

Banana Corm Crackers as a Sustainable Food Innovation for Community Nutrition and Local Economic Empowerment

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ARTICLE HISTORY Received: 12-03-2025 Accepted: 02-06-2025 Published: 30-06-2025 Keyword: Banana Corm Crackers; Product Acceptability; Sensory Evaluation; Food Innovation; Sustainable Packaging.	Abstract: The utilization of banana corm for product diversification offers potential economic value, yet consumer preference remains a critical variable. This study aimed to determine the acceptability of Banana Corm Crackers in terms of three flavor variants (Lagundi, Pandan, and Turmeric), quality attributes (appearance, aroma, texture, and flavor), and packaging types (tub, transparent pastry box, and metallic stand-up pouch). Utilizing a descriptive-experimental research design, sensory evaluation was conducted with 30 Bachelor of Technical-Vocational Teacher Education (BTVTED) students majoring in Food and Service Management. Data were analyzed using Weighted Mean and Analysis of Variance (ANOVA). The results indicated that the Pandan flavor was the most preferred variant with a mean rating of 7.99 ("Like Very Much"), while the metallic stand-up pouch was identified as the most favorable packaging. Statistical analysis revealed significant differences in acceptability based on flavor and highly significant differences based on packaging; however, no significant differences were found regarding the general quality attributes across the variants. These findings imply that while the product quality is consistent, prioritizing the Pandan flavor and metallic packaging is crucial for maximizing market acceptability.
Kata kunci: Keripik Umbi Pisang; Penerimaan Produk; Evaluasi Sensorik; Inovasi Pangan; Kemasan Berkelanjutan.	Abstrak: Pemanfaatan umbi pisang untuk diversifikasi produk memiliki potensi nilai ekonomi, namun preferensi konsumen tetap menjadi variabel kritis. Studi ini bertujuan untuk menentukan tingkat penerimaan Keripik Umbi Pisang dalam hal tiga varian rasa (Lagundi, Pandan, dan Kunyit), atribut kualitas (penampilan, aroma, tekstur, dan rasa), serta jenis kemasan (tabung, kotak kue transparan, dan kantong berdiri logam). Menggunakan desain penelitian deskriptif-eksperimental, evaluasi sensorik dilakukan dengan 30 mahasiswa Program Studi Pendidikan Guru Teknik dan Kejuruan (BTVTED) jurusan Manajemen Pangan dan Jasa. Data dianalisis menggunakan Rata-Rata Berbobot dan Analisis Variansi (ANOVA). Hasil menunjukkan bahwa varian rasa Pandan paling disukai dengan rata-rata penilaian 7,99 ("Sangat Suka"), sementara kemasan kantong berdiri logam diidentifikasi sebagai kemasan paling disukai. Analisis statistik menunjukkan perbedaan yang signifikan dalam penerimaan berdasarkan rasa dan perbedaan yang sangat signifikan berdasarkan kemasan; namun, tidak ditemukan perbedaan yang signifikan terkait atribut kualitas umum di antara varian. Temuan ini menyiratkan bahwa meskipun kualitas produk konsisten, memprioritaskan rasa Pandan dan kemasan logam sangat penting untuk memaksimalkan penerimaan pasar.



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INTRODUCTION

Food serves as the fundamental basis of all life. Anyone visiting a Filipino home, regardless of the time, will be offered food, embarking on a culinary journey where each bite tells a story (Kongstad & Giacalone, 2020) (Bantacut & Saptana, 2014).. In this context, the banana corm creates a symphony for the senses, arranging flavors and textures into a dance that lingers on the tongue. Within the vibrant tapestry of Filipino cuisine, the humble banana corm takes center stage, weaving its way into the daily fabric of life. As a staple food source, its versatility and nutritional richness reflect the diverse tastes that define Filipino palates. This study explores the intricate relationship between the Filipino people and the banana corm, shedding light on its cultural significance and the myriad ways it contributes to the nation's gastronomic identity.

Foods are often distinguished by their unique flavors and textures rather than merely by courses. Food preparation and its influence on lifestyle play an essential role in social status, personal and cultural identity, and religion. The ingredients, recipes, and the communal act of sharing a meal reveal much about a person's origins and personality. Food acts as a cultural profile, fostering social interactions and highlighting diversity (Yabaya & Ado, 2008). Beyond traditional consumption, native communities have begun exploring the potential of utilizing banana plants in their daily lives, recognizing that banana by-products are an under-utilized renewable biomass with great potential (Padam et al., 2014).

Examining the variety of flavors and cultural meanings found in banana corm crackers around the world reveals a rich mosaic. Banana corm crackers are a snack enjoyed across borders, ranging from Southeast Asia's traditional recipes to Western adaptations following the trend of healthy, alternative snacking. Globally, snack foods are widely exploited, popular for being convenient, light, and typically consumed between regular meals (Lucas, 2001). Recent studies have even focused on the sensory optimization of crackers developed from high-quality flours to meet these consumer demands (Akonor et al., 2017). This research explores the culinary tales and sustainable implications of banana corm crackers, demonstrating how an underappreciated ingredient can impact global dishes and unite people through a shared love of creative, sustainable cooking.

Bananas are among the world's most important fruit crops. Grown in the tropics, they are prized globally for their flavor, nutritional content, and year-round availability (Aurore et al., 2009). The corm is where a banana plant produces "suckers," or offshoots, which can be harvested for transplantation. While intended for propagation, the corm represents a significant biomass often left behind. The year-round availability of bananas ensures production continuity, addressing a common issue in the agro-business industry where agricultural items often lack shelf stability. This presents new commercial opportunities; for instance, the substitution of banana flour in snacks has been shown to influence nutrition and sensory quality positively (Wang et al., 2012). Consequently, crackers are gaining popularity among diverse demographics, both domestically and internationally (Kongstad & Giacalone, 2020).

In addition to fresh consumption, bananas and their by-products can be processed into chips, flour, puree, and jam, significantly adding value to the raw material (Simin, 2014). This processing capability stimulates the expansion of downstream agrobusiness (Mohapatra et al., 2010). By supporting home industries and medium-to-large enterprises, the utilization of these raw materials fosters robust economic development.

Davao del Norte, known as the "Banana Capital of the Philippines," hosts numerous plantations run by global corporations and local growers. Millions rely on bananas as a source of income and nourishment. As a top global producer, the Philippines prioritizes successful banana cultivation for both export and domestic consumption. It is a crucial economic crop for approximately 5 million Filipino farmers, providing food, livelihood, and financial security (Choo & Aziz, 2010). Furthermore, studies have identified that banana corms are rich in bioactive compounds and essential nutrients, including potassium and vitamins, offering potential health benefits (FAJRIH et al., 2021).

Abra Province, a captivating area in the Cordillera region, is known for its rich culture where agriculture remains the primary economic activity. Local farmers cultivate rice, corn, and fruit-bearing trees, including bananas. Supporting these local farmers is effective for preserving the environment and ensuring food security. Agriculture benefits society by providing food, habitat, employment, and raw materials, fostering robust economies through trade specifically, the development of food politics based on composite flour industries can strengthen local potential (Bantacut & Saptana, 2014).

Consumers and stakeholders in agriculture can benefit significantly from studies on banana corm flavors. Diversifying banana corm products can increase their appeal and add to the nutritional variety and potential health benefits. Investigating various flavors can also lead to the creation of novel culinary products, expanding market options for consumers (Kongstad & Giacalone, 2020).

Conducting this study on banana corm holds significant importance. Firstly, it delves into the cultural and culinary heritage of the Philippines, showcasing how an ordinary ingredient shapes the nation's food traditions. Secondly, it contributes to agricultural and nutritional understanding, exploring its potential as a sustainable and nutritious resource. Lastly, it provides insights into economic aspects, considering the role of banana corm in local markets.

Regarding agriculture, this research may help growers by offering information on high-value products made from banana corms. Expanding the applications of banana corms supports sustainable agricultural practices by utilizing leftovers that might otherwise be discarded (Mohapatra et al., 2010; Padam et al., 2014). Generating market demand for banana corm-derived products can offer farmers financial opportunities, creating a win-win situation that bridges consumer desires with agricultural sustainability.

METHOD

This study utilized a descriptive-experimental research design. The descriptive approach was employed to evaluate the level of acceptability of banana corm crackers across diverse flavor variations specifically Lagundi, pandan, and turmeric. This evaluation encompassed sensory qualities including appearance, aroma, texture, and flavor, as well as the assessment of packaging options such as plastic tubs, transparent pastry boxes, and metallic stand-up pouches. Consumer perception of packaging is critical, as innovations like stand-up pouches significantly influence purchasing decisions (Likoudis et al., 2016b).

Simultaneously, the experimental method was applied during the product development phase, specifically in the formulation and concentration of powdered banana corm, milk, and sugar to produce the crackers. The use of banana corm as a primary ingredient aligns with efforts to utilize under-utilized renewable food biomass (Padam et al., 2014). Furthermore, the incorporation of specific flavors like pandan is supported by its known volatile composition, which contributes distinct aroma profiles, while turmeric is recognized for its beneficial properties (Jiang, 1999).

Data collection was conducted using a sensory score sheet. The gathered data were then tabulated and analyzed using appropriate statistical tools to address the specific research problems raised in the study.

RESULTS AND DISCUSSION

This chapter presents the analysis and interpretation of the collected data, allowing the researchers to fully comprehend the findings and address the specific problems raised in the study. The results are systematically presented in both tabular and textual formats to provide a clear understanding of consumer preferences. Understanding these preferences is vital, as chemosensory learning and flavor perception significantly drive food intake and preference.

Problem 1: Level of Acceptability of Banana Corm Crackers in Different Flavors
This section evaluates the acceptability of banana corm crackers infused with three distinct flavors. The inclusion of these flavors aims to enhance the sensory experience and nutritional value of the product:

- a. Lagundi: Traditionally known for its therapeutic properties, Lagundi is often utilized as an effective remedy for respiratory ailments such as coughs and asthma.
- b. Pandan: This ingredient is widely appreciated in culinary applications for its unique aroma and taste profile, often described as grassy with hints of vanilla.
- c. Turmeric: Recognized globally for its health benefits, turmeric adds a distinct color and flavor, contributing to the product's functional appeal.

Table 1. Level of Acceptability of Banana Corm Crackers in Diverse Tastings in terms of Quality.

Quality	Flavors					
	Lagundi		Pandan		Turmeric	
	Mean	DR	Mean	DR	Mean	DR
Appearance	8.07	LVM	8.07	LVM	8.30	LVM
Aroma	7.97	LVM	8.10	LVM	8.07	LVM
Color	7.90	LVM	7.97	LVM	8.27	LVM
Texture	7.50	LVM	7.57	LM	7.40	LM
Flavor	7.27	LM	8.27	LVM	7.57	LVM
Total	7.74	LVM	7.99	LVM	7.92	LVM

Norm:

Hedonic Scale	Range	Descriptive Rating
9	8.5-9.0	Like extremely (LE)
8	7.5-8.49	Like very much (LVM)
7	6.5-7.49	Like moderately (LM)
6	5.5-6.49	Like slightly (LS)
5	4.5-5.49	Neither like nor dislike (NLD)
4	3.6-4.49	Dislike slightly (DS)
3	2.5-3.49	Dislike moderately (DM)
2	1.5-2.49	Dislike very much (DVM)

Based on the tabulated data, the respondents rated the qualities of Lagundi Banana Corm Crackers as “Like Very Much,” with an overall mean rating of 7.74. This indicates a high level of satisfaction with the Lagundi flavor. Specifically, the product's Appearance obtained the highest mean rating of 8.07 (“Like Very Much”). Conversely, the Flavor attribute garnered the lowest mean rating of 7.27 (“Like Moderately”). This lower rating may be attributed to the respondents' perception of the aroma; while Lagundi is widely recognized as an effective herbal remedy for respiratory issues, its distinct medicinal scent might not immediately appeal to all palates as a snack flavor (Corporation, 2022).

In the case of Pandan Banana Corm Crackers, the respondents also gave a “Like Very Much” rating, with an impressive overall mean of 7.99. This demonstrates strong satisfaction with the Pandan variation. Notably, Flavor received the highest mean rating of 8.27. Pandan possesses a unique profile described as floral, sweet, and slightly nutty, which appeals to a wide range of taste preferences (Wartenberg, 2020). The volatile

composition of pandan leaves contributes significantly to this distinctive aroma and taste (Jiang, 1999). However, the Texture of the Pandan variation received the lowest mean rating of 7.57 (“Like Moderately”). The respondents might have been unfamiliar with the integration of pandan into this cracker format. Texture is a critical sensory quality in snacks, and substitution of ingredients can significantly influence hardness and mouthfeel (Wang et al., 2012).

The results for Turmeric Banana Corm Crackers show that respondents rated the overall qualities as “Like Very Much,” with a mean of 7.92. Appearance obtained the highest mean rating of 8.30, likely due to Turmeric’s reputation as a spice known for its vibrant yellow color and health benefits. On the other hand, Texture garnered the lowest mean rating of 7.40 (“Like Moderately”). The negative perception could be attributed to a sensation of grittiness or roughness. Optimization of ingredients is often required to ensure that fibrous or powder-based inclusions do not negatively impact the sensory texture of crackers (Akonor et al., 2017).

Ultimately, comparing the qualities across diverse tastings, the Pandan Flavor achieved the highest overall acceptability with a mean rating of 7.99 (“Like Very Much”).

Table 2. Level of Acceptability of the Banana Corm Crackers in terms of Packaging.

Flavor	Packaging					
	Tub		Transparent pastry box		Metallic stand- up pouch	
	Mean	DR	Mean	DR	Mean	DR
Lagundi	7.40	LM	6.73	LM	8.37	LVM
Pandan	7.47	LM	6.87	LM	8.37	LVM
Turmeric	7.53	LVM	6.70	LM	8.50	LE

Norm:

Hedonic Scale	Range	Descriptive Rating
9	8.5-9.0	Like extremely (LE)
8	7.5-8.49	Like very much (LVM)
7	6.5-7.49	Like moderately (LM)
6	5.5-6.49	Like slightly (LS)
5	4.5-5.49	Neither like nor dislike (NLD)
4	3.6-4.49	Dislike slightly (DS)
3	2.5-3.49	Dislike moderately (DM)
2	1.5-2.49	Dislike very much (DVM)
1	1.0-1.49	Dislike extremely (DE)

The tabulated data indicates that the Metallic Stand-up Pouch was the most preferred packaging option among the three tested variables. This preference is evidenced by the high computed mean ratings: 8.37 for both Lagundi and Pandan

variants, corresponding to a “Like Very Much” description, and an impressive 8.50 for the Turmeric variant, described as “Like Extremely.”

Conversely, the Plastic Tub emerged as the second most favored option. It garnered mean ratings of 7.40 for Lagundi and 7.47 for Pandan (“Like Moderately”), while the Turmeric variant received a slightly higher rating of 7.53 (“Like Very Much”).

The Transparent Pastry Box was identified as the least preferred packaging format. The respondents assigned mean ratings of 6.73 for Lagundi, 6.87 for Pandan, and 6.60 for Turmeric. However, despite being the lowest ranked, these scores still fall within the “Like Moderately” descriptive category, indicating a baseline level of acceptance.

The distinct preference for the metallic pouch over the transparent options suggests that consumers value specific attributes of modern packaging. Research indicates that packaging innovations, particularly stand-up pouches, play a critical role in shaping consumer perception and acceptance, often outweighing traditional transparency in certain product categories.

Table 3a. ANOVA Summary Table on the Differences in the Total Mean Score Given by the Respondents as their Acceptability of the Banana Corm Crackers When Grouped According to Flavor.

Flavor	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Lagundi	7.74 ^a	0.688	3.101	0.505(p>0.05)	Not Significant
Pandan	7.99 ^a				
Turmeric	7.92 ^a				

Note: Means of the same letters are not significantly different from each other.

In general, there are no appreciable differences between the ratings given by the study’s participants for the acceptability of the banana corm crackers When Grouped According to Flavor. This was supported by the calculated F value (0.688), which was less than the F critical value (3.101) with an associated probability of 0.505(p>0.05), and as a result, the difference was determined to be insignificant.

Table 3b. ANOVA Summary table on the differences in the Appearance given by the respondents as their acceptability to the Appearance of Banana Corm Crackers when grouped according to flavor.

Flavor	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Lagundi	8.07 ^a	0.607	3.101	0.547(p>0.05)	Not Significant
Pandan	8.07 ^a				
Turmeric	8.30 ^a				

Note: Means of the same letters are not significantly different from each other.

It is shown in the table above that when it comes to appearance, the three flavors are on the same level; hence, the decision was not significant. This was proven by the computed F-ratio of 0.607, which was found to be lower than the critical value of 3.101 with an associated probability of 0.547 ($p > 0.05$). Therefore, there are no significant differences in the appearance of the Banana Corm Crackers in diverse tastings.

Despite the statistical similarity, the visual aspect remains a fundamental sensory attribute. Respondents view appearance as a reflection of the quality and freshness of ingredients, which directly influences expectations of flavor and nutritional value. Studies on snack development emphasize that substitution of ingredients, such as banana flour, significantly impacts color and visual texture, which are critical factors for consumer acceptance (Wang et al., 2012). Furthermore, chemosensory perception suggests that visual stimuli play a vital role in capturing attention and forming initial preferences before consumption (Blakeslee et al., 2012).

Observationally, the appearance of Turmeric, with a mean score of 8.30, is rated numerically higher than the appearance of Lagundi and Pandan (mean score of 8.07). This slight preference is likely due to several factors related to visual appeal. Turmeric's vibrant yellow color is visually striking and often associated with health and vitality, making it more appealing to consumers. Additionally, turmeric's widespread use in cooking contributes to its perceived appeal, as its color is often utilized as a natural dye in food, enhancing its visual desirability (Turmeric Benefits, 2022) (Srinivas et al., 2010).

Table 3c. ANOVA Summary table on the differences in the Aroma given by the respondents as their acceptability to the Aroma of Banana Corm Crackers when grouped according to flavor.

Flavor	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Lagundi	7.97 ^a	0.137	3.101	0.872($p > 0.05$)	Significant
Pandan	8.10 ^a				
Turmeric	8.07 ^a				

Note: Means of the same letters are not significantly different from each other.

Based on the table above, there are no significant differences between Lagundi, Pandan, and Turmeric variations. This is confirmed by the computed F-ratio of 0.137, which is lower than the critical value of 3.101 with an associated probability of 0.872 ($p > 0.05$). Therefore, the null hypothesis is accepted, indicating no significant statistical difference in terms of the aroma of the banana crackers across the different flavors.

Despite the statistical uniformity, aroma remains a critical determinant of food acceptance. Olfactory perception plays a vital role in consumer preference and intake, acting as a primary driver for flavor learning and sensory engagement (Prescott, 2012). A pleasant aroma can enhance the overall product experience by engaging multiple senses simultaneously, creating a deeper connection with the consumer.

Observationally, the difference in mean aroma scores among Pandan (8.10), Turmeric (8.07), and Lagundi (7.97) suggests that, on average, Pandan is rated numerically higher. This preference can be attributed to the specific volatile composition of pandan leaves, which are well-known for their distinctive, sweet, and floral fragrance often used to enhance dishes in Southeast Asia (Jiang, 1999). Additionally, pandan is frequently described as having a pleasant, grassy vanilla note that is generally appealing (Wartenberg, 2020).

In contrast, while Turmeric and Lagundi possess characteristic aromas, they may not be as universally appealing in a cracker format. Turmeric is recognized for its strong, earthy scent associated with its active components (LD, 2023). Similarly, Lagundi is traditionally utilized as a remedy for respiratory ailments (Corporation, 2022); this strong association with medicinal properties may impart a herbal scent that some consumers find less preferable compared to the culinary familiarity of pandan.

Table 3d. ANOVA Summary table on the differences in the Color given by the respondents as their acceptability to the Color of Banana Corm Crackers when grouped according to flavor.

Flavor	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Lagundi	7.90 ^a	1.065	3.101	0.349(p>0.05)	Not Significant
Pandan	7.97 ^a				
Turmeric	8.27 ^a				

Note: Means of the same letters are not significantly different from each other.

It is shown in the table above that when it comes to color, the three flavors are on the same level; hence, the decision was not significant. This was proven by the computed F-ratio of 1.065, which was found to be lower than the critical value of 3.101 with an associated probability of 0.349 ($p > 0.05$). Therefore, there are no significant differences in the color of the Banana Corm Crackers across the diverse tastings.

Although the statistical difference is negligible, maintaining superior product quality, particularly in visual attributes like color, remains essential as it influences consumer perception and market positioning. In the context of snack development, color is a critical quality parameter that is significantly affected by ingredient substitution, such as the use of banana flour, and directly impacts overall sensory acceptance (Wang, Zhang, & Mujumdar, 2012).

Regarding specific variations, Turmeric is particularly noted for its distinctive characteristics. While statistically similar to others in this study, Turmeric is renowned for its vibrant profile, often characterized by a bright yellow-orange hue and earthy notes with a subtle hint of bitterness (LD, 2023). This natural coloring can serve as a

visual cue for its flavor and functional benefits, reinforcing the product's appeal to health-conscious consumers.

Table 3e. ANOVA Summary table on the differences in the Texture given by the respondents as their acceptability to the Texture of Banana Corm Crackers when grouped according to flavor.

Flavor	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Lagundi	7.50 ^a	0.170	3.101	0.844(p>0.05)	Not Significant
Pandan	7.57 ^a				
Turmeric	7.40 ^a				

Note: Means of the same letters are not significantly different from each other.

Based on the table above, regarding texture, the three flavors are on the same level; hence, the decision was not significant. This was proven by the computed F-ratio of 0.170, which was found to be lower than the critical value of 3.101 with an associated probability of 0.844 ($p > 0.05$). Therefore, there are no significant differences in the texture of the banana corm crackers across the diverse tastings.

Despite the variations in flavoring agents used, the texture of the banana corm crackers remained consistent across the different profiles. The uniformity in the texture ratings implies that the incorporation of these specific flavors did not result in distinct textural differences that were discernible to the respondents during the evaluation process. This consistency is crucial, as texture is a key sensory attribute that significantly influences consumer acceptance of snack products, particularly those utilizing banana flour substitutes (Wang et al., 2012).

Furthermore, the interplay between texture and flavor is vital for overall product appreciation. While texture provides the physical structure, chemosensory learning suggests that the combination of texture and flavor perception drives preference and intake, influencing how consumers evaluate the quality of the food (Blakeslee et al., 2012).

Table 3f. ANOVA Summary table on the differences in the Flavor given by the respondents as their acceptability to the Flavor of Banana Corm Crackers when grouped according to flavor.

Flavor	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Lagundi	7.27 ^b	4.489	3.101	0.014(p<0.05)	Not Significant
Pandan	8.27 ^a				
Turmeric	7.57 ^{ab}				

Note: Means of the same letters are not significantly different from each other.

It can be seen from the table above that the computed F-value is 4.489, which is higher than the critical value of 3.101 with an associated probability of 0.014 ($p < 0.05$). Consequently, the decision indicates a significant difference in the flavor acceptability among the variations. For that reason, Pandan was the most favored flavor among the three.

Flavor is a pivotal attribute in food product development as it directly influences consumer satisfaction and market success. Research indicates that flavor perception is a primary determinant of food intake and preference, often outweighing other factors. According to Prescott (2012), chemosensory learning the association between flavor and post-ingestive consequences plays a significant role in driving consumer behavior and establishing food preferences.

In analyzing the significant differences observed, the higher mean flavor rating for Pandan (8.27) compared to Turmeric (7.57) and Lagundi (7.27) can be attributed to its unique and widely appreciated profile. Pandan is well-known for its sweet, floral, and aromatic qualities, often described as having a grassy vanilla note (Wartenberg, 2020). The volatile composition of pandan leaves contributes to this distinctive fragrance, which is a staple in Southeast Asian cuisine (Jiang, 1999). This cultural familiarity and positive sensory association likely led respondents to rate pandan-flavored crackers more favorably.

Conversely, the Turmeric variant received a lower mean rating (7.57). While functional, turmeric possesses a distinct flavor profile characterized by earthy notes and a hint of bitterness. This profile might be perceived as an acquired taste or "niche" compared to the universally pleasant sweetness of pandan.

Finally, the Lagundi flavor garnered the lowest mean rating (7.27). This lower acceptability likely stems from its strong medicinal association. Lagundi is widely recognized and utilized as an effective herbal remedy for coughs and asthma (Choo & Aziz, 2010). Because it is traditionally viewed as medicine rather than food, respondents might be less accustomed to its presence in a snack format, resulting in a polarizing or less universally appealing taste experience.

Table 4a. ANOVA Summary table on the differences in the Acceptability of the Lagundi Banana Corm Crackers when grouped according to Packaging.

Packing	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Tub	7.40 ^a	12.394	3.101	0.000($p < 0.01$)	Highly Significant
Transparent Pastry Box	6.73 ^a				
Metallic stand-up pouch	8.37 ^b				

Note: Means of the same letters are not significantly different from each other.

In the evaluation of Lagundi Banana Corm Crackers, respondents significantly preferred the Metallic Stand-up Pouch over the other two packaging options: the Plastic Tub and the Transparent Pastry Box. This preference was statistically confirmed by a computed F-ratio of 12.394, which exceeds the critical value of 3.101 with an associated probability of 0.000 ($p < 0.01$). Consequently, the decision is highly significant, indicating a distinct consumer preference for the metallic pouch format.

One of the primary functions of packaging is to protect the product from damage, contamination, and spoilage during storage, transportation, and handling. Packaging materials and design elements such as seals, barriers, and cushioning provide physical protection and help preserve the product's quality, freshness, and integrity until it reaches the consumer. The respondents' approval of the Metallic Stand-up Pouch can be attributed to its functional superiority. Stand-up pouches provide excellent barrier properties, protecting the product from moisture, oxygen, light, and other external contaminants that can degrade quality or reduce shelf life. The metallic layer in the pouches adds an extra level of protection, helping to maintain product freshness and integrity throughout storage and transportation.

The higher mean score of the metallic stand-up pouch compared to the tub and transparent pastry box can be explained by its premium material, functional design, and ability to evoke positive consumer perceptions. Research indicates that packaging innovation, particularly the use of stand-up pouches, significantly influences consumer perceptions of product quality and value. By leveraging these factors, brands can enhance the perceived value of their products and differentiate themselves in the competitive marketplace.

Table 4b. ANOVA Summary table on the differences in the Acceptability of the Pandan Banana Corm Crackers when grouped according to Packaging.

Packing	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Tub	7.47 ^a	13.788	3.101	0.000($p < 0.01$)	Highly Significant
Transparent Pastry Box	6.87 ^a				
Metallic stand-up pouch	8.37 ^b				

Note: Means of the same letters are not significantly different from each other.

In the evaluation of the Pandan Banana Corm Crackers, the respondents demonstrated a distinct preference for the Metallic Stand-up Pouch over the alternative packaging options, namely the Plastic Tub and the Transparent Pastry Box. This preference was statistically confirmed by a computed F-ratio of 13.788, which exceeds the critical value of 3.101 with an associated probability of 0.000 ($p < 0.01$).

Consequently, the decision indicates a highly significant difference in consumer acceptance across the packaging types.

Packaging serves as the primary interface between the product and the consumer, often dictating the initial purchasing decision. A well-designed package not only captures attention but also creates intrigue and sets the tone for the overall product experience. The respondents' preference for the Metallic Stand-up Pouch aligns with current trends in packaging innovation. Research indicates that stand-up pouches significantly influence consumer perceptions of product quality and value, often conveying a modern and innovative brand image that appeals to contemporary consumers (Jones & Green, 2020).

Furthermore, the preference for metallic pouches is likely driven by their superior functional benefits. In the context of snack food processing, packaging must provide durability and effective barriers against moisture, light, and external contaminants to preserve freshness (Lucas, 2001). The metallic layer in stand-up pouches offers enhanced protection compared to transparent boxes, ensuring that the crackers maintain their texture and aroma. The combination of aesthetic appeal, modern functionality, and enhanced product protection makes metallic stand-up pouches more favorable, as they effectively meet consumer expectations for quality and convenience (Jones & Green, 2020) (Wang et al., 2012).

Table 4c. ANOVA Summary table on the differences in the Acceptability of the Turmeric Banana Corm Crackers when grouped according to Packaging.

Packing	Mean	F - Computed Value	F- Critical Value	F - Probability Value	Decision
Tub	7.53 ^a	19.035	3.101	0.000(p<0.01)	Highly Significant
Transparent Pastry Box	6.70 ^b				
Metallic stand-up pouch	8.50 ^c				

Note: Means of the same letters are not significantly different from each other.

In the evaluation of the Turmeric Banana Corm Crackers, respondents demonstrated a distinct preference for the Metallic Stand-up Pouch over the alternative packaging options, namely the Plastic Tub and the Transparent Pastry Box. This preference was statistically confirmed by a computed F-ratio of 19.035, which is higher than the critical value of 3.101 with an associated probability of 0.000 ($p < 0.01$). Consequently, the decision indicates a highly significant difference in consumer acceptance across the packaging types.

Packaging serves as an essential component of a brand's identity and messaging, communicating values and positioning in the market. Beyond aesthetics, the primary

role of packaging in snack food processing is to ensure product quality by providing protection against environmental hazards such as moisture, light, and oxygen. The respondents' preference for the Metallic Stand-up Pouch can be attributed to these functional assurances. While tubes and transparent boxes serve basic packaging needs, they may not offer the same level of barrier protection and perceived safety as the metallic pouch format.

The specific preference for the Metallic Stand-up Pouch, with a mean score of 8.50, compared to the Transparent Pastry Box (6.70), highlights the impact of packaging innovation. Metallic stand-up pouches offer superior protection, helping to maintain freshness and prolong shelf life, which is a critical factor in snack food quality (Lucas, 2001). Additionally, their modern, sleek appearance and reflective surface make them aesthetically appealing. Research suggests that packaging innovations, such as stand-up pouches, significantly influence consumer perceptions of product value and quality, often acting as a visual cue for a premium product (Likoudis et al., 2016).

Collectively, the combination of functional benefits and aesthetic appeal explains the superior rating of the metallic pouch. Consumers perceive products in metallic packaging as having higher quality and better protection. Strategic packaging choices, such as adopting stand-up pouches, provide a competitive advantage by enhancing brand appeal and aligning with consumer expectations for convenience and modernity.

The food innovation of "Banana Corm Crackers in Diverse Tastings" demonstrates significant potential to influence various dimensions of social health, which is defined as the holistic well-being of a community, encompassing economic, environmental, nutritional, cultural, and psychological aspects. The utilization of banana corms, previously an agricultural waste product, into a value-added item bridges ecological sustainability with human welfare. This approach presents a compelling case study on how local product development can contribute to multidimensional social progress.

Economically, this product holds substantial potential for local community empowerment. Transforming agricultural waste into crackers can establish new income streams for farmers and residents, thereby enhancing the economic stability of households and villages. Furthermore, the entire production process, from raw material processing to marketing, generates employment opportunities, stimulates the growth of Micro, Small, and Medium Enterprises (MSMEs), and fosters a resilient and inclusive local economic ecosystem.

From nutritional and environmental perspectives, banana corm crackers contribute to food security and sustainability. Banana corms are rich in fiber and minerals, making their processing into a snack an alternative nutrient source that diversifies dietary intake. Simultaneously, the effective use of corms significantly reduces organic waste volume, promotes more sustainable agricultural practices, and exemplifies a "zero-waste" innovation essential for long-term ecosystem and community health.

The "diverse tastings" aspect of this product carries profound socio-cultural implications. The variety of flavors can both reflect and promote local culinary richness

while integrating traditional culture into modern products. This has the potential to strengthen communal cultural identity, cultivate collective pride, and act as a "social glue" that facilitates interaction and togetherness, especially since snacks are frequently consumed in social settings.

Collectively, these impacts accumulate to enhance overall social well-being, including psychological dimensions. Success in developing innovative products from previously underutilized materials can foster a sense of optimism, creativity, and collective self-esteem within the community. Thus, "Banana Corm Crackers in Diverse Tastings" is more than just a consumer product; it represents a model of local resource-based innovation that promotes social health through economic reinforcement, environmental sustainability, cultural enrichment, and social cohesion.

The innovation process of banana corm crackers involves a systematic transformation of underutilized agricultural biomass into a marketable food product through a combination of product development and consumer-based evaluation. Initially, banana corms are processed into a functional ingredient and formulated into crackers with controlled variations in composition, including flavor enhancements such as lagundi, pandan, and turmeric. This stage is followed by experimental refinement to optimize sensory attributes appearance, aroma, texture, and taste ensuring product consistency and acceptability. Subsequently, a descriptive-experimental approach is employed through sensory evaluation involving target consumers to assess preference levels across flavor variants and packaging types. Statistical analyses, including weighted mean and ANOVA, are utilized to identify significant differences in consumer acceptance, particularly highlighting the superiority of pandan flavor and metallic stand-up pouch packaging in enhancing market appeal. This integrative process reflects a user-centered innovation model that combines food technology, sensory science, and market-oriented design to produce a sustainable and competitive food product.

The innovation of banana corm crackers demonstrates significant societal benefits, particularly in strengthening local economic resilience and promoting sustainable resource utilization (Campagna, 2005). By transforming underutilized agricultural biomass into value-added food products, this innovation creates new income opportunities for farmers and supports the development of micro, small, and medium enterprises (MSMEs). The study indicates that product acceptability especially in terms of preferred flavor and packaging plays a crucial role in enhancing market competitiveness, thereby increasing the potential for commercialization and community-based entrepreneurship (Blakeslee et al., 2012). Consequently, this innovation contributes to inclusive economic growth while reducing dependency on conventional raw materials.

From a socio-environmental and nutritional perspective, banana corm crackers provide a dual contribution to food diversification and ecological sustainability (Bakti & Harahap, 2023). The utilization of banana corms not only reduces organic agricultural waste but also supports a "zero-waste" approach in food production systems (Likoudis

et al., 2016). Additionally, the product offers an alternative source of nutrients, contributing to dietary diversity and food security within local communities. Beyond its functional value, the integration of diverse flavors reflects cultural adaptation and enhances social cohesion through shared food practices, positioning the innovation as a multidimensional model that links sustainability, nutrition, and socio-cultural development.

CONSLUSION

Among the three flavors of Banana Corm Crackers Pandan Flavor was the most favored by the respondents with a mean rating of 7.99 that belongs to Like Very Much. The level of acceptability of qualities of the three Flavors of Banana Corm Crackers were all "Like Very Much" by the respondents. Metallic stand-up pouch is the most favorable by the respondents. There are significant differences among the level of acceptability of Banana Corm Crackers in Diverse Tastings when grouped according to flavor. There are no significant differences among the level of acceptability of Banana Corm Cracker in Diverse Tastings when grouped into qualities. It is highly significant among the level of acceptability of Banana Corm Crackers in Diverse Tastings when grouped according to packaging.

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