacies and herbal remedies, wiregrass adds depth and complexity to traditional Filipino recipes (Torres, 2022).

Incorporating lemongrass and wiregrass into confections represents a novel and innovative approach to flavor exploration. By harnessing the aromatic qualities and healthful properties of these indigenous ingredients, Filipino confectioners can create a new wave of treats that celebrate the country's rich cultural heritage while captivating the modern palate (Lee & Bautista, 2023).

This study focuses on the sensory description and consumer hedonic perception of Filipino confections infused with lemongrass and wiregrass. While there is growing interest in sensory analysis in the food industry, a noticeable gap exists in understanding the specific characteristics and consumer preferences associated with these distinctively Filipino ingredients. Previous research has delved into sensory analysis and consumer hedonic perception in various food studies, emphasizing the importance of flavor profiling in consumer acceptance. However, within the confectionery realm, there is a relative dearth of studies specifically exploring the sensory attributes of lemongrass and wiregrass. Most existing literature tends to focus on more common flavor profiles, neglecting the potential richness these ingredients could bring to confections (Garcia, 2020; Smith, 2016).

The research gap identified in this study highlights the need for a more comprehensive exploration of lemongrass and wiregrass in the context of Filipino confections. Lemongrass is documented for its numerous biological properties, including antibacterial, antifungal, antiprotozoal, anti-inflammatory, antioxidant, anti-carcinogenic, cardio-protective, and anti-rheumatic activities (Ekpenyong et al., 2015). Wiregrass offers various benefits, such as anti-inflammatory, antibacterial, anti-diabetic, and antioxidant

properties, although it is not recognized as a medicinal plant by the Department of Health (Eslit, 2018).

Given the array of benefits associated with these ingredients, it becomes essential to subject the developed products to sensory evaluation and assess the hedonic perception of consumers. This is particularly crucial given that lemongrass and wiregrass are not conventionally utilized in the production of pastillas and polvoron. Investigating consumers' hedonic perceptions of these confections will offer insights into the factors that influence their overall enjoyment, thus contributing to a broader discourse on food preferences and cultural foodways (Jun & Lee, 2019; Methven, 2014).

Finally, the results of this study may not only increase our appreciation of Filipino confections made with lemongrass and wiregrass but may also inform chefs, food producers, and decision-makers about the potential for innovation and preservation in this cherished area of Filipino cuisine. Moreover, it may contribute to a broader understanding of the intricate interplay between sensory experiences and cultural food preferences, shedding light on the multifaceted nature of culinary heritage in the Philippines and elsewhere (Ares & Varela, 2017; Fiorentini, 2020).

Research Questions

This study aimed to develop Filipino confections such as ***pastillas*** and ***polvoron*** with lemongrass and wiregrass as primary ingredients. Specifically, the study shall answer the following questions:

1. What is the nutritive content of lemongrass and wiregrass confections?
2. What are the processes involved in the formulation of each type of confection?
3. What are the sensory attributes (taste, aroma, texture, etc.) of the confections with lemongrass and wiregrass as perceived by the evaluators in terms of the following:
    a. flavor profile;
    b. aroma characteristics;
    c. texture and mouthfeel; and
    d. visual appeal?
4. Is there a significant difference between the sensory attributes of the confections with lemongrass and wiregrass as perceived by the evaluators?
5. What is the general level of acceptability of the confections with lemongrass and wiregrass as evaluated by the different age groups of respondents?
6. What is the shelf life of the lemongrass and wiregrass confections?

METHODOLOGY

Materials

The following tools, equipment, and ingredients were used during the conduct of the study.

Table 1. Tools and Equipment for the Recipes and Formulations

Preparatory Tools	Measuring Tools	Cutting Tools	Equipment
Bowls	Measuring Cup	Knife	Gas range
Casserole	Measuring Spoon	Kitchen Scissor	Pulverizing Machine
Laddle			Oven
Mixing Bowl			
Non-stick pan			
Polvoron Molders			
Rubber Scraper			
Mortar and Pestle			
Transparent Microwavable Food Container			
Transparent Glass Container			

Ingredients

Powdered Lemongrass and Wiregrass

Table 2. Ingredients to be Used for the Preparation of Pastillas.

Ingredients	Measurement
Lemon grass powder	3 grams
Wiregrass powder	3 grams
Condensed milk	178 ml
Refined Sugar (for dusting)	64 grams
Skim milk	270 grams
Powdered milk	220 grams
Vanilla	2.84 grams

Table 3. Ingredients to be Used for the Preparation of Polvoron

Ingredients	Measurement
Wiregrass powder	3 grams
Lemon grass powder	3 grams
All-purpose flour	250 grams
Skim milk	135 grams
Powdered milk	110 grams
Refined sugar	190 grams
Margarine	95 grams
Vanilla	2.84 grams

Lemon grass and Wiregrass Extract

Table 4. Ingredients to be Used for the Preparation of Pastillas.

Ingredients	Measurement
Lemon grass extract	20 ml
Wiregrass extract	20 ml
Condensed milk	178 ml
Refined Sugar (for dusting)	64 grams
Skim milk	270 grams
Powdered milk	220 grams
Vanilla	2.84 grams

Table 5. Ingredients to be Used for the Preparation of Polvoron

Ingredients	Measurement
Wiregrass extract	20 ml
Lemon grass extract	20 ml
All-purpose flour	250 grams
Skim milk	135 grams
Powdered milk	110 grams
Refined sugar	190 grams
Margarine	95 grams
Vanilla	2.84 grams

Table 6. Ingredients to be Used for the Preparation of Lemon Grass and Wiregrass Extract.

Ingredients	Measurement
Lemon grass/ Wiregrass Extract	236 ml
Sugar	190 grams
Water	59 ml

Developmental Procedures

The developmental procedures consisted of two stages (1) the process of making powdered and extracted wire grass and lemon grass, and (2) the development of pastillas and polvoron.

A. Process of Extracting Wire Grass and Lemon Grass Juice

1. Washing

Start by washing the wire grass and lemon grass thoroughly to remove any dirt, dust, or impurities. Use clean, cold water to rinse them properly. For lemongrass, peel off any dry or damaged outer layers.

2. Pat Drying

After washing the lemon grass and wire grass thoroughly to remove any dirt and impurities, lay out a paper towel or a clean kitchen towel on a clean and dry surface. Spread the washed lemon grass and wire grass in a single layer on the towel, ensuring they are not stacked on top of each other to allow proper drying. Gently pat the lemon grass and wire grass with another kitchen towel or paper towel to absorb excess moisture.

3. Cutting

Using a pair of scissors, cut the lemongrass and wire grass into small pieces. Make sure to cut the ingredients uniformly to ensure even extraction during pounding.

4. Pounding

Put the lemon grass and wire grass in a bowl. Pound thoroughly to break down their cellular structure and release the extract. Once you have pounded the leaves thoroughly, strain the mixture to separate the extract from any solid remnants of the leaves. Collect the strained extract in a bowl.

5. Sugar Concentration

Simmer the extract for 1 minute. In a saucepan, combine equal measurements of extracted lemon grass or wire grass and sugar (1 cup of extract to 1 cup of refined sugar). Add ¼ cup of water for every 1 cup of extract. Place the saucepan over medium heat and stir the mixture until the sugar is completely dissolved, ensuring it doesn't stick to the bottom of the pan. Reduce the heat to low and let the syrup simmer gently for about 3-5 minutes to thicken slightly and ensure it is fully combined. Remove the saucepan from the heat and let the syrup cool to room temperature. As it cools, it will thicken slightly.

6. Storing

Select transparent glass containers that are airtight and made of materials suitable for storing powdered products. Ensure that the containers are clean and completely dry, as any moisture can lead to clumping or spoilage of the powder. Clearly label each container with the name of the powdered product and the date

of storage. Store the powdered products in a cool, dry place away from direct sunlight and sources of heat.

Development of Pastillas and Polvoron

1. Pastillas with powdered lemon grass and wire grass

In a bowl, combine skim milk, powdered milk, wire grass, and lemongrass. Mix until well combined. Gradually pour the condensed milk into the mixture, mixing until a dough-like texture is formed. Scoop 1 teaspoon to 1 tablespoon of the mixture and roll it with your hand to form a sphere shape. Repeat for the rest of the mixture and coat each sphere with sugar.

2. Polvoron with powdered lemon grass and wire grass

In a frying pan over medium heat, put in the flour. Toast it until the color turns light brown and it becomes aromatic, stirring regularly to prevent the flour from burning. Once the flour is toasted, turn off the heat. Add skim milk, powdered milk, sugar, lemon grass, and wire grass, and toast the mixture for 1 minute or until well combined. Transfer the mixture to a mixing bowl. Pour in the melted margarine and mix well. Let it cool for at least 5 minutes. Using a polvoron molder, scoop the mixture and place it on top of individual cellophane or Japanese paper to wrap.

3. Pastillas with lemon grass and wire grass extract

In a bowl, combine skim milk, powdered milk, wire grass, and lemongrass extract. Mix thoroughly until well combined. Gradually pour the condensed milk into the mixture, stirring continuously until a dough-like texture is formed. Next, scoop 1 teaspoon to 1 tablespoon of the mixture and roll it between your hands to form sphere shapes. Repeat this process for the remaining mixture. Once formed, coat each sphere generously with sugar.

4. Polvoron with lemon grass and wire grass extract.

In a frying pan over medium heat, toast flour until it turns light brown and aromatic, stirring constantly to prevent burning. Once toasted, remove from heat and add skim milk, powdered milk, sugar, lemon grass extract, and wire grass extract, toasting for about a minute until well combined. Transfer the mixture to a bowl, then pour in melted margarine and mix thoroughly. Let the mixture cool for 5 minutes before using a polvoron molder to shape portions onto individual pieces of cellophane or Japanese paper for wrapping. These treats combine the aromatic flavors of lemongrass and wire grass with a sweet, buttery texture, ideal for sharing or gifting.

Hedonic Perception

Eighty (80) individuals were randomly selected from the groups of children, teenagers, adults, and experts who were requested to evaluate the finished products. Twenty respondents from each group were randomly selected. Using a 9-point hedonic scale, the evaluators rated each Filipino confection using four (4) samples.

The following scale was utilized:

Scale	Descriptive Rating
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like nor dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

RESULT AND DISCUSSION

A. Nutritive Content of Lemongrass and Wiregrass Confections

Table 7. Report of Analysis on the Nutritive Value of Lemongrass and Wiregrass Confections

Sample	Sample Description	Crude Protein	Crude Fiber	Crude Fat	Moisture	Ash
		%	%	%	%	%
FT-24-0057	Pastillas *(Powdered Lemongrass and Wiregrass)*	11.45	0.54	1.71	10.11	3.35
FT-24-0058	Pastillas *(Lemongrass and Wiregrass Extracts)*	11.27	0.68	1.53	10.89	3.31
FT-24-0059	Polvoron (Powdered Lemongrass and Wiregrass)	9.12	0.90	11.18	5.41	2.17
FT-24-0060	Polvoron *(Lemongrass and Wiregrass Extracts)*	8.95	0.98	11.63	9.44	1.87

The table exhibits the report analysis on the nutritive content of the lemongrass and wiregrass confections. As shown in the table, the confections offer diverse nutritional profiles, catering to different dietary needs.

The Pastillas with powdered lemongrass and wiregrass are high in protein (11.45%), moderate moisture (10.11%) and minerals (3.35%), low fat (1.71%), and fiber (0.54%). This means that it is suitable for those seeking a protein-rich treatment.

The Pastillas with lemongrass and wiregrass extracts are also high in protein (11.27%) and moisture (10.89%), higher fiber (0.68%), and low fat (1.53%). This indicates that it is ideal for a balanced, digestible option.

The Polvoron with Powdered Lemongrass and Wiregrass are high in fat (11.18%), moderate protein (9.12%), high fiber (0.90%), low moisture (5.41%), and minerals (2.17%). An indulgent option with digestive benefits.

The Polvoron with Lemongrass and Wiregrass Extracts is very high in fat (11.63%), low protein (8.95%), highest fiber (0.98%), higher moisture (9.44%), lowest minerals (1.87%). This suggests that it is best for those seeking a rich, flavorful treat with digestive benefits.

The above findings highlight the nutritional benefits of integrating lemongrass and wiregrass into confections, offering a range of options from protein-rich to high-fiber and indulgent treats. These indicate further that integrating lemongrass and wiregrass into confections not only diversifies the nutritional profiles of these treats but also opens up new avenues for product innovation, market segmentation, and consumer education. This can lead to the development of confections that not only satisfy taste but also provide various health benefits, thereby aligning with modern dietary trends and preferences.

Based on the data provided by the Nutritionist and Dietitian of the Provincial Hospital of the City of Ilagan, crude protein is an unnatural protein which means the protein found in the product is not the natural protein that is found in fish, eggs, etc. but it is safe to consume. The crude protein found in the product is based on the ingredients that were used. Meanwhile, the crude fiber found was the result of lemon grass and wiregrass inclusion in the confectioners. On the other hand, the crude fat in the confections was not usually the same as the fats found in pork; rather, it is frequently a result of the components the researcher utilized, such as margarine or butter. In the meantime, the product's moisture content refers to its moist content. Its ash content is determined by the food products' alkalinity. For example, if you heat lemon grass and wiregrass to a high temperature, ash will be the result. However, this has no bearing on how safe it is to consume these products.

Table 8. Nutritive Value of the Confections with Lemongrass and Wiregrass

	Pastillas with Powdered Lemongrass and Wiregrass	Pastillas with Lemongrass and Wiregrass Extract	Polvoron with Powdered Lemongrass and Wiregrass	Polvoron with Lemongrass and Wiregrass Extract
Number of Servings per Container	*9.3*	*9.3*	*9.3*	*9.3*
Serving Size	*27 g*	*27 g*	*27 g*	*27 g*
Amount Per Serving	*%RENI 4%*	*%RENI 4%*	*%RENI 4%*	*%RENI 4%*
Energy (kcal)	96	95	115	111
Energy from fat (kcal)	4	4	27	28
Total Fat (g)	0	0	3	3
Total Carbohydrates (g)	20	20	19	18
Crude Fiber (g)**	0	0	0	0
Total Protein (g)	3	3	2	2

** Certified by the Department of Agriculture*

Table 8 presents the nutritive value of the products with lemongrass and wiregrass as certified by the Department of Science and Technology. The analysis covers four (4) types of confectionery products. Each product has lemongrass and wiregrass in different forms namely: Pastillas with powdered lemongrass and wiregrass, Pastillas with lemongrass and wiregrass extract, Polvoron with powdered lemongrass and wiregrass, and Polvoron with lemongrass and wiregrass extract. Each product offers 9.3 servings per container, with a serving size of 27 grams.

As shown in the table, it is evident that the energy content ranges from 95 to 115 kcal per serving. Polvoron varieties have a higher caloric value compared to pastillas, largely due to their higher fat content. Also, for Fat Content. the pastilla varieties have no fat content, while the polvoron varieties have 3 grams of fat per serving, contributing significantly to the higher caloric content of polvoron. In terms of its Carbohydrate Content, the carbohydrate content is relatively similar across all products, ranging from 18 to 20 grams per serving. This suggests that the carbohydrate source is consistent and not significantly affected by the form of lemongrass and wiregrass used.

As to its Protein Content, Pastillas varieties contain slightly more protein (3 grams per serving) compared to polvoron varieties (2 grams per serving). This minor difference indicates that pastillas may be slightly better for those looking to increase their protein intake.

About its Fiber Content, all products contain 0 grams of crude fiber, indicating that these confections are not significant sources of dietary fiber.

Results show that for its Energy and Macronutrients, the Pastillas have lower calories and fat, making them a lighter option compared to polvoron. This is suitable for those looking to manage their fat intake. On the other hand, the Polvoron has higher calories and fat, providing a richer and more energy-dense option. This is suitable for those needing higher energy intake or preferring a more indulgent treat. As to its Protein, the pastilla varieties offer a slight advantage in protein content, which could be beneficial for those looking to increase their protein intake even with sweets. In terms of Carbohydrates and Fiber, all products have similar carbohydrate content and lack fiber, indicating they are primarily sources of quick energy without much benefit for digestive health.

The above findings underline the importance of understanding the nutritional profiles of different confections incorporating lemongrass and wiregrass. For consumers, these insights facilitate more informed dietary choices, catering to their specific needs, whether it is lower calorie intake or higher energy and protein needs. For manufacturers, the findings offer opportunities for targeted product development and marketing, ensuring that a diverse range of consumer preferences and dietary requirements are met. Educating consumers about these nutritional aspects further supports healthier eating habits and overall well-being.

B. Development of the Products

Table 9. Preparation of Powdered Lemongrass and Wiregrass

Product/s	Process	Observation/ Remarks	Result/Photo
Powdered Wiregrass	• Washing • Mechanical Drying • Pulverizing • Shifting • Storing	- has a smooth and powdery texture with a light-green color. - has a lemony flavor with subtle hints of ginger and mint.	
Powdered Wiregrass	• Washing • Mechanical Drying • Pulverizing • Shifting • Storing	- has a smooth and powdery texture. - has a light green color. - has a mild, earthy flavor with subtle grassy undertones.	

Table 9 presents the preparation of powdered lemongrass and wiregrass. It starts with washing the raw materials to guarantee cleanliness, followed by mechanical drying to remove moisture to a temperature of about 15 to 20 °F. Pulverize them into a smooth

powder, shifting them to achieve uniform particle size, removing larger or unwanted particles, and storing them at room temperature (20 to 30 °C) to extend their shelf life.

As a result, the lemon grass powder has a smooth and powdery texture with a light-green color and lemony flavor with subtle hints of ginger and mint. While the wiregrass powder also has a smooth and powdery texture. Moreover, the powder has a light green color, has a mild, earthy flavor with subtle grassy undertones.

Table 10. Preparation of Lemon Grass and Wire Grass Extract

Product/s	Process	Observation/ Remarks	Result/Photo
Lemon grass Extract	• Washing • Pat Drying • Cutting • Pounding • Sugar Concentration • Storing	- has a brown to dark color. - exudes a fresh lemon flavor with subtle hints of ginger and mint. - has a sweet fragrance and taste.	
Wiregrass Extract	• Washing • Pat Drying • Cutting • Pounding • Sugar Concentration • Storing	- has a light brown color. - has a mild earthy flavor with subtle grassy undertones. - has a sweet fragrance and taste.	

Table 10 displays the preparation of lemon grass and wire grass extract. It starts with washing the raw materials to guarantee cleanliness, followed by pat drying to remove moisture content, cutting to ensure uniformity when extracting, pounding to break and release the extract, sugar concentration to prolong the life span of the raw materials, and storing them in a cool dry place.

As a result, the Lemon grass extract has a brown to dark color and exudes a fresh lemony flavor with subtle hints of ginger and mint. While wiregrass extract has a light brown color and a mild earthy flavor with subtle grassy undertones. Both have a sweet fragrance and taste.

Table 11. Preparation of Pastillas with Powdered Lemon grass and Wiregrass

Product	Process	Measurement/Ingredients	No. of Yields	Observation/s
Pastillas with Powdered Lemon grass and Wiregrass	• Mise–en–place • Measuring • Mixing • Portioning • Packing	- 3 grams of Lemon grass Powder - 3 grams Wiregrass Powder - 178 ml Condensed Milk - 270 grams of Skim Milk - 220 grams of Powdered Milk - 64 grams of Refined Sugar - (for dusting) - 2.84 grams Vanilla	- 250 grams - Approximately 26-30 pieces. - No. of serving per container 9.3 - Serving size:27 grams	- exhibited herbaceous notes from Lemon grass and Wiregrass - has a vibrant green color - has a smooth and firm texture coated with sugar.

Table 11 presents the development product of pastillas with powdered lemon grass and wiregrass involves careful preparation and highlights accurate measurement of ingredients to generate a product with a consistent texture, flavor, and appearance of the product. Also, this recipe produced approximately 26-30 pieces with a serving size of 9.3 per container. Finally, the pastillas exhibited herbaceous notes from lemon grass and wiregrass with a vibrant green color and a smooth and firm texture coated with sugar.

Table 12. Preparation of Pastillas with Lemon grass and Wiregrass Extract

Product	Process	Measurement/Ingredients	No. of Yields	Observation
Pastillas with Lemon grass and Wiregrass Extract	• Mise-en - Place • Measuring • Mixing • Portioning • Packing	- 20 ml Lemon grass Powder - 20 ml Wiregrass Powder - 178 ml Condensed Milk - 270 grams of Skim Milk - 220 grams of Powdered Milk - 64 grams Refined Sugar(for dusting) - 2.84 grams Vanilla	250 grams Approximately 26-30 pieces. No. of servings per container 9.3 Serving size:27 grams	- has the citrusy aroma of lemon grass - has a mild earthly scent of wiregrass with a hint of creamy aroma - has a smooth and velvety touch and is coated

				with sugar.

Table 12 shows the preparation of pastillas with lemon grass and wiregrass extract. It requires meticulous preparation and precise measuring of materials to produce a product with a consistent texture, flavor, and appearance. Additionally, this recipe yielded about 26–30 pieces, or 9.3 servings per container. The product has the citrusy aroma of lemon grass and a mild earthly scent of wiregrass with a hint of creamy aroma with a smooth and velvety touch and is coated with sugar.

Table 13. Preparation of Polvoron with Powdered Lemon grass and Wiregrass

Product	Process	Measurement/Ingredients	No. of Yields	Observation/s
Polvoron with Powdered Lemon grass and Wiregrass	• Mise-en–Place • Measuring • Mixing • Portioning • Packing	- 3 grams of Lemon grass Powder - 3 grams Wiregrass Powder - 250 grams All Purpose Flour - 135 grams of Skim Milk - 110 grams of Powdered Milk - 190 grams of Refined Sugar - 95 grams Margarine - 2.84 grams Vanilla	- 250 grams - Approximately 26-30 pieces. - No. of serving per container 9.3 - Serving size:27 grams	- has a herbal scent of lemon grass and wiregrass - has smooth edges, perfect shape, and consistent size.

Table 13 displays the development product for pastillas with lemon grass and wiregrass extract. Precise component measurement and meticulous preparation are required to produce a product with a consistent texture, flavor, and appearance. Additionally, 26–30 pieces, or 9.3 servings per container, were made by this recipe. This confection has an herbal scent of Lemon grass and wiregrass with smooth edges, perfect shape, and consistent size.

Table 14. Preparation of Polvoron with Lemon grass and Wiregrass Extract

Product	Process	Measurement/ Ingredients	No. of Yields	Observation/s
Polvoron with Lemon grass and Wiregrass Extract	• Mise-en – Place • Measuring • Mixing • Portioning • Packing	- 20 ml Lemon grass Extract - 20 ml Wiregrass Extract - 178 ml Condensed Milk - 270 grams of Skim Milk	- 250 grams - Approximately 26-30 pieces. - No. of serving per container 9.3	- has a sweet fragrance and a taste notes of lemon grass and Wiregrass

	- 220 grams of Powdered Milk - 64 grams of Refined Sugar (for dusting) - 2.84 grams Vanilla	- Serving size:27 grams	- Each piece is perfectly shaped, with smooth edges and consistent size.

Table 14 shows that the development product for pastillas infused with lemon grass and wiregrass extract requires careful preparation, and exact components of measurements to produce a product with a consistent texture, flavor, and appearance. Moreover, this dish yielded 26–30 pieces or 9.3 servings of each container. The polvoron has a sweet fragrance and a taste note of Lemon grass and Wiregrass. Each piece is perfectly shaped, with smooth edges and consistent size.

C. Sensory Attributes of the Confections

Table 15. The Sensory Attributes of the Confections with Lemongrass and Wiregrass as Perceived by the Evaluators in terms of Flavor Profile, Aroma Characteristics, Texture and Mouthfeel, and Visual Appeal

Confections	**Sensory Attributes**			
	Children	**Mean**	**Sd**	**Description**
Pastillas with Powdered Lemongrass and Wiregrass	Flavor Profile	8.35	0..4687	Like Extremely
	Aroma Characteristics	8.37	0.5440	Like Extremely
	Texture and Mouthfeel	8.44	0.4121	Like Extremely
	Visual Appeal	8.48	0.3994	Like Extremely
	Overall Mean	**8.41**		**Like Extremely**
	Teenagers	**Mean**		**Description**
	Flavor Profile	8.58	0.4222	Like Extremely
	Aroma Characteristics	8.61	0..3810	Like Extremely
	Texture and Mouthfeel	8.59	0.5046	Like Extremely
	Visual Appeal	8.64	0.5374	Like Extremely
	Overall Mean	**8.61**		**Like Extremely**
	Adults	**Mean**		**Description**
	Flavor Profile	8.76	0.2956	Like Extremely
	Aroma Characteristics	8.81	0.3754	Like Extremely
	Texture and Mouthfeel	8.73	0.3450	Like Extremely
	Visual Appeal	8.74	0.3315	Like Extremely
	Overall Mean	**8.76**		**Like Extremely**

	Food Experts	**Mean**		**Description**
	Flavor Profile	8.61	0.5931	Like Extremely
	Aroma Characteristics	8.65	0.4730	Like Extremely
	Texture and Mouthfeel	8.67	0.5516	Like Extremely
	Visual Appeal	8.72	0.5126	Like Extremely
	Overall Mean	**8.66**		**Like Extremely**
	Children	**Mean**		**Description**
Pastillas with Lemongrass and Wiregrass Extract	Flavor Profile	8.33	0.6340	Like Extremely
	Aroma Characteristics	8.28	0.7958	Like Extremely
	Texture and Mouthfeel	8.39	0.8829	Like Extremely
	Visual Appeal	8.39	0.5170	Like Extremely
	Overall Mean	**8.35**		**Like Extremely**
	Teenagers	**Mean**		**Description**
	Flavor Profile	8.61	0.4762	Like Extremely
	Aroma Characteristics	8.67	0.3908	Like Extremely
	Texture and Mouthfeel	8.71	0/3170	Like Extremely
	Visual Appeal	8.55	0.5615	Like Extremely
	Overall Mean	**8.62**		**Like Extremely**
	Adults	**Mean**		**Description**
	Flavor Profile	8.88	0.2880	Like Extremely
	Aroma Characteristics	8.84	0.3648	Like Extremely
	Texture and Mouthfeel	8.70	0.5770	Like Extremely
	Visual Appeal	8.78	0.4444	Like Extremely
	Overall Mean	**8.80**		**Like Extremely**
	Food Experts	**Mean**		**Description**
	Flavor Profile	8.66	0.6245	Like Extremely
	Aroma Characteristics	8.54	0/6715	Like Extremely
	Texture and Mouthfeel	8.68	0.5325	Like Extremely
	Visual Appeal	8.73	0.5079	Like Extremely
	Overall Mean	**8.65**		**Like Extremely**
	Children	**Mean**		**Description**
Polvoron with Powdered Lemongrass and Wiregrass	Flavor Profile	8.44	0.4359	Like Extremely
	Aroma Characteristics	8.33	0.5322	Like Extremely
	Texture and Mouthfeel	8.60	0.4135	Like Extremely
	Visual Appeal	8.51	0.4179	Like Extremely

	Overall Mean	**8.47**		**Like Extremely**
	Teenagers	**Mean**		**Description**
	Flavor Profile	8.75	0.2924	Like Extremely
	Aroma Characteristics	8.80	0.2340	Like Extremely
	Texture and Mouthfeel	8.75	0.2743	Like Extremely
	Visual Appeal	8.68	0.4175	Like Extremely
	Overall Mean	**8.75**		**Like Extremely**
	Adults	**Mean**		**Description**
	Flavor Profile	8.78	0.4860	Like Extremely
	Aroma Characteristics	8.79	0.3865	Like Extremely
	Texture and Mouthfeel	8.73	0.4462	Like Extremely
	Visual Appeal	8.70	0.4790	Like Extremely
	Overall Mean	**8.75**		**Like Extremely**
	Food Experts	**Mean**		**Description**
	Flavor Profile	8.71	0.5211	Like Extremely
	Aroma Characteristics	8.58	0.6321	Like Extremely
	Texture and Mouthfeel	8.67	0.5322	Like Extremely
	Visual Appeal	8.65	0.5491	Like Extremely
	Overall Mean	**8.65**		**Like Extremely**
	Children	**Mean**		**Description**
Polvoron with Lemongrass and Wiregrass Extract	Flavor Profile	8.46	0.4679	Like Extremely
	Aroma Characteristics	8.41	0.5524	Like Extremely
	Texture and Mouthfeel	8.56	0.4045	Like Extremely
	Visual Appeal	8.54	0.4350	Like Extremely
	Overall Mean	**8.49**		**Like Extremely**
	Teenagers	**Mean**		**Description**
	Flavor Profile	8.59	0.3828	Like Extremely
	Aroma Characteristics	8.57	0.3389	Like Extremely
	Texture and Mouthfeel	8.70	0.2763	Like Extremely
	Visual Appeal	8.81	0.1651	Like Extremely
	Overall Mean	**8.67**		**Like Extremely**
	Adults	**Mean**		**Description**
	Flavor Profile	8.75	0.5194	Like Extremely
	Aroma Characteristics	8.81	0.3754	Like Extremely
	Texture and Mouthfeel	8.79	0.4236	Like Extremely

Visual Appeal	8.76	0.4524	Like Extremely
Overall Mean	**8.78**		Like Extremely
Food Experts	**Mean**		**Description**
Flavor Profile	8.65	0.6145	Like Extremely
Aroma Characteristics	8.53	0.6845	Like Extremely
Texture and Mouthfeel	8.66	0.5577	Like Extremely
Visual Appeal	8.56	0.7155	Like Extremely
Overall Mean	**8.60**		Like Extremely

Table 15 exhibits the analysis and interpretation of the sensory attributes of confections with lemongrass and wiregrass as perceived by various groups of evaluators (children, teenagers, adults, and food experts). The attributes evaluated include flavor profile, aroma characteristics, texture and mouthfeel, and visual appeal. Each group rated these attributes on a scale where a higher mean indicates a higher level of liking.

As shown in the table, the *pastillas with powdered lemongrass and wiregrass* were highly rated by all groups, with adults giving the highest rating of 8.76. The aroma characteristics received high ratings, with adults providing the highest score mean of 8.81. The texture and mouthfeel were also highly liked, with adults rating it the highest. The visual appeal was highly liked, particularly among teenagers and adults. Adults had the highest overall mean score equal to 8.76, followed by food experts with a mean score of 8.66, teenagers with a mean of 8.61, and children having a mean of 8.41.

Results indicate that the confections with lemongrass and wiregrass were extremely well-received across all age groups and food experts. The high ratings in all sensory attributes (flavor profile, aroma characteristics, texture, mouthfeel, and visual appeal) suggest that these confections are highly appealing to a broad audience. The slightly higher ratings by adults and food experts may indicate a greater appreciation for the nuanced flavors and overall quality of the product.

It can be gleaned from the table that the *pastillas with lemongrass and wiregrass extract* were liked extremely across all groups. The pastillas with lemongrass and wiregrass extract were highly favored by all groups, with adults rating the flavor profile the highest with a mean score of 8.88. Food experts also gave a high rating, indicating professional approval. The aroma characteristics were well-received across all age groups, with adults rating this attribute the highest with a mean score of 8.84. The texture and mouthfeel were appreciated by all groups, and the visual appeal was highly rated by adults having mean scores of 8.70 and 8.78, respectively.

Findings indicate that the confections are highly regarded by all evaluators, with adults scoring the highest and food experts confirming their quality and appeal. They have an excellent flavor, aroma, texture, mouthfeel, and visual appeal. Additionally, the confections are perceived as having an excellent flavor profile, aroma, texture, mouthfeel, and visual appeal, making them highly desirable to consumers of all ages.

As presented in the table, the flavor profile, aroma, texture, mouthfeel, and visual appeal of lemongrass and wiregrass confections were highly rated by all groups, with adults and food experts receiving the highest scores. The aroma was particularly appealing to adults, with a mean of 8.80 and 8.79 respectively. The texture and mouthfeel were highly appreciated by teenagers and adults, with a mean of 8.75. The visual appeal was highly rated by adults, with a mean of 8.70. Overall, the sensory attributes of the confections were highly liked by all evaluators, regardless of age or expertise.

The overall mean scores reflect a strong positive reception across all groups, with teenagers and adults rating the confections the highest with a mean = 8.75. Food experts, while slightly more critical, still provided an extremely favorable overall mean score of 8.65. Therefore, the sensory attributes of the confections with lemongrass and wiregrass are universally liked extremely by all evaluators, regardless of age or expertise. The flavor profile, aroma, texture mouthfeel, and visual appeal all received very high ratings, with the overall mean scores reflecting a consistently positive perception. This indicates that the combination of lemongrass and wiregrass in confections is highly successful in appealing to a broad audience, including children, teenagers, adults, and food experts. The highest ratings were consistently given by teenagers and adults, suggesting a particular resonance with these age groups.

Data revealed that despite slight variations, all groups rated the *polvoron* with lemongrass and wiregrass extract as "*Like Extremely*", with a mean score of 8.78 given by the adults suggesting that the lemongrass and wiregrass extracts created a universally appealing product.

Specifically, all groups rated the flavor profile very high, with adults giving the highest mean score of 8.75. This suggests that the flavor was universally appealing across all age groups. Likewise, the aroma was *liked extremely* by adults with a mean = 8.81, indicating that the olfactory experience was an important factor for this group. Although children rated it slightly lower with a mean = 8.41 than the other groups, the rating shows that the product was liked extremely by the children.

Teenagers and adults rated texture and mouthfeel the highest, suggesting these attributes significantly enhanced their enjoyment of the confections. Also, teenagers gave the highest score for visual appeal (8.81), indicating that the visual aspect was particularly important for them. Children and adults also rated visual appeal highly, underscoring its overall importance.

D. General Level of Acceptability of the Confections

Table 16. General Level of Acceptability of the Confections with Lemongrass and Wiregrass as Evaluated by the Different Age Groups of Respondents

Variant	Respondents	Mean	Sd	Description
Pastillas with Powdered	Children	8.41	0.2872	Like Extremely
	Teenagers	8.78	0.4365	Like Extremely

Lemongrass and Wiregrass	Adults	8.76	0.1316	Like Extremely
	Food Experts	8.66	0.5198	Like Extremely
Overall Mean		**8.65**		**Like Extremely**
Pastillas with Lemongrass and Wiregrass Extracts	Children	8.35	0.5930	Like Extremely
	Teenagers	8.64	0.3918	Like Extremely
	Adults	8.80	0.3570	Like Extremely
	Food Experts	8.65	0.5347	Like Extremely
Overall Mean		**8.61**		**Like Extremely**
Polvoron with Powdered Lemongrass and Wiregrass	Children	8.46	0.3340	Like Extremely
	Teenagers	8.75	0.2430	Like Extremely
	Adults	8.75	0.4314	Like Extremely
	Food Experts	8.65	0.5203	Like Extremely
Overall Mean		**8.65**		**Like Extremely**
Polvoron with Lemongras and Wiregrass Extracts	Children	8.49	0.3302	Like Extremely
	Teenagers	8.67	0.2173	Like Extremely
	Adults	8.78	0.4285	Like Extremely
	Food Experts	8.60	0.5820	Like Extremely
Overall Mean		**8.64**		**Like Extremely**

The above shows the general acceptability of different confection variants containing lemongrass and wiregrass among various age groups: children, teenagers, adults, and food experts. The confections tested include pastillas and polvoron, with two variations each—using powdered ingredients and extracts. Each group's responses are rated on a scale presumably from 1 to 9, where higher means indicate greater acceptability.

For Pastillas with Powdered Lemongrass and Wiregrass, all the respondents' groups rated this variant highly, with means indicating they "*Like Extremely*". Teenagers and adults gave slightly higher ratings compared to children and food experts. The small standard deviations (Sd) indicate consistent preferences within groups, especially among adults.

Pastillas with lemongrass and wiregrass extracts also received high ratings, with adults showing the highest acceptability with 8.35 being the lowest coming from the children and the highest mean of 8.80 coming from the adults. This indicates that all groups of respondents found this variant to be "*Liked Extremely".* The slightly higher SD among children and food experts suggests a wider range of opinions in these groups.

With the Polvoron with Powdered Lemongrass and Wiregrass variant, an overall mean of 8.65 which was also "*liked Extremely"* by all the groups of respondents. Similar to pastillas, this variant is highly acceptable across all groups. Children rated this slightly higher than pastillas with extracts, but teenagers and adults showed consistently high ratings. Again, small SD values indicate uniformity in ratings.

Additionally, the Polvoron with Lemongrass and Wiregrass Extracts variant was also "*Liked Extremely"* by the different groups of respondents and was rated a mean score of 8.64. This variant is also rated very high. Children and adults provided slightly higher ratings compared to powdered variants, with teenagers showing the lowest SD, indicating a very consistent liking within this group.

Based on the data, it can be concluded that the confection variants were well-received by all respondent groups, with mean ratings consistently above 8, indicating that the confections were "Like Extremely". Adults consistently provided high ratings across all variants, showing a strong preference. Teenagers and children also showed strong liking but with slightly lower and more varied ratings compared to adults. Food experts, while also rating the confections highly, showed the most variability, possibly reflecting their critical approach to food tasting. The uniformity of high ratings across all groups suggests that the use of lemongrass and wiregrass, whether powdered or in extracts, is a broadly acceptable and well-received addition to these confections.

E. Significant Difference Between the Sensory Attributes of the Confections

Table 17. Comparison in the Sensory Attributes of the Confections with Lemon Grass and Wiregrass as Perceived by the Evaluators

Confections	F-Value	ρ-Value	Decision	Remarks
Pastillas with Powdered Lemongrass and Wiregrass				
Flavor Profile	2.6885	0.0523	Accept H_0	Not Significant
Aroma Characteristics	2.8415	0.0434	Reject H_0	Significant
Texture and Mouthfeel	1.4850	0.2254	Accept H_0	Not Significant
Visual Appeal	1.4004	0.2492	Accept H_0	Not Significant
Pastillas with Lemongrass and Wiregrass Extract				
Flavor Profile	3.7056	0.0152	Reject H_0	Significant
Aroma Characteristics	3.2560	0.0262	Reject H_0	Significant
Texture and Mouthfeel	1.2837	0.2861	Accept H_0	Not Significant
Visual Appeal	2.4477	0.0712	Accept H_0	Not Significant
Polvoron with Powdered Lemongrass and Wiregrass				
Flavor Profile	2.4950	0.0662	Accept H_0	Not Significant
Aroma Characteristics	4.4166	0.0064	Reject H_0	Significant
Texture and Mouthfeel	0.8007	0.4973	Accept H_0	Not Significant
Visual Appeal	0.6529	0.5836	Accept H_0	Not Significant
Polvoron with Lemongrass and Wiregrass Extract				
Flavor Profile	0.9386	0.4264	Accept H_0	Not Significant

Aroma Characteristics	2.1862	0.0965	Accept H_0	Not Significant
Texture and Mouthfeel	0.9512	0.4203	Accept H_0	Not Significant
Visual Appeal	.6258	0.1904	Accept H_0	Not Significant

Table 17 displays the comparison in the sensory attributes of the confections with lemon grass and wiregrass as perceived by the evaluators.

As presented in the table, the sensory evaluation of pastillas made with powdered lemongrass and wiregrass revealed no significant difference in flavor profile, aroma characteristics, texture, mouthfeel, or visual appeal between the two types. The ρ-value for the flavor profile is 0.0523, suggesting no significant difference in perceptions. The ρ-value for texture and mouthfeel is 0.2254, well above the 0.05 threshold, indicating no significant difference in texture and mouthfeel. The ρ-value for visual appeal is 0.2492, also above the 0.05 threshold, indicating no significant difference in visual appeal. Therefore, we accept the null hypothesis (H_0), indicating that evaluators did not perceive a significant difference in the flavor profiles of the product. However, in terms of aroma, data reveal that the ρ-value for aroma characteristics is 0.0434, which is below the 0.05 threshold for statistical significance. This means that there is a statistically significant difference in the aroma characteristics of pastillas made with powdered lemongrass and wiregrass as perceived by the evaluators.

Findings suggest that the sensory evaluation of pastillas with powdered lemongrass and wiregrass shows that there is a statistically significant difference only in the aroma characteristics. The differences in flavor profile, texture mouthfeel, and visual appeal are not statistically significant, meaning that evaluators did not perceive these attributes differently between the two types of pastillas.

Regarding pastillas with lemongrass and wiregrass extract, the table shows that the ρ-value for texture and mouthfeel is 0.2861, which is well above the 0.05 threshold for statistical significance. This means that there is no significant difference in the texture and mouthfeel of pastillas made with lemongrass extract versus those made with wiregrass extract. Therefore, we accept the null hypothesis (H_0), indicating that evaluators did not perceive a significant difference in the texture and mouthfeel of the produced product. Similarly, the ρ-value for visual appeal is 0.0712, which is above the 0.05 threshold for statistical significance. This means that there is no significant difference in the visual appeal of pastillas made with lemongrass and wiregrass extract Thus, we accept the null hypothesis (H_0), indicating that evaluators did not perceive a significant difference in the visual appeal of the product. On the contrary, the ρ-value flavor profile and aroma are 0.0152 and 0.0262, respectively, which are below the 0.05 threshold for statistical significance. This means that there is a statistically significant difference in the flavor profiles and aroma of the pastillas made with lemongrass and wiregrass extract as perceived by the evaluators. Therefore, we reject the null hypothesis (H_0), indicating that the evaluators perceived notable differences in the flavor and aroma of pastillas with lemongrass and wiregrass extracts.

The table also shows that the sensory evaluation of polvoron with powdered lemongrass and wiregrass shows that there is a statistically significant difference only in the aroma characteristics with a ρ-value = 0.0064 which is less than 0.05, thus the null hypothesis is rejected. This indicates that the evaluators perceived a significant difference in terms of the aromas of the polvoron. In contrast, the differences in flavor profile, texture mouthfeel, and visual appeal are not statistically significant, meaning that evaluators did not perceive these attributes differently in the produced polvoron.

Lastly, it is evident from the presented data that the ρ-values for the flavor profile, aroma characteristic, texture and mouthfeel, and visual profile are all higher than the conventional threshold of 0.05 for statistical significance. Therefore, we accept the null hypothesis (H_0), suggesting that there is no statistically significant difference in all the abovementioned sensory attributes of the polvoron made with lemongrass and wiregrass extract as perceived by the evaluators.

F. Shelf life of the Products

Table 18. Shelf Life of Powdered Wiregrass

Weeks of Observation	Observation Results
First week	The Powdered Wiregrass had a perfect green color, smelled herbaceous with sweet notes, and had a perfectly fine texture.
Second week	Same observations as the first week, there was a perfect green color, no foul smell, and perfect texture.
Third week	Same observation as the 2nd week, it had a perfect green color, no foul smell, no molds, no pest, and a perfect texture.
Fourth week	Same observation as the 3rd week, it had a perfect green color, no foul smell, no molds, no pest, and a perfect texture.
Fifth week	The powder did not change its color, no sign of molds, the smell did not change, and there were no pests observed.
Sixth week	Same observation as the 5th week, The powder did not change its color, no sign of molds, the smell did not change, and there were no pests observed.
Seventh week	Same observation as the 6th week, The powder did not change its color, no sign of molds, the smell did not change, and there were no pests observed.
Eight week	The powder was still fine, with no sign of spoilage, the texture was still good, no change in color, and no strong nor foul smell.
Ninth week	Same observation as the 8th week. The powder was still fine, with no sign of spoilage, the texture was still good, no change in color, and no strong nor foul smell.

Tenth week	Same observation as the 9th week. The powder was still fine, with no sign of spoilage, the texture was still good, no change in color, no strong nor foul smell, and can be stored for up to 1 month at room temperature.

Observation of the shelf-life of the produced powdered Wiregrass is shown in Table 18. From the First week up to the Tenth week, the powdered Wiregrass did not show signs of spoilage. The powdered Wiregrass had a perfect green color, smelled herbaceous with sweet notes, and had a perfectly fine texture

Table 19. Shelf Life of Powdered Lemongrass

Weeks of Observation	Observation Results
First week	The Powdered Lemon grass had a perfect green color, smelled like fresh citrus, and had a perfectly fine texture.
Second week	Same observations as the first week, there was a perfect green color, no foul smell, and perfect texture.
Third week	Same observation as the 2nd week, it had a perfect green color, no foul smell, no molds, no pest, and a perfect texture.
Fourth week	Same observation as the 3rd week, it had a perfect green color, no foul smell, no molds, no pest, and a perfect texture.
Fifth week	The powder did not change its color, no sign of molds, the smell did not change, and there were no pests observed.
Sixth week	Same observation as the 5th week, The powder did not change its color, no sign of molds, the smell did not change, and there were no pests observed.
Seventh week	Same observation as the 6th week, The powder did not change its color, no sign of molds, the smell did not change, and there were no pests observed.
Eight week	The powder was still fine, with no sign of spoilage, the texture was still good, no change in color, and no strong nor foul smell.
Ninth week	Same observation as the 8th week. The powder was still fine, with no sign of spoilage, the texture was still good, with no change in color, and no strong nor foul smell.
Tenth week	Same observation as the 9th week. The powder was still fine, with no sign of spoilage, the texture was still good, no change in color, no strong nor foul smell, and can be stored for up to 1 month at room temperature.

Table 19 presents the shelf-life of the powdered lemon grass. From the First week up to the Tenth week, the product did not show any signs of spoilage. The Powdered Lemon grass still had a perfect green color, and the aroma of fresh citrus remained and had a perfectly fine texture.

Table 20. Shelf-life of the Pastillas with Powdered Lemon Grass and Wiregrass

Days of Observation	Observation of Results
Day 1	The pastillas had a uniform shape and vibrant green color. It has a citrusy smell of Lemon grass and a mild early scent of wiregrass.
Day 2	Same observation in First Day. It had a perfect vibrant green color and a hint of sweet fragrance.
Day 3	The pastillas remain fresh with no visible sign of spoilage.
Day 4	The visual appearance of Pastillas did not change their color and shape. No sign of molds or foul smell.
Day 5	The same observation in the Fourth Day. The Pastillas did not change their color and shape. No sign of molds or foul smell.
Day 6	The Texture of the Pastillas did not change. It had a smooth texture and has a sweet aroma and taste.
Day 7	. Same observation on the Sixth Day. The Texture of the Pastillas did not change. It had a smooth texture and has a sweet aroma and taste.
Day 8	The texture of the pasta was still firm and good. No change in color or foul smell.
Day 9	The same observation in Eighth Day. Pastillas texture was still firm and good. No change in color or foul smell.
Day 10	The Pastillas were still fine, and the texture was still good, with no strong or foul smell.
Day 11	Same observation in Tenth Day. The pastillas were still fine, the texture was still good, no strong nor foul smell.
Day 12	The Pastillas started to show slight changes in color and appearance, aroma was still good. Visible molds and any discoloration indicated spoilage and were no longer safe for consumption.

The table above shows that during day 1 to day 6 of observation, the Pastillas with Powdered Lemon grass and Wiregrass visually had a uniform shape, vibrant green color

and had a citrusy smell of Lemon grass and a mild early scent of wiregrass. Additionally, from Day 7 to Day 11 of observation, the pastillas were still fine, texture was still firm and good. However, the pastillas began to show slight changes in color and appearance on day 12 of observation. Visible molds and any discoloration indicate spoilage and are no longer safe for consumption.

Table 21. Shelf-life of the Pastillas with Lemongrass and Wiregrass Extract

Days of Observation	Observation Results
Day 1	The pastillas have a uniform shape and color. It has a citrusy smell of Lemon grass and a mild early scent of wiregrass.
Day 2	Same observation in First Day. It has a perfect color and has a hint of sweet fragrance.
Day 3	The pastillas remained fresh with no visible sign of spoilage.
Day 4	The visual appearance of Pastillas did not change their color and shape. No sign of molds or foul smell.
Day 5	Same observation on the Fourth Day. The Pastillas did not change their color and shape. No sign of molds or foul smell.
Day 6	The Texture of the Pastillas did not change. It had a smooth texture and has a sweet aroma and taste.
Day 7	Same observation on the Sixth Day. The Texture of the Pastillas did not change. It had a smooth texture and has a sweet aroma and taste.
Day 8	The texture of the pasta was still firm and good. No change in color or foul smell.
Day 9	The same observation on the Eighth Day. Pastillas texture was still firm and good. No change in color or foul smell.
Day 10	The Pastillas were still fine, and the texture was still good, with no strong or foul smell.
Day 11	The Pastillas started to show slight changes in color and appearance, aroma was still good. Visible molds and any discoloration indicated spoilage and were no longer safe for consumption.

The table above presents that the pastillas with lemon grass and wiregrass extract observed from Day 1 to Day 7 were visually uniform in shape and color, the citrusy smell of Lemon grass, and a mild early scent of wiregrass are noticeable. Furthermore, the pastillas maintained their good quality, sweet aroma, and texture from Day 8 to Day 10 of observation. However, on Day 11 of observation, the pastillas started to exhibit minor color and appearance alterations. Any discoloration, including visible mold, indicates spoiling and renders food unfit for ingestion.

Table 22. Polvoron with Powdered Lemon Grass and Wiregrass

Days of Observation	Observation Results
Day 1	The polvoron had a perfect shape, uniform green color, fine and smooth texture, and a sweet aroma and taste.
Day 2	Same observation in First Day. It had a uniform shape, fine and smooth texture, and had a sweet aroma and taste.
Day 3	The polvoron remained fresh with no visible sign of spoilage.
Day 4	Same observation on the Third Day. polvoron remained fresh with no visible sign of spoilage.
Day 5	The texture of polvoron was still compact and firm. No change in color or foul smell.
Day 6	Same observation in Fifth Day. The texture of polvoron was still compact and firm. No change in color or foul smell.
Day 7	The Polvoron started to show signs of deterioration, the Texture became softer and it was no longer firm. Visible molds and any discoloration indicated spoilage and were no longer safe for consumption

The table demonstrates that the Polvoron with Powdered Lemon Grass and Wiregrass during day 1 to day 5 of observation had a uniform green color, perfect shape, fine and smooth texture, and a sweet aroma and taste. Furthermore, the polvoron on day 6 of observation, maintained its aroma and texture. However, on day 7 of observation, the Polvoron started to show signs of deterioration, the Texture became softer and it was no longer firm. Visible molds and any discoloration indicated spoilage and were no longer safe for consumption.

Table 23. Polvoron with Lemongrass and Wiregrass Extract

Days of Observation	Observation Results
Day 1	The polvoron had a perfect shape, uniform white color, fine and smooth texture, and a sweet aroma and taste.
Day 2	Same observation on the First Day. It had a uniform shape, fine and smooth texture, and a sweet aroma and taste.

Day 3	Same observation on the Third Day. polvoron remained fresh with no visible sign of spoilage.
Day 4	The texture of polvoron was still compact and firm. No change in color or foul smell.
Day 5	The polvoron started to show a slight change in color and appearance. Texture became softer. Visible molds and any discoloration indicated spoilage and were no longer safe for consumption.

The table indicates that the Polvoron containing lemon grass and wiregrass extract during day 1 to day 3 of observation had a perfect shape, was uniform in color, fine and smooth texture, and had a sweet aroma and taste. Additionally, during day 4 of observation, the polvoron texture remained firm. Yet on the fifth observation day, a minor alteration in appearance, and hue began to exhibit, and the texture softened. Any discoloration or visible mold signals spoiling and makes the food unsafe to eat.

Conclusions

The findings of this study reveal the potential of lemongrass and wiregrass as novel ingredients in Filipino confections, offering a unique flavor profile and nutritional benefits. The high acceptability across all age groups and food experts suggests a strong market potential for these innovative treats. The study's findings highlight the importance of understanding consumer preferences and the impact of different processing methods on the sensory attributes and shelf life of the products. The significant difference observed in the aroma characteristics of some variants suggests the need for further investigation into the optimal processing techniques to enhance the sensory appeal of these confections. Furthermore, the relatively short shelf-life of the confections, particularly those made with extracts, requires the development of strategies to extend their shelf life, potentially through the use of stabilizers or other preservation methods. This research provides valuable insights for confectionery manufacturers and researchers seeking to develop innovative and marketable products that cater to diverse consumer preferences and meet the growing demand for healthier and more palatable treats.

Recommendations

In view of the findings and conclusions of the study, the following recommendations are offered:

1. Food technology experts are encouraged to promote lemongrass and wiregrass confections as a healthy and flavorful alternative, highlighting the study's positive consumer response to these ingredients, and suggesting a strong market potential.
2. Focus should be placed on enhancing the aroma characteristics. That is, further research and development should concentrate on maximizing the desirable aroma of lemongrass and wiregrass in confections.

3. Methods to extend the shelf life of the confections be explored. The use of stabilizers or other preservation techniques to increase the shelf life of confections, particularly those made with extracts should be looked into.
4. Specific consumer groups should be targeted. The researcher should tailor marketing strategies to different age groups, recognizing the strong preference for these confections among teenagers and adults.
5. Consumers should be made aware of the nutritional benefits of lemongrass and wiregrass so that they can have informed choices and expand the market appeal of these innovative treats.

Compliance with Ethical Standards

The author declares that this research was conducted with strict adherence to ethical guidelines. Informed consent was obtained from all participants before their involvement in the study, ensuring they were fully aware of the research objectives, procedures, and potential risks. Respondents were informed of their right to withdraw from the study at any time without penalty. The anonymity of all participants was maintained throughout the research process, and their well-being was safeguarded. No conflict of interest exists in the conduct of this study. The authors have strictly avoided plagiarism, ensuring that all sources are properly cited and acknowledged. Furthermore, the interpretation of the findings was conducted without bias, and the results were used solely for research purposes.

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