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Formulation and Acceptability of Banana Core and Bamboo Shoots Siomai: A Comprehensive Technology Package

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ABSTRACT

Background: This study explored the use of banana core and bamboo shoots as plant-based alternatives to pork in siomai, a popular steamed dumpling in the Philippines. These natural ingredients are high in fiber, potassium, calcium, and essential vitamins, making them suitable for health-conscious individuals and those with dietary restrictions. As the demand for sustainable, plant-based food increases, the study aimed to assess the sensory appeal and nutritional value of siomai using these vegetable substitutes. **Methods:** A Completely Randomized Design (CRD) was used to create five formulations for each variant, replacing pork with increasing amounts of banana core or bamboo shoots. 16 Faculty experts and 62 student evaluators assessed each treatment using a 9-point Hedonic Scale. Nutritional components such us moisture, ash, and crude protein were tested in a laboratory. Data were analyzed using Analysis of Variance (ANOVA) and Least Significant Difference (LSD) methods. **Results:** Findings revealed that the siomai containing 75% banana core and 25% pork (Treatment 3) received the highest scores in taste, texture, aroma, and overall acceptance. The 100% bamboo shoot formulation (Treatment 4) was most preferred for its appearance and aroma. Nutritional analysis showed that vegetable-enriched siomai had higher moisture and ash but lower protein content. **Conclusion:** In summary, banana core and bamboo shoots serve as viable pork replacements in siomai, offering nutritional value and sensory appeal while promoting plant-based, sustainable Filipino cuisine.

Keywords: Vegetable, Siomai, Bamboo Shoots, Banana Core, Pseudo stem

INTRODUCTION

A nutritious, plant-based substitute for classic meat-filled dumplings, siomai made with banana core and bamboo shoots can be eaten with a range of cuisines. Banana cores are high in potassium, fiber, and antioxidants, whereas bamboo shoots are high in calcium, magnesium, and vitamins A and C. This light appetizer of siomai, which is low in calories and fat, aids in weight management and digestion. It is naturally gluten-free, making it perfect for anyone following special diets.

The center of a banana can be consumed raw and is commonly used in Indian and Southeast Asian cuisine. The chunky, flaky texture of banana heart makes it a perfect alternative to fish. The Surapong Filipino word for steamed Chinese dumplings that are typically filled with pork and sometimes shrimp is siomai. It might be pronounced "siumai" (siu mai) or "shumai" (shu mai) by Americans and it is called "shaomai" in Mandarin. It adds flavor, lightness to any meal, and it is a great option for anyone trying to cut back on meat consumption without compromising flavor (Maisog et al. 2020).

Moreover, siomai is a popular snack or appetizer that is served during both informal dining experiences and special occasions. Made with ground pork, it is typically seasoned, wrapped in thin dumpling skins, and served with chile, calamansi, and soy sauce. It is a staple of Filipino culinary culture and is present in a variety of venues, including restaurants and street food vendors. In addition to reflecting the blending of Chinese and Filipino cuisines, the dish is a major part of the thriving street food scene, where many varieties are offered by sellers to suit local palates. The trend toward plant-based substitutes is increasing as customers' health consciousness grows (Lao, 2020).

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In fact, in the Philippine setting, the potential culinary applications of banana core are becoming more widely acknowledged, especially in view of the nation's expanding banana crop sector. Banana core, which was often thought to be waste, is now being investigated for its nutritional value and culinary variety. Both home cooks and chefs are starting to use banana core in several dishes, such as stir-fries, salads, and even as a filling for dumplings and siomai. Because of its distinctive mouthfeel and nutritional content, its fibrous texture appeals to consumers who are health conscious. In addition to improving the nutritional value of local recipes that use banana core, they also help to reduce waste in banana production, which promotes environmental sustainability. As more people become aware of its advantages, chefs are experimenting with banana core in novel ways and incorporating it into both contemporary and traditional Filipino meals (Araneta & Sison, 2021). Consequently, in the study of Leonor (2019), clients preferred siomai with 75% pork 63% of the time, whereas 25% preferred siomai with bamboo shoots and 37% preferred siomai with solely pork. While 63% of patrons believed that siomai was better without entire pork, 37% of patrons disliked the siomai's high pork content and bamboo shoot. Additionally, the nutritional information for bamboo shoot siomai is as follows: 136 Kcal/100g of energy, 1.37g of ash, 7.58g of crude protein, 3.0 g of total fat, 19.5 g of carbohydrates, and 68.5g of moisture. The siomai with 75% pork and 25% bamboo shoot was preferred by 63% of customers, whereas 37% of them selected the siomai with 100% pork.

Furthermore, the literature found only use of 75% pork and 25% bamboo shoots and 100% pork meat content. The researcher further investigated its acceptability and nutrient content using various composition. Furthermore, this study made use of the ingredients required for making siomai with young bamboo shoots, ground pork, eggs, molo wrappers, all-purpose flour, and additional seasonings (Leonor, 2019).

The study's main goal was to evaluate these two versions' sensory qualities, including taste, texture, aroma, appearance, and general acceptance. By doing this, the study aimed to ascertain whether siomai made from vegetables may be a tasty and feasible substitute for the classic form that is loaded with meat. This study was contemporary and important in evaluating consumer preferences and the possibility for vegetable-based alternatives in popular culinary techniques, given the increasing demand for more sustainable food options and a move toward plant-based diets.

METHODOLOGY

Research Design

This study utilized quantitative research approach using Completely Randomized Design (CRD) with five (5) treatments in each experiment as the most straightforward design for comparative studies which was appropriate in determining the acceptability of vegetable-based siomai. Furthermore, the experiment was laid out following a 2x2x5 factorial split-split-plot arrange in Completely Randomized Design (CRD) with three replications per treatment per block. The following treatments were evaluated: Main-plots: A1 = Banana Core Siomai and A2 = Bamboo Shoots Siomai; split-plots: Faculty (B1) and Student (B2): and split-split plots: T1 (75% Pork & 25% BC), T2 (50% Pork & 50% BC), T3(25% Pork & 75% BC), T4 (100% BC).

Table A. Experiment Set-up for Banana Core Siomai

The proportion of ingredients that were used in the experiment set-up for banana core siomai that included various ingredients and its quantity. There were five (5) treatments in the study of banana core siomai using 48 grams of eggs, 3 grams of powdered black pepper, 12 grams of sugar, 10 grams of salt, 3 grams of garlic powder, 120 grams of all-purpose flour, and 200 grams of molo wrapper as constant ingredients, while the quantity of ground pork meat and banana core wre different in each treatment. T0 (100% pork meat) had 250 grams of ground pork meat, T1 (75% pork meat, 25% banana core) had 187.5 grams of ground pork meat and 62.5 of banana core, T2 (50% pork meat, 50% banana core) had 125 grams of ground pork meat and 125 grams of banana core, T3 (25% pork meat, 75% banana core) had 62.5 grams of ground pork meat and 187.5 of banana core, and T4 (100% banana core) had 250 grams of banana core. Moreover, discusses the proportion of ingredients that were used in the experiment set-up for bamboo shoots siomai that included various ingredients and its quantity. There were five (5) treatments in the study of bamboo shoots siomai using 48 grams of eggs, 3 grams of powdered black pepper, 12 grams of sugar, 10 grams of salt, 3 grams of garlic

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powder, 120 grams of all-purpose flour, and 200 grams of molo wrapper as constant ingredients, while the quantity of ground pork meat and bamboo shoots were different in each treatment. T_0 (100% pork meat) had 250 grams of ground pork meat, T_1 (75% pork meat, 25% bamboo shoots) had 187.5 grams of ground pork meat and 62.5 of bamboo shoots, T_2 (50% pork meat, 50% bamboo shoots) had 125 grams of ground pork meat and 125 grams of bamboo shoots, T_3 (25% pork meat, 75% bamboo shoots) had 62.5 grams of ground pork meat and 187.5 of bamboo shoots, and T_4 (100% banana core) had 250 grams of bamboo shoots.

Research Environment

The study was carried out at Northwest Samar State University – San Jorge Campus, Home Economics Laboratory Area. The researcher prepared all the needed materials and ingredients in the laboratory area and the finished products were evaluated by the respondents. Moreover, Northwest Samar State University-San Jorge Campus had easy access to banana core and bamboo shoots because it is well-known as agricultural school, which included numerous amounts of bamboo and banana plants that were available in the locality. The community utilizes banana (its part like blossoms) and bamboo shoots as raw materials for different preparation of food dishes.

Research Instrumentation

The research instruments that were used in the study were the score card which was adapted from Quartermaster Corps. 9-point Hedonic Scale, originally developed at the U.S. Army Food and Container Institute, and the standard survey questionnaire for economic value from Kotler 2016. The nine-point hedonic scale was used to assess general acceptability of Banana Core and Bamboo Shoots Siomai.

Sampling Procedure

This study used probability sampling with the total enumeration sampling in which this technique used to determine whether vegetable-based siomai was acceptable or not by surveying every respondent. To guarantee that everyone would be included in the study, the Bachelor of Technology and Livelihood Education (BTLEd)-Home Economics with sixteen (16) faculty-experts and sixty-six (62) number of students from first year to fourth year with seventy-eight (78) total number of respondents participated in the study at the San Jorge Campus of Northwest Samar State University.

Furthermore, in carrying out this method, researcher asked everyone in the public to rate the vegetable-based siomai by distributing surveys or questionnaires. After that, the replies were gathered and examined to ascertain the general acceptability level. Even though total enumeration sampling provided thorough data, it could be resource- and time-intensive, particularly when working with larger populations. Notwithstanding these difficulties, the approach guaranteed that the findings represent the opinions of the whole community. Making well-informed decisions about marketing tactics and product enhancements required a rigorous approach to data collection.

Data Gathering Procedure

The first step in the data collection process was the controlled preparation of pork siomai and siomai made from banana core and bamboo shoots. In creating the best proportions of ingredients, several formulations as treatment were utilized for the vegetable-based siomai, including different proportions of banana core to bamboo shoots, adjusting the flavor, and using binding agents. Moreover, in providing a baseline for comparison, a consistent recipe was used to create the pork siomai. Sensory assessments were the main method of gathering data, expert faculty and Home Economics students used a Likert scale to rate each variety of siomai on characteristics like taste, texture, aroma, appearance, and general acceptability.

Additionally, a nutritional analysis was performed on each siomai sample to determine its nutritional properties. A varied sample of respondents was given acceptance surveys to gauge their preference for vegetable-based siomai over pork-based siomai. These assessments yielded numerical information regarding acceptability and the nutritional advantages of the vegetable-based substitute. Furthermore, in identifying the

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most palatable and nutritionally beneficial choice, statistical analysis, such as Analysis of Variance (ANOVA) was employed in comparing the sensory scores and nutritional content of the two varieties of siomai.

Statistical Treatment of Data

This study assured that an analysis of variance (ANOVA) was performed on all of the data that was obtained. The relevance of the several treatments taken together was assessed by comparing them using Least Significance Difference (LSD) at the $P<0.05$ threshold of significance using the Statistical Tool for Agricultural Research (STAR). Descriptive statistics were among the statistical methods employed in the study; they included frequency counts, percentages, and averages, which were calculated to analyze the quantitative data and give a summary of the responses for every siomai type. The acceptability of the pork siomai and the banana core and bamboo shoots siomai were compared using inferential statistical tests to see whether there were any notable variations.

Additionally, the analysis included different vegetable siomai formulations, and one-way ANOVA was used for more thorough comparisons. This enabled the researcher in determining whether the several groups under test differed significantly from one another.

Ethical Considerations

The researcher ensured that the data gathered and the information obtained were treated with the utmost confidentiality. Additionally, approval and permission from the involved individuals, institutions, management, and authorities were secured prior to the conduct of the study. Every respondent in the acceptability testing and sensory evaluation was aware of the study's objectives, and they asked for their consent before beginning. Also, to guarantee the privacy and rights of participants, ethical guidelines were adhered to.

Furthermore, the conduct of this study prioritized the maintenance of sanitary conditions in all aspects, ensuring that adequate cleanliness protocols were followed to prevent contamination. It strictly followed food safety requirements, which included the proper handling, preparation, and distribution of food samples for tasting. Allergy screening was an important element of the process, and it was performed on all participants before they participated in any food tasting, assuring their safety and wellbeing.

Lastly, first-aid support was easily available during the study, with fast assistance offered by the campus nurse as requested. Screening questions were included before participants begin the survey, assisting in identifying any health concerns or dangers in advance and ensuring that the entire study was carried out with the utmost care and attention for the participants' safety. The researcher also ensured that research ethics were observed throughout the study.

RESULTS AND DISCUSSION:

Proportion of Ingredients for Banana Core and Bamboo Shoots Siomai

The composition of a product for each of the five treatments (T_0 to T_4), with different amounts of ground pork meat and banana core. T_0 (Control) has 250g (38.70%) of ground pork meat that has not had the banana core added. The quantity of ground pork meat per treatment drops by 62.5g (9.68%) as the treatments move from T_1 to T_4, but the amount of banana core increases by the same amount. By T_4, all of the pork meat has been replaced by 250g (38.70%) of banana core. In all formulations, the following ingredients are the same: eggs (48g, 7.43%), sugar (12g, 1.86%), powdered black pepper (3g, 0.46%), salt (10g, 1.55%), and garlic powder (3g, 0.46%). For each treatment, 120g of all-purpose flour (18.58%) is used, probably as a thickening and binding agent. The Molo wrapper (200g, 30.96%) serves as the product's outer covering and is unaltered. To ensure comparability, each formulation's total weight is always 646g (100%).

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Proportion of Ingredients for Bamboo Shoots Siomai

The composition of a product across five treatments (T_0 to T_4) with different amounts of young bamboo shoots and ground pork meat. T_0 (Control) has no young bamboo shoots and 250g (38.70%) of ground pork meat. The quantity of ground pork meat per treatment drops by 62.5g (9.68%) as the treatments move from T_1 to T_4, but the quantity of young bamboo shoots increases by the same amount. By T_4, all of the pork meat has been replaced with 250g (38.70%) of young bamboo shoots. All formulations contain the same amount of other ingredients, such as eggs (48g, 7.43%), sugar (12g, 1.86%), powdered black pepper (3g, 0.46%), salt (10g, 1.55%), and garlic powder (3g, 0.46%). Each treatment contains 120g of all-purpose flour (18.58%), most likely as a binding agent. Every formulation uses the same Molo wrapper (200g, 30.96%) as an outer covering. Each formulation's total weight is always 646g (100%), guaranteeing comparability when assessing the impact of substituting young bamboo shoots.

General Acceptability of Banana Core and Bamboo Shoots Siomai

The general acceptability of Banana Core Siomai (BCS) and Bamboo Shoots Siomai (BSS) as well as the general acceptability in terms of taste, texture, aroma, and appearance.

Banana Core Siomai

The general acceptability of Banana Core Siomai (BCS) based on sensory attributes evaluated by faculty-experts and students. Treatment T3 consistently received the highest ratings in taste, texture, aroma, appearance, and overall mean, indicating its strong potential as the most preferred and commercially viable formulation among the tested treatments.

The general acceptability of Banana Core Siomai as evaluated by faculty-experts and students based on five sensory attributes: taste, texture, aroma, appearance, and overall mean. Each group assessed five different formulations or treatments labeled T0 to T4. Among faculty-experts, Treatment T3 emerged as the most highly rated in four out of five categories. It recorded the highest scores in taste (7.94), texture (7.94), aroma (7.88), and the overall mean (7.89). Meanwhile, Treatment T4 scored the highest in appearance (7.94), slightly surpassing T3's 7.81. These findings indicate that faculty-experts found T3 to be the most consistently acceptable variant across multiple sensory dimensions. Moreover, from the students' evaluations, Treatment T3 also received the highest scores across all five categories, with particularly impressive ratings in appearance (8.31) and overall mean (8.19). Additionally, T3 led in taste (8.21), texture (8.03), and aroma (8.21), showing a strong and unanimous preference among the student respondents.

In summary, the comprehensive data analysis shows that Treatment T3 is the most favored Banana Core Siomai formulation overall. Its consistently high scores from both faculty-experts and students, especially in taste, aroma, and appearance, make it the most acceptable and potentially the most marketable version among the tested treatments.

Bamboo Shoots Siomai (BSS)

The evaluation presented in Figure 2 highlights the general acceptability of Bamboo Shoots Siomai, demonstrating that both faculty experts and students responded positively overall, with Treatment T4 emerging as the most preferred variant across key sensory attributes including taste, texture, appearance, and aroma—particularly excelling in visual appeal and palatability, which significantly contributed to its high overall acceptability.

The evaluation of the General Acceptability of Bamboo Shoots Siomai, revealing that both Faculty-Experts and Students showed a generally positive response across all treatments. Among the faculty, Treatment T4 emerged as the most favorable in terms of aroma (7.81), appearance (7.88), and overall mean (7.75), while T0 and T2 were noted for having the highest taste (7.88). For the students, T4 consistently ranked the highest across almost all categories including taste (8.16), texture (8.02), appearance (8.27), and overall mean (8.11), indicating it was the most preferred variant. The results suggest that Treatment T4 was the most generally acceptable formulation of Bamboo Shoots Siomai, particularly excelling in visual appeal and palatability,

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which strongly influenced its high overall acceptability score. This implies that the specific preparation method or ingredient balance in T4 could serve as the most promising for broader consumer satisfaction.

Summary of results for the general acceptability of banana core and bamboo shoots siomai

The summary of results for the general acceptability of Banana Core Siomai, indicating that Treatment 3 was consistently the most preferred by both faculty-experts and students in terms of taste, texture, aroma, and overall acceptability. While Treatment 4 stood out among faculty in appearance, students still favored Treatment 3 in this attribute. These findings suggest that Treatment 3 offered a well-balanced combination of sensory qualities, making it the most generally accepted formulation across both respondent groups.

The summary of results for the general acceptability of Bamboo Shoots Siomai, revealing that Treatment 4 was the most preferred by both faculty-experts and students, especially in terms of texture, aroma, appearance, and overall acceptability. While faculty-experts rated Treatments 0 and 2 equally highest in taste, students favored Treatment 4 for taste as well. This strong and consistent preference across multiple sensory attributes highlights Treatment 4 as the most favorable and well-accepted formulation, making it a promising option for wider consumer acceptance.

Nutritional Properties of Banana Core and Bamboo Shoots Siomai

The data on nutritional properties of Banana Core Siomai (BCS), showing variation in both moisture and ash content across four sample types (T1 to T4), each measured in three repetitions. The moisture content ranges from 50.46% to 64.76%, with the highest moisture content observed in T4 (ranging from 63.87% to 64.76%) and the lowest in T1 (ranging from 50.46% to 52.16%). These moisture levels reflect the water retention properties of the ingredients in the Siomai, and the observed increase in moisture content from T1 to T4 could indicate the incorporation of more water-binding or moisture-rich components in the later samples. Generally, a higher moisture content is often associated with improved texture and mouthfeel in food products. The ash content, which indicates the mineral content of the sample, ranges from 1.42% to 1.99%. T1 shows the lowest ash content (1.42% to 1.53%), while T4 exhibits the highest ash content (1.94% to 1.99%).

Furthermore, this suggests that as moisture increases in the sample, the ash content also increases slightly, possibly due to the higher mineral composition of the ingredients used. Such results are consistent with other plant-based food products, where variations in moisture and mineral content are common. For example, a recent study by Poyato et al. (2023) on plant-based meat analogs found similar trends, where foods with higher moisture content often had slightly elevated ash levels due to their mineral-rich components, such as plant-based fibers and proteins. Based on the values for moisture and ash content, the Banana Core Siomai seems nutritionally balanced and consistent with other similar products, making it a viable option for consumers seeking a plant-based food item that offers moderate moisture retention and a balanced mineral profile.

The analysis of nutritional characteristics of Bamboo Shoots Siomai (BSS), providing an in-depth look at the moisture and ash quantities in four distinct samples (T1 to T4), each tested three times. The moisture levels in these samples vary from 50.74% to 68.74%, with T4 having the highest moisture content (between 65.34% and 68.74%) and T1 the lowest (ranging from 50.74% to 52.20%). This gradual increase in moisture from T1 to T4 may be attributed to a greater inclusion of bamboo shoots in the latter samples, as bamboo shoots inherently possess a high-water content. The elevated moisture levels in T4 are likely to enhance the softness and mouthfeel, traits that are standard for Siomai and comparable products. These observations align with the general concept that increased moisture can improve the sensory attributes of food, particularly in steamed or dumpling-style items. Regarding ash content, which indicates the mineral composition of the samples, the values range from 1.60% to 1.89%. T1 presents the lowest ash content (1.60% to 1.63%), while T3 and T4 reflect the highest ash contents (1.85% to 1.89%). The rise in ash content alongside higher moisture levels implies that the samples with more moisture (specifically T3 and T4) may possess larger quantities of minerals. Bamboo shoots are recognized for their richness in vital minerals like potassium, calcium, and magnesium, which likely contribute to the increased ash content found in these samples. This pattern is consistent with a recent study conducted by Pandey et al. (2022), which emphasized the substantial mineral

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composition of bamboo shoots, notably in calcium and potassium, positioning them as a valuable component in food products aimed at fulfilling nutritional demands.

In summary, the findings indicate that Bamboo Shoots Siomai is a nutritionally balanced item with moderate levels of moisture and minerals. The trend of rising moisture and ash content from T1 to T4 suggests a change in formulation that may enhance the nutritional quality of the Siomai, converting it into a more mineral-rich, hydrating, and flavorful food option. Considering the nutritional advantages linked to bamboo shoots, BSS could serve as a healthy and nutritious choice for consumers seeking plant-based, mineral-enriched foods.

The crude protein content of both Banana Core and Bamboo Shoots Siomai formulations, showing variation across different treatments, but generally, the values fall within a normal range for plant-based protein content. Banana Core Siomai, for instance, starts with a higher protein percentage of 7.93% in T1, but this decreases in subsequent treatments to 4.08% in T3. Bamboo Shoots Siomai also demonstrates a decline in protein content, starting at 5.47% in T1 and dropping to 3.15% in T3. This decline in protein content over different formulations is typical in food products that are plant-based and undergo variations in preparation methods. A study by Gomez et al. (2018) also observed similar variations in protein content in plant-based food products, highlighting the influence of processing on nutrient levels. Therefore, the observed fluctuations in protein content in these Siomai formulations are not abnormal and can be attributed to ingredient proportions and processing conditions.

The results align with similar plant-based dumpling innovations globally. In China, vegetarian siu mai made with tofu and mushrooms are popular for their umami taste (Zhang et al., 2021). Korean mandu with tofu and sprouts are valued for their texture and nutrition (Kim & Lee, 2019). Western vegan dumplings using lentils and jackfruit are also well-received (Patel & Green, 2022). Likewise, banana core and bamboo shoots siomai present a distinct Filipino alternative that supports global trends in sustainable, plant-based eating.

Limitations:

This study was limited to sensory evaluation and basic nutritional analysis (moisture, ash, and crude protein) of siomai formulations using banana core and bamboo shoots. The sample size, while representative of the university context, may not fully reflect broader consumer preferences. Moreover, the study did not assess other essential nutritional components such as fat, fiber, or micronutrients, nor did it evaluate the products' shelf life or cost-effectiveness. Future research should include more diverse respondents, extended nutritional profiling, and market feasibility studies to better understand the scalability of these plant-based alternatives.

CONCLUSIONS:

The following conclusions were drawn in the study:

1. Both the Banana Core and Bamboo Shoots Siomai formulations followed a similar approach, gradually substituting ground pork with banana core or bamboo shoots across five treatments. However, Treatment 3 (75% banana core and 25% pork) received the highest acceptability rating for Banana Core Siomai, while Treatment 4 (100% bamboo shoots) was rated highest for Bamboo Shoots Siomai.

2. The sensory evaluation results revealed distinct preferences between the Banana Core and Bamboo Shoots Siomai formulations. Treatment 3 of the Banana Core Siomai was the most favored by both faculty experts and students across all sensory attributes, while Treatment 4 of the Bamboo Shoots Siomai consistently ranked the highest, particularly in texture, aroma, appearance, and overall acceptability demonstrating strong consumer appeal.

3. The evaluation of both Banana Core and Bamboo Shoots Siomai revealed high levels of acceptability across all sensory attributes. The students consistently rated the products more favorably than faculty-experts, especially in terms of taste and appearance. Therefore, Treatment 3 for Banana Core and Treatment 4 for Bamboo Shoots emerged as the most preferred formulations.

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4. Furthermore, Treatment 4 of both Banana Core and Bamboo Shoots Siomai showed the highest moisture and ash content, suggesting that moisture-rich ingredients like bamboo shoots enhance texture and mineral value. Crude protein decreased across treatments, a typical trend in plant-based foods. While pork siomai remains preferred, growing interest in vegetable-based options highlights market potential for healthier, sustainable, and widely available plant-based siomai.

5. The study revealed significant differences in taste, texture, aroma, and appearance among siomai made with banana core, bamboo shoots, and pork. The students favored siomai with higher vegetable content particularly banana core for both taste and texture, while faculty members preferred the traditional pork variant. Texture improved with increased amounts of banana core. Although aroma and appearance were not significantly affected by the ingredients, students consistently gave higher ratings for appearance.

Future Research Directions:

To enhance the potential of banana core and bamboo shoots as plant-based substitutes in siomai, further research is encouraged to examine their shelf life and stability under different storage conditions to ensure consistent quality and safety. Market testing involving a wider range of consumer groups and geographic areas may offer deeper insights into acceptance and commercial appeal. Moreover, evaluating the cost-effectiveness of large-scale production can help determine its practicality, particularly for communities interested in sustainable food-based enterprises.

Declarations:

Ethics approval and consent to participate (Not Applicable)

Consent for publication (Not Applicable)

Availability of data and materials (Not Applicable)

Competing interests (Not Applicable)

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The author is a 27-year-old professional from Brgy. San Miguel, Gandara, Samar, known for his strong commitment to education, personal growth, and community service. A Magna Cum Laude graduate of Northwest Samar State University–San Jorge Campus, he holds a degree in Technology and Livelihood Education and a Master's in Education from Samar State University. With experience in both teaching and youth leadership, he continues to inspire through service, scholarship, and dedication.

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