

**Development and sensory acceptability of Banana Blossom (*Musa spp.*)
as a Sustainable Taco Filling**

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ABSTRACT

The growing demand for sustainable and plant-based food alternatives has encouraged the exploration of locally available ingredients that can replace traditional meat products. However, limited studies have examined the potential of banana blossom (*Musa spp.*) as a primary ingredient in innovative food preparations such as taco fillings. This study aimed to develop and evaluate the acceptability of banana blossom (*Musa spp.*) as a filling in tacos. Using an experimental-descriptive research design, four treatments with varying proportions of banana blossom and ground beef were formulated and assessed by 37 respondents. Sensory evaluation results revealed that all treatments were acceptable, with the 50% banana blossom and 50% beef formulation rated highest in appearance, aroma, taste, and texture. Statistical analysis using ANOVA indicated significant differences in acceptability across age groups. The product was found to be marketable due to its affordability, nutritional value, and availability of raw materials. Shelf-life testing showed that the taco filling remained acceptable for up to three days at room temperature and five days under refrigeration. The study concludes that banana blossom is a viable, nutritious, and sustainable meat alternative. It is recommended that food producers and entrepreneurs promote its wider use in healthy, plant-based innovations.

Keywords: banana blossom, sensory evaluation, food innovation, product development, marketability

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INTRODUCTION

Bananas (*Musa spp.*) are among the most economically significant fruits in the Philippines, contributing greatly to agricultural productivity and rural livelihoods. Beyond the fruit itself, the banana plant yields other valuable components, such as the banana blossom or “banana heart,” which has been recognized for its rich nutritional and medicinal properties. The banana blossom is rich in dietary fiber, antioxidants, flavonoids, and essential minerals, including potassium, calcium, and iron. Studies have shown that it can help reduce cholesterol, enhance digestion, and prevent oxidative stress and inflammation (Sheng et al., 2011; Sowmya, 2022). Despite these benefits, the banana blossom remains underutilized in many Filipino households and is often prepared only as a salad, stew, or mixed vegetable dish.

In the context of increasing global demand for plant-based alternatives, the banana blossom presents a promising substitute for meat due to its fibrous texture and capacity to absorb flavor during cooking. With heightened awareness of health and sustainability, consumers are seeking nutritious and affordable options that align with environmentally responsible consumption patterns. Food researchers and entrepreneurs are therefore challenged to develop innovative recipes that are both locally sourced and health-conscious. Utilizing banana blossom in food products contributes to food security and sustainability while reducing dependence on imported meat products.

Tacos, a popular Mexican dish consisting of tortillas filled with various ingredients, are now widely enjoyed in the Philippines as convenient street food. However, the traditional meat-based taco can be costly and less sustainable. Substituting banana blossom for meat in taco fillings can provide consumers with a healthier and more affordable option while promoting the use of indigenous agricultural products. Moreover, this initiative can offer livelihood opportunities to banana growers and local food producers by increasing the demand for banana by-products, which are often discarded after harvesting.

Previous research, such as Salvador’s (2012) study on the consumer acceptability of banana blossom sisig, revealed that the banana blossom can be an appealing ingredient when properly prepared and seasoned. Similarly, Sheng et al. (2011) confirmed the antioxidant potential of banana flowers, while Sowmya (2022) highlighted their rich mineral and vitamin content that supports overall wellness. These findings underscore the feasibility of developing banana blossom-based food products that are both nutritious and palatable. However, limited studies have explored its application in snack-type or fast-food dishes like tacos, creating a need for further exploration in this area.

Thus, this study titled *Development and Acceptability of Banana Blossom as Filling in Taco* aims to develop and evaluate the product’s sensory acceptability, specifically its appearance, aroma, taste, and texture, across varying treatment proportions. It also assesses the general acceptability, marketability, and shelf-life of the product. The findings of this research are expected to benefit consumers seeking healthier and affordable food options, entrepreneurs interested in innovative food products, and farmers who can gain additional income by supplying banana blossoms. Overall, this study contributes to the growing movement toward sustainable food innovation and highlights the potential of banana blossom as a valuable, nutrient-rich, and locally sourced ingredient.

Statement of the problem

This study aimed to determine the level of acceptability of banana blossom (*Musa spp.*) as a filling in tacos. Specifically, it sought to evaluate whether consumers would accept the product as a substitute for the traditional meat-based filling in terms of its sensory qualities—appearance, aroma, taste, and texture. The study further examined the product's general acceptability, marketability, and shelf-life under various treatment conditions. Specifically, the study sought to answer the following questions:

1. What are the processes involved in the preparation of banana blossom tacos using four different treatments?
2. What is the level of acceptability of banana blossom as a taco filling using four treatments with different proportions in terms of appearance, aroma, taste, and texture?
3. What is the level of general acceptability of banana blossom as a taco filling using the four treatments in terms of appearance, aroma, taste, and texture?
4. Is there a significant difference in the level of acceptability of banana blossom as a taco filling using the four treatments as evaluated by respondents across different age groups?
5. What is the level of marketability of banana blossom as a taco filling using the four treatments with different proportions in terms of consumer demand, availability of materials, and production cost?
6. What is the shelf-life of banana blossom as a taco filling in terms of storage temperature and number of days?

METHODOLOGY

This study employed an experimental–descriptive research design to develop and evaluate the acceptability of banana blossom (*Musa spp.*) as a filling in tacos. The experimental component focused on formulating various treatment combinations of banana blossom and ground beef to determine the most acceptable mixture based on sensory qualities such as appearance, aroma, taste, and texture. Meanwhile, the descriptive aspect aimed to gather evaluative data from respondents using a structured questionnaire to measure the product's level of acceptability, general acceptability, and marketability. The data collected were subjected to statistical analysis to determine consumer preferences and identify significant differences among treatments.

A total of thirty-seven respondents participated in the study. They were purposively selected based on their availability and familiarity with taco products, ensuring that the evaluation would reflect informed consumer perceptions. The respondents were classified according to age, with three aged 23 years and above, thirty-three aged 21 to 22 years, and one aged 19 to 20 years. Each respondent assessed the sensory attributes of the product using a standardized evaluation form designed for food testing.

The experiment and evaluation were conducted at Isabela State University, City of Ilagan Campus, in Isabela, Philippines. The institution was chosen as the research locale because it provided access to appropriate kitchen facilities and a population familiar with food innovation and product evaluation. The site also offered a controlled environment for preparing and testing the product under consistent conditions.

Product development followed a systematic food preparation process to ensure uniformity and quality. The main ingredient, banana blossom, was cleaned, boiled for three to five minutes, drained, minced, and sautéed with garlic, onion, soy sauce, seasoning, and salt until fully cooked. The filling was then combined with other taco ingredients—such as cabbage, tomatoes, onions, mayonnaise, and cheese—and assembled inside taco shells. Four treatments were formulated by varying the proportions of banana blossom and ground beef: Treatment 1 (25% banana blossom and 75% ground beef), Treatment 2 (50% banana blossom and 50% ground beef), Treatment 3 (75% banana blossom and 25% ground beef), and Treatment 4 (100% banana blossom without meat). All treatments underwent the same preparation and cooking procedure to ensure comparability in sensory evaluation.

Data collection utilized a structured questionnaire checklist composed of three sections: level of acceptability, general acceptability, and marketability. The instrument evaluated appearance, aroma, taste, and texture for sensory quality; overall product acceptance; and market potential based on consumer demand, material availability, and production cost. Respondents rated each criterion using a five-point Likert scale, ranging from “Highly Acceptable/Highly Marketable” (5.00–4.50) to “Not Acceptable/Not Marketable” (1.49–1.00). This scale allowed for a clear interpretation of consumer perceptions and facilitated comparative analysis across treatments.

During data gathering, respondents were briefed on the evaluation process and instructed to taste all four treatments in succession. Each participant rated the samples immediately after tasting to maintain consistency and minimize bias. All responses were collected, encoded, and statistically analyzed using the Statistical Package for the Social Sciences (SPSS). The weighted mean was used to determine the overall level of acceptability, general acceptability, and marketability, while a one-way analysis of variance (ANOVA) tested for significant differences among the treatments and across respondent age groups.

The shelf-life of the banana blossom taco filling was evaluated by storing samples at a refrigeration temperature of 4°C (40°F) and observing changes in sensory attributes over a five-day period. Parameters such as appearance, aroma, taste, and texture were monitored daily, with additional samples stored at room temperature for comparison. The findings provided insights into storage stability and guided recommendations for safe handling and consumption duration.

Ethical considerations were strictly observed throughout the conduct of the study. Prior to participation, the objectives of the research were explained to all respondents, and informed consent was obtained. Participants were assured of confidentiality, and their responses were used exclusively for academic purposes. Food preparation adhered to sanitation and safety protocols to ensure the health and well-being of the evaluators, as well as the quality and safety of the taco fillings produced.

RESULTS AND DISCUSSION

A total of thirty-seven respondents participated in the evaluation of the banana blossom (*Musa spp.*) taco fillings. As described in the methodology, the respondents were purposively chosen for their familiarity with taco products and were grouped according to age, ensuring a diverse evaluation base. Four different treatments were formulated by varying the proportions of banana blossom and ground beef—25:75, 50:50, 75:25, and 100:0—and each sample was assessed in terms of appearance, aroma, taste, texture, general acceptability, marketability, and shelf-life.

Data were collected through a standardized sensory evaluation form and statistically analyzed using the weighted mean and one-way ANOVA to determine the differences in acceptability across treatments and age groups.

Processes involved in the preparation of banana blossom tacos

The development of banana blossom as a taco filling followed a systematic and standardized process designed to ensure consistency across treatments. The procedure began with ingredient preparation, where banana blossoms were carefully cleaned, boiled for three to five minutes, drained, and finely minced to achieve a meat-like texture. The minced blossoms were then sautéed with garlic, onion, soy sauce, seasoning, and a small amount of water to enhance flavor and aroma. After cooking, the mixture was combined with fresh vegetables such as cabbage, tomatoes, onions, mayonnaise, and cheese, and assembled into taco shells. This meticulous process maintained the desired sensory attributes of the product while showcasing the versatility of banana blossom as an alternative ingredient. Its fibrous texture and ability to absorb flavors allowed it to mimic meat characteristics effectively, while its nutritional content made it a healthier option for consumers seeking plant-based alternatives.

Level of acceptability of banana blossom as taco filling

Findings indicated that all four treatments of banana blossom tacos achieved an overall rating of “acceptable” among respondents, confirming the product’s sensory appeal. Treatment 2, composed of an equal ratio of 50% banana blossom and 50% ground beef, garnered the highest mean scores in appearance, aroma, taste, and texture. This balance between the plant-based ingredient and meat yielded the most favorable results in terms of sensory satisfaction. Treatments 1, 3, and 4, although slightly lower in ratings, were still deemed acceptable, highlighting that even a 100% banana blossom mixture can be palatable and well-received. Respondents emphasized the pleasant aroma, moist texture, and distinct flavor that differentiated the product from traditional tacos. These results affirm the findings of Lawless and Heymann (2010), which suggest that consumers tend to appreciate food innovations that maintain familiar sensory attributes while introducing new, health-conscious components.

Level of general acceptability of banana blossom tacos

In assessing the general acceptability of the banana blossom tacos, the results similarly revealed favorable evaluations across all treatments. Treatment 2 once again emerged as the most preferred variant, particularly for its balanced flavor and pleasing color. Respondents remarked that the equal blend of banana blossom and beef produced a harmonious combination—retaining the savory profile of meat while adding a subtle earthy undertone from the blossom. Treatment 4, which contained only banana blossom, was described as more organic and natural-tasting but less flavorful compared to the blended variants. The findings underscore that partial substitution of meat with banana blossom can maintain sensory appeal while reducing cost and enhancing nutritional value. This supports the notion that consumers are open to accepting alternative

ingredients when properly proportioned and seasoned, affirming the potential of banana blossom as a viable component in familiar food products.

Significant differences in acceptability across age groups

Statistical analysis using one-way ANOVA revealed a significant difference in the level of acceptability across age groups. Respondents aged 21–22 and those 23 years and above demonstrated higher appreciation of the product compared to younger participants. This variation suggests that older consumers may have more developed taste discernment or a greater openness to plant-based food innovations. The results also indicate that perceptions of taste and texture may be influenced by maturity and dietary experience. Nonetheless, all age groups rated the banana blossom taco fillings as acceptable, highlighting the product's broad appeal across demographic segments. These findings align with the observations of Guinard and Mazzucchelli (1996), who reported that demographic characteristics significantly influence consumer perception and product acceptance.

Level of marketability of banana blossom tacos

The analysis of marketability showed that the banana blossom taco fillings were rated as “marketable” in all four treatments. Respondents recognized the product's health benefits, affordability, and appealing aroma as major factors contributing to its commercial potential. The availability and low cost of banana blossoms—commonly found in local markets—make the product economically feasible and sustainable for continuous production. Additionally, the preparation process is simple and requires no advanced equipment, which could encourage small-scale food entrepreneurs to adopt the innovation. These results reinforce the economic advantage of banana-based products, as emphasized by Horwood (2006), who found that banana-derived goods significantly improve local livelihoods due to the crop's abundance and affordability. Thus, the banana blossom taco presents itself as an accessible, nutritious, and low-cost food innovation suitable for local and commercial markets alike.

Shelf-life of banana blossom taco filling

The shelf-life evaluation indicated that the banana blossom taco filling remained safe and acceptable for consumption for up to three days at room temperature and up to five days when stored under refrigeration at 4°C (40°F). Within this duration, only minimal changes in appearance, aroma, and texture were observed, suggesting good short-term stability. However, noticeable deterioration in quality occurred beyond the third day at room temperature, primarily due to moisture retention and enzymatic activity. These findings highlight the importance of proper refrigeration to preserve the product's freshness and safety. This observation aligns with the general food preservation principles outlined by Jay et al. (2005), which state that plant-based cooked foods are prone to spoilage due to high moisture content unless stored under low temperatures. Therefore, maintaining appropriate storage conditions is essential to ensure the product's quality and extend its shelf-life.

Overall, the study demonstrated that banana blossom is a viable and acceptable alternative filling for tacos. The results affirmed that the product achieved high levels of sensory acceptability, strong market potential, and reasonable shelf stability. Among all treatments, the 50:50 ratio of banana blossom and ground beef (Treatment 2) was found to provide the most balanced and appealing sensory experience. These findings underscore the potential of banana blossom as a nutritious, sustainable, and cost-effective ingredient that can promote healthier dietary options while supporting local agricultural production and small-scale food innovation in the Philippines.

CONCLUSION

The findings of this study confirm that banana blossom (*Musa* spp.) can serve as an effective and acceptable alternative filling for tacos, offering both nutritional and economic advantages. Across the four treatments tested, all formulations were found to be acceptable, with the 50% banana blossom and 50% ground beef combination (Treatment 2) receiving the highest sensory ratings in terms of appearance, aroma, taste, and texture. This suggests that a balanced mixture of banana blossom and meat yields a product that closely aligns with consumer preferences while maintaining the health and sustainability benefits of plant-based ingredients. The results also revealed that acceptability varied significantly across age groups, indicating that taste familiarity and dietary openness may influence consumer evaluation of innovative food products. Nevertheless, all age groups generally regarded the banana blossom tacos as palatable and marketable.

In terms of market potential, the study established that the banana blossom taco filling is both nutritious and economically viable. Respondents agreed that the product's affordability, nutritional value, and accessibility of materials make it a promising enterprise for small-scale food producers. Banana blossoms are locally abundant and inexpensive, which reduces production costs while promoting the utilization of agricultural by-products. The product's marketability rating of "marketable" further supports its potential for commercialization and integration into the local food industry. Regarding shelf-life, the taco filling was found to be safe and acceptable for consumption for up to three days at room temperature and up to five days when refrigerated at 4°C, highlighting the importance of proper storage to maintain product quality and safety.

Based on these findings, it is recommended that food technologists, entrepreneurs, and educators consider incorporating banana blossom into more commercial and instructional food applications to promote healthy, sustainable, and locally sourced alternatives to meat. Small-scale enterprises may explore the production of banana blossom tacos as a viable livelihood opportunity, while local farmers can benefit from the increased demand for banana blossoms as a marketable crop by-product. To further enhance product appeal, researchers may experiment with flavor enhancements, seasoning variations, or packaging innovations to extend shelf life and broaden consumer acceptance. Future studies may also investigate the nutritional composition, microbial stability, and consumer behavior toward plant-based taco products to provide a stronger empirical basis for scaling up production.

In conclusion, the study demonstrates that banana blossom tacos are not only acceptable and marketable but also a sustainable food innovation. By transforming a readily available local ingredient into a nutritious, affordable, and appealing dish, this research supports the growing

movement toward the development of plant-based foods and the empowerment of rural livelihoods. It underscores the potential of indigenous resources to meet modern food demands while promoting health, sustainability, and local economic growth.

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