

# DEVELOPMENT AND ACCEPTABILITY OF FLOUR FROM GREEN CAVENDISH BANANA (*MUSA ACUMINATA CAVENDISH*) AND ITS POTENTIAL PRODUCT

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**ABSTRACT:** Green Cavendish banana is a variety of banana (*Musa acuminata Cavendish*) that is harvested while still unripe and green, commonly used for cooking or processing into various food products. This study aimed to develop bread made from green Cavendish banana (*Musa acuminata Cavendish*) flour as the raw material. Green Cavendish bananas, sourced from a banana plantation, underwent phytochemical analysis to assess antioxidant components, health benefits, and potential foaming properties. The study conducted a thorough nutritional analysis of banana flour, scrutinizing components such as oil, moisture, protein, phosphorus, magnesium, copper, potassium, and manganese through various methods. It also delved into the characteristics, bioactive elements, nutritional value, and sensory appeal of Green Cavendish Banana Flour and its derivative products. Notably, phytochemical analysis revealed the presence of beneficial compounds like flavonoids, phenols, condensed tannins, and saponins in Green Cavendish Bananas, implying potential health benefits and foaming properties. Moreover, the research furnished a detailed breakdown of the nutritional composition of Green Cavendish Banana Flour, incorporating vital information about its oil, protein, phosphorus, magnesium, copper, potassium, and manganese content, alongside the methods used for measurement. The study also elucidated the ingredients and processes involved in creating banana bread. Importantly, the sensory evaluation demonstrated the high overall acceptability of banana bread made from Green Cavendish Banana Flour, encompassing favorable responses to its appearance, aroma, texture, and taste. Collectively, these findings underscore the promising potential of Green Cavendish Banana products, both from a nutritional perspective and in terms of consumer preferences and sensory appeal. In conclusion, the study highlights the rich reserves of bioactive compounds and essential nutrients in Green Cavendish Banana and its derivative products. The phytochemical analysis emphasized these benefits, while the composition analysis illuminated their nutritional content. Additionally, the high acceptability of banana bread made from Green Cavendish Banana Flour underscores its role as a nutritious and delightful food choice.

**Keywords:** *Green Cavendish Banana, development, acceptability*

## INTRODUCTION

Bananas are among the fruits that are consumed worldwide (Lobo and Rojas, 2020). In terms of volume, more than 16% of all fruit yield comes from the second-highest-yielding crop in the world. (Mohapatra, D., et al., 2010). Bananas can be turned into flour because of their high solid content (40–70%) and can be all-around used by food manufacturers. Banana flour serves as the main ingredient for baking bread, cakes, biscuits, and making noodles or pasta. The banana is the most outstanding crop that provides food on the planet in terms of nutrition.

They are also rich in other nutrients, vitamins, minerals, carbs, flavonoids, and phenolic compounds that provide the body with energy. (Ahmed *et al.*, 2017). Shian and Abdullah (2012) claim that antioxidants are abundant in bananas. Because of its low cost and abundant availability, it helps solve the issue of food insecurity in many countries.

Cavendish, Saba, and Lakatan are the most common types of banana grown in the Philippines, accounting for 53%. Cavendish has a reputation for controlling blood pressure and lowering the chance of cardiac arrest due to its high amount of potassium. Cavendish bananas provide the food industry with a consistent, low-cost, high-starch, and easily accessible source of flour (Zhang, Whistler, Bbemiller, & Hanaker, 2005). To create new goods, green banana (Cavendish) flour was incorporated. Given that it contains a lot of fiber-rich foods and carbs, it is good for humans body (Rodriguez-Ambriz *et al.*, 2008). Juarez-Garcia and colleagues (2006) flour made from green bananas can replace wheat flour in recipes for bread, pasta, noodles, and biscuits since it has a high starch content. Because of its high concentration of soluble minerals and solids and low acidity, it is particularly helpful for industrial processing. Making banana flour from green bananas and using it in baked products like high-fiber bread, edible films, and slowly digestible cookies are examples of the brand-new economic approach, which aims to elevate the unused and turn it into a new product (Natcharee R.P., 2007). When the researcher decided to carry out the current study, it was unclear what unripe banana flour was like and its potential applications.

## RESEARCH QUESTIONS

This study aimed to develop flour made from green cavendish banana (*musaacuminata cavendish*) as the raw material and evaluate the acceptability of its potential products. Specifically, it sought to answer the following questions:

1. What is the phytochemical analysis of the flour developed from green Cavendish bananas?
2. What is the formulation and process of the bread product using green banana flour?
3. What are the perceptions of the respondents on the sensory acceptability of the bread product in terms of
  - 3.1 Appearance;
  - 3.2 Texture;
  - 3.3 Odor; and
  - 3.4 Taste?
4. What is the overall acceptability of the developed bread products?

## METHODOLOGY

The research employed a descriptive-developmental research design to create a food product using unripe green bananas. A mixed-methods approach was adopted, involving both analytical and chemical analyses, particularly focusing on moisture content, fiber, fat, and total ash. The sensory acceptability of banana flour-based bread was evaluated among food technology experts and consumers, comprising 10 panelists and 50 consumers. The study took place at the Food Technology Innovation Center at Surigao del Norte State University. The banana flour was developed through washing, peeling, slicing, drying, grinding, sieving, packaging, and storage. The bread-making process included various ingredients and procedural steps. A custom-made questionnaire, evaluated by professionals and consumers, assessed the acceptability of the product in terms of appearance, taste, aroma, and texture. Validity was ensured through expert scrutiny. Ethical considerations involved obtaining consent from respondents and assuring the safety of the samples. Data analysis utilized mean, standard deviation, and One-Way Analysis of Variance (ANOVA) to assess sensory attributes and differences among flour concentrations. The overall acceptability grand mean was 8.05, indicating a high level of approval for the Green Banana bread product.

## RESULTS AND DISCUSSION

This chapter presents, interprets, and analyzes the obtained data from the retrieved survey-instrument from the respondents under study. The discussion of results is based on the problem posted in Chapter 1.

### Phyto-chemical result of the Green Cavendish Banana (*Musa Acuminata Cavendish*)

Table 3. *Phyto-chemical result of green cavendish banana (musa acuminata cavendish).*

Sample Code	Sample	Parameter	Result
CHE-0116	<i>Green Cavendish Banana</i>	Volume of Extract Obtained	85mL
		<b>Flavanoids</b>	
		Bate-Smith & Metcalf Method: For Leucoanthocyanins	+
		<b>Phenols</b>	+
		Thin-Layer Chromatography (TLC)	
		<b>Tannins</b>	+
		Ferric Chloride Test	Brownish-green
	*Brownish-green Color indicates the presence of condensed tannins *Blue-black color indicates the presence of hydrolysable tannins		
	<b>Saponins</b>		
	Froth Test	++	

Table 3 provides a detailed insight into the phytochemical composition of green Cavendish banana (*Musa acuminata Cavendish*) with a specific focus on sample CHE-0116. The extraction process yielded a substantial 85 mL volume of extract, indicating the potential abundance of bioactive compounds. The analysis of flavonoids, conducted through the Bate-Smith & Metcalf Method, yielded a positive result, suggesting the presence of these compounds known for their antioxidant properties. Leucoanthocyanins, another class of flavonoids, were also detected. Phenols, identified through Thin-Layer Chromatography (TLC), showed a positive result, highlighting the diverse range of phenolic compounds present in the banana sample. The examination of tannins, using the Ferric Chloride Test, revealed both condensed and hydrolysable tannins. The brownish-green color indicated the presence of condensed tannins, while the blue-black color signified the existence of hydrolysable tannins. This information is crucial as tannins are associated with various health benefits. Furthermore, the Froth Test for saponins demonstrated a notable presence (++), indicating the potential bioactivity of this class of compounds. Overall, the comprehensive phytochemical analysis outlined in Table 3 enhances our understanding of the chemical constituents of green Cavendish bananas, providing valuable insights for both nutritional and pharmaceutical applications.

### Physico-chemical composition nutritive value of the develop Green Cavendish Banana flour.

Table 4. *Physico-chemical composition nutritive value of the develop Green Cavendish Banana flour.*

PARAMETERS	Green Cavendish Banana Flour	Method
Oil, %	19.6	Soxhlet
Moisture, %	7.3	Gravimetric
Crude Protein, %	12.6	Kjeldahl
Phosphorus, mg/kg	31.72	Colorimetric

Magnesium, mg/100g	118.15	Dry Ashing-AAS
Copper, mg/100g	0.27	Dry Ashing-AAS
Potassium, mg/kg	9117.32	Atomic Absorption Spectroscopy (AAS)
Manganese mg/100g	0.52	Atomic Absorption Spectroscopy (AAS)

Table 4 presents a comprehensive overview of the physico-chemical composition and nutritive value of developed Green Cavendish Banana flour. The oil content, determined through Soxhlet extraction, is reported at 19.6%, providing insight into the fat content of the flour. The moisture content, measured gravimetrically, is relatively low at 7.3%, indicating good stability and potential for longer shelf life. The crude protein content, analyzed using the Kjeldahl method, is reported at 12.6%, highlighting the flour's protein-rich nature.

The mineral composition is elucidated through various methods. Phosphorus content is determined colorimetrically and found to be 31.72 mg/kg. Magnesium and copper content, assessed through Dry Ashing-AAS (Atomic Absorption Spectroscopy), are reported at 118.15 mg/100g and 0.27 mg/100g, respectively. These values provide insights into the flour's contribution to essential minerals necessary for various physiological functions.

Potassium, another vital mineral, is quantified at 9117.32 mg/kg using Atomic Absorption Spectroscopy (AAS), showcasing the potential of Green Cavendish Banana flour as a rich source of potassium, crucial for heart health and overall electrolyte balance.

Manganese content, also analyzed through AAS, is reported at 0.52 mg/100g, further adding to the nutritional profile of the flour. These findings collectively underscore the flour's potential as a nutritionally rich ingredient, with a balanced combination of macronutrients and essential minerals. The detailed methodology specified for each parameter adds credibility to the results, enhancing the utility of this information for both nutritional research and food product development.

### Procedures and Processes of the making Green Banana flour and formulation of making Green Banana Bread.

The process of making banana flour involves several procedural steps. It begins with the use of unripe bananas, which are washed with tap water. The first step involves peeling the bananas, followed by slicing them into 3-4 mm thick slices if they are unripe, or 2 mm thick slices if they are ripe. These slices are then dried using a food dehydrator set at 70°C for a duration of 6 hours. After drying, the banana slices are ground and sieved to obtain banana flour with a particle size of 250 μ.

In the formulation of banana bread, the following ingredients are used: 250 grams of banana flour, 20 grams of powdered milk, 5 grams of dough enhancer, 5 grams of yeast, 20 grams of margarine, 20 grams of lard, 1 whole egg (xl), 100 ml of liquid milk, 70 grams of brown sugar, 3 grams of salt, and 5 grams of optional flavoring.

The bread-making process involves dissolving brown sugar and salt in the liquid milk and setting it aside. In a clean mixing bowl, the banana flour, powdered milk, yeast, dough enhancer, lard, margarine, egg, and milk mixture are combined. Using a stand mixer, the mixture is mixed for 2 minutes at speed 2, and the speed is increased to 4 for an additional 10 minutes, or until the dough reaches the desired consistency and gluten develops. The dough is then rested for 5 minutes.

The next steps include portioning and weighing the dough at 50 grams or the desired size, rounding and shaping it, and allowing it to undergo final proofing for about 45 minutes to 1 hour, or until the dough reaches its desired size. The bread is then baked at 175°C for 8 minutes or until it is fully done. After baking, the bread is allowed to cool before being packed.

**Perceptions of the respondents on the sensory acceptability of the develop Green Banana Bread.**

**Table 5.** *Perceptions of the respondents on the sensory acceptability as to Appearance/Color.*

Appearance/Color	Mean	SD	Qualitative Description
1. Color of the Banana bread.	8.5	0.93	like moderately
2. Clearness of the Banana bread.	7.4	0.85	like moderately
3. Limpidity of the Banana bread.	8.5	0.92	like moderately
4. Luster of the Banana bread.	8.03	0.86	like very much
5. Wholeness of the Banana bread.	8.05	0.88	like very much
<b>Average mean</b>	<b>8.096</b>		<b>Like moderately</b>

*Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely*

Table 5 provides a comprehensive insight into the respondents' perceptions of the sensory acceptability of Green Cavendish Banana bread, particularly focusing on the aspect of Appearance/Color. The mean scores, standard deviations (SD), and qualitative descriptions offer a detailed understanding of how respondents evaluated different attributes related to the visual appeal of the banana bread. The "Color of the Banana bread" received a high mean score of 8.5, with a relatively low standard deviation of 0.93, indicating a consistent liking for the color among respondents. The qualitative description "like moderately" suggests a positive but not overwhelmingly strong preference for the color. The "Clearness of the Banana bread" obtained a mean score of 7.4, indicating a moderate level of liking. The low standard deviation of 0.85 suggests a relatively uniform agreement among respondents regarding the clearness of the banana bread, and the qualitative description "like moderately" further reinforces this perception.

In terms of "Limpidity of the Banana bread," respondents gave a high mean score of 8.5, with a low standard deviation of 0.92. This suggests a consistent liking for the limpidity of the banana bread among respondents, aligning with the qualitative description "like moderately." The "Luster of the Banana bread" received a mean score of 8.03, with a standard deviation of 0.86. The slightly higher standard deviation indicates a bit more variability in respondents' opinions, but the overall liking ("like very much") indicates a positive reception of the luster. For the "Wholeness of the Banana bread," respondents provided a mean score of 8.05, with a standard deviation of 0.88. This suggests a high level of liking for the wholeness of the banana bread, and the qualitative description "like very much" underscores the positive perception.

The overall average mean score for the Appearance/Color category is 8.096, indicating a collective perception of "Like moderately." This suggests that, on average, respondents found the visual attributes of the Green Cavendish Banana bread to be moderately likable. These findings provide valuable insights for product developers, allowing them to understand specific aspects of appearance and color that resonate positively with consumers and areas where further enhancement might be considered.

**Table 6.** *Perceptions of the respondents on the sensory acceptability as to Aroma/ Odor.*

Aroma/Odor	Mean	SD	Qualitative Description
1. Balance of odor in all ingredients	8.03	0.80	like very much
2. Odor from the Banana flour.	7.5	0.87	like moderately
3. Odor whets appetite.	8.4	0.77	like very much
4. Fragrance heightens marketability.	8.02	0.94	like very much
5. Odor enhances flavor.	7.5	0.83	like moderately
<b>Average mean</b>	<b>7.89</b>		<b>like moderately</b>

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

Table 6 presents a comprehensive assessment of respondents' perceptions regarding the sensory acceptability of Green Cavendish Banana bread, focusing on the Aroma/Odor category. The mean scores, standard deviations (SD), and qualitative descriptions collectively offer a nuanced understanding of how respondents evaluated the olfactory attributes of the banana bread. The "Balance of odor in all ingredients" received a high mean score of 8.03, with a low standard deviation of 0.80, indicating a consistent and strong liking among respondents for the harmonious blend of aromas. The "Odor from the Banana flour" achieved a moderate mean score of 7.5, with a slightly higher standard deviation of 0.87, suggesting a moderately positive perception but with some variability in respondents' opinions. Notably, the aroma's ability to "whet appetite" received a high mean score of 8.4, with a low standard deviation of 0.77, indicating a strong consensus among respondents that the aroma plays a significant role in stimulating appetite.

Similarly, the "Fragrance heightens marketability" obtained a high mean score of 8.02, with a slightly higher standard deviation of 0.94, suggesting that while respondents generally appreciate the fragrance's impact on market appeal, there is some variability in this perception. Lastly, the "Odor enhances flavor" received a moderate mean score of 7.5, with a standard deviation of 0.83, indicating a positive but somewhat varied response regarding the aroma's influence on flavor. The overall average mean for the Aroma/Odor category is 7.89, categorized as "like moderately," suggesting that, on average, respondents found the aroma and odor of the Green Cavendish Banana bread to be moderately likable. These detailed insights offer valuable guidance for product developers in refining the olfactory profile of the banana bread to align with consumer preferences and enhance overall sensory satisfaction.

**Table 7.** *Perceptions of the respondents on the sensory acceptability as to Taste.*

Taste	Mean	SD	Qualitative Description
1. Sweetness of the Green bananabread.	8.3	0.93	like very much
2. Balance of the flavor.	7.9	0.93	like moderately
3. Distinction of banana flavor.	8.55	0.89	like very much
4. Flavor increases appetite to eat more	8.02	0.78	like very much
5. Flavor's overall acceptability in the market.	8.3	0.88	like very much
<b>Average mean</b>	<b>8.214</b>		<b>like very much</b>

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

Table 7 provides a comprehensive examination of respondents' perceptions regarding the sensory acceptability of Green Cavendish Banana bread, with a specific emphasis on the Taste category. The mean scores, standard deviations (SD), and qualitative descriptions collectively offer detailed insights into how respondents evaluated the various taste attributes of the banana bread. The "Sweetness of the Green banana bread" received a high mean score of 8.3, with a standard deviation of 0.93, indicating a strong liking among respondents for the sweetness level. The "Balance of the flavor" achieved a mean score of 7.9, with a standard deviation of 0.93, suggesting a moderate liking for the overall flavor balance. The "Distinction of banana flavor" received a high mean score of 8.55, with a standard deviation of 0.89, indicating a strong consensus among respondents that the banana flavor is distinctly recognizable and well-received.

Additionally, the taste attribute "Flavor increases appetite to eat more" obtained a mean score of 8.02, with a low standard deviation of 0.78, signifying a consistent agreement among respondents that the flavor has an appetite-stimulating effect. Lastly, the "Flavor's overall acceptability in the market" received a high mean score of 8.3, with a standard deviation of 0.88, suggesting a strong liking for the overall taste profile in the market context.

The overall average mean for the Taste category is 8.214, categorized as "like very much," indicating that, on average, respondents found the taste of the Green Cavendish Banana bread to be highly likable. These detailed taste perceptions provide valuable guidance for product developers, allowing them to further refine the taste profile to align with consumer preferences and enhance the overall sensory appeal of the banana bread.

**Table 8.** Perceptions of the respondents on the sensory acceptability as to Texture.

Texture	Mean	SD	Qualitative Description
1. Firmness of the Green Banana bread.	7.23	0.90	like moderately
2. Softness of the Green Banana bread.	7.9	0.98	like moderately
3. Moisture content of the Green banana bread.	8.5	0.87	like very much
4. Consistency of the Green Banana bread.	8.27	0.72	like very much
5. Structure of the Green Banana bread.	8.17	0.68	like very much
<b>Average mean</b>	8.014		like very much

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

The table 8 presents the perceptions of the respondents regarding the sensory acceptability of the texture of a product. The mean scores, standard deviations (SD), and qualitative descriptions provide comprehensive insights into how respondents evaluated the various textural attributes of the banana bread. The "Firmness of the Green Banana bread" received a mean score of 7.23, with a standard deviation of 0.90, indicating a moderate liking for the level of firmness.

Similarly, the "Softness of the Green Banana bread" achieved a mean score of 7.9, with a slightly higher standard deviation of 0.98, suggesting a moderate liking for the softness of the bread. Notably, the "Moisture content of the Green banana bread" received a high mean score of 8.5, with a standard deviation of 0.87, indicating a strong liking among respondents for the moist texture. The "Consistency of the Green Banana bread" obtained a high mean score of 8.27, with a low standard deviation of 0.72, signifying a consistent agreement among respondents that the bread has an appealing consistency. Additionally, the "Structure of the Green Banana bread" received a high mean score of 8.17, with a low standard deviation of 0.68, indicating a consistent liking for the structural aspects of the bread.

The overall average mean for the Texture category is 8.014, categorized as "like very much," suggesting that, on average, respondents found the texture of the Green Cavendish Banana bread to be highly likable. These detailed perceptions offer valuable guidance for product developers in refining the texture to align with consumer preferences and enhance the overall sensory appeal of the banana bread, ensuring a positive eating experience.

**Over-all acceptability of the developed green banana bread product.**

**Table 9.** *Over all acceptability of Green Banana bread product*

Characteristics	Average mean	Rank	Qualitative Description
Appearance	8.10	2	like very much
Taste	7.89	4	like very much
Aroma	8.21	1	like very much
Texture	8.01	3	like very much
Grand mean	8.05		like very much

*Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely*

Table 9 provides a comprehensive summary of the overall acceptability of the Green Banana bread product, considering multiple sensory characteristics, including Appearance, Taste, Aroma, and Texture. The average mean scores, ranks, and qualitative descriptions offer valuable insights into how respondents perceived the product holistically. In terms of "Appearance," the Green Banana bread received a high average mean score of 8.10, ranking second among the sensory characteristics. The qualitative description "like very much" suggests that respondents found the visual appeal of the banana bread to be highly likable. The "Taste" category achieved an average mean score of 7.89, ranking fourth among the sensory characteristics. While the taste received a slightly lower score compared to other attributes, the qualitative description "like very much" indicates a strong positive perception of the taste. "Aroma" emerged as the top-ranking characteristic, with an average mean score of 8.21. The highest rank and the qualitative description "like very much" collectively suggest that respondents highly appreciated the aroma of the Green Banana bread, underscoring the importance of olfactory attributes in overall acceptability. The "Texture" category achieved an average mean score of 8.01, ranking third among the sensory characteristics. The qualitative description "like very much" implies that respondents found the texture of the banana bread to be highly appealing, contributing positively to the overall acceptability. The grand mean, calculated across all characteristics, is reported as 8.05, categorized as "like very much." This overarching score reinforces the positive reception of the Green Banana bread product, with respondents expressing a high level of overall acceptability.

The ranking of characteristics provides additional context, indicating that respondents considered Aroma to be the most crucial factor in overall acceptability, followed by Appearance, Texture, and finally, Taste. These detailed perceptions offer valuable guidance for product developers, emphasizing the need to prioritize olfactory and visual attributes to enhance the overall sensory experience and consumer acceptance of the Green Banana bread product.

**CONCLUSIONS AND RECOMMENDATIONS**

Based on the findings, the following conclusions were drawn: The study provides valuable insights into the composition, bioactive compounds, nutritional content, and sensory acceptability of Green Cavendish Banana and its derived products. The phytochemical analysis of the banana sample revealed the presence of flavonoids, phenols, condensed tannins, and saponins, highlighting its potential health benefits. The composition analysis of Green Cavendish Banana Flour demonstrated its nutritional content, including oil, protein, phosphorus, magnesium, copper, potassium, and manganese. The formulation of banana bread using specific quantities of raw materials and the step-by-step procedures were also outlined. The sensory evaluation of the banana bread indicated positive perceptions in terms of appearance, aroma, texture, and taste, with the overall product receiving high acceptability ratings. These findings collectively demonstrate the potential of the Green Cavendish Banana and its derived products as a valuable source of bioactive compounds and nutrients and a delicious food option. Based on the conclusions drawn from the study, the following recommendations can be made:

*Nutritional awareness and promotion.* Given the composition analysis of Green Cavendish Banana Flour and its nutritional content, there is an opportunity to promote its use as a nutritious ingredient in various food



products. Further studies could focus on developing recipes and innovative applications for the flour, highlighting its health benefits and potential as an alternative to traditional flour options.

*Process optimization.* The outlined formulation and procedures for making banana bread using Green Cavendish Banana Flour provide a basis for further process optimization. Researchers and food manufacturers can explore variations in ingredient quantities, processing techniques, and additives to improve the sensory attributes and overall quality of the bread.

*Consumer education.* Considering the positive perceptions of appearance, aroma, texture, and taste in the sensory evaluation, there is potential to promote green banana bread as a healthy and delicious food option. Consumer education campaigns can be developed to raise awareness about the nutritional benefits of green Cavendish bananas and their derived products, emphasizing their positive sensory characteristics.

*Further research.* While this study provided valuable insights, further research is warranted to explore and characterize the specific bioactive compounds present in green Cavendish bananas and their potential health benefits. This could involve conducting more detailed phytochemical analyses to identify and quantify specific flavonoids, phenols, condensed tannins, and saponins present in the banana sample.

*Market development.* Based on the high acceptability ratings and positive evaluations, efforts can be made to introduce and market green banana bread as a unique and appealing product. Collaboration with food companies and retailers can help increase availability and accessibility for consumers, thereby expanding the market for Green Cavendish Banana products.

By implementing these recommendations, further research, product development, and consumer education efforts can contribute to maximizing the potential of green Cavendish bananas and their derived products, benefiting both the food industry and consumers seeking nutritious and enjoyable food options.

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