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RESEARCH ARTICLE OPEN ACCESS

ENHANCING THE NUTRITIONAL PROFILE OF NOODLES USING BANANA BLOSSOM AS SUBSTITUTION TO NORMAL NOODLES: A FOOD SYSTEM APPROACH

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ABSTRACT

The banana bloom was employed in the creation of a pasta dish in the present study. Pasta was a highly desired delicacy that people liked consuming, and Filipinos had also incorporated pasta dishes into their celebrations of significant occasions, such as birthdays. Utilizing banana blossom as the primary component in the noodles could potentially provide health benefits associated with fortified noodles, emphasizing its positive impact on the well-being of the customer. The study's findings on the advantages of incorporating banana blossom into noodles constituted a noteworthy addition to the disciplines of nutrition and food science. Furthermore, it advocated for a perspective in the advancement of food systems, urging the embrace of more nutritious dietary practices while considering the ecological and economic sustainability of these advancements. The study's findings revealed a significant shift in the nutritional makeup of noodles, with increased levels of vital vitamins, minerals, and dietary fiber. The research employed a comprehensive Food System Strategy to investigate the impact of incorporating banana blossom into the noodle production process across several stages. Subsequent endeavors to increase the variety and improve the nutritional content of basic food items by using innovative replacements would be based on the results of this study.

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INTRODUCTION

The banana bloom, the consumable flower of the Musa species native to Malaysia, is commonly used as a vegetable in certain regions of Sri Lanka. Despite being technically a fruit, it is enjoyed for its subtly sweet and floral taste. Rich in nutrients like antioxidants, fiber, and essential minerals such as potassium, calcium, magnesium, iron, zinc, and copper, the banana blossom supports various physiological functions and helps prevent gastrointestinal issues like constipation (Devje, 2022). Banana blossoms offer numerous health benefits, including promoting menstrual health, regulating diabetes, enhancing mood, and reducing anxiety. The ethanol in banana extract inhibits pathogenic germs spread through direct contact, adding to its medicinal properties. The banana plant, particularly the Musa Acuminata species, is renowned for its therapeutic capabilities, with every part of the plant being used for diverse purposes. Banana flower extract helps protect nerve tissue from destructive free radicals and is commonly incorporated into food and medication (Nayak, 2021).Nayak (2021) highlights the exceptional nutritional value of banana flowers, emphasizing their benefits for diabetes management, ulcer treatment, and constipation relief. Rich in vitamins A, B, C, and E, as well as essential minerals and antioxidants, banana flowers exhibit antibacterial, antimicrobial, anticancer, antiviral, anti-inflammatory, and antioxidant properties. These attributes make them a potent ally in combating harmful free radicals within the body (Farrah, 2018). The study explores the use of "Puso ng Saging" (banana blossom) to develop highly nutritious noodles, offering an alternative utilization for this often-discarded part of the banana plant. The research aims to introduce banana blossom noodles to the market as a sustainable, nutritious option. Unlike traditional instant noodles, which can contribute to obesity and hypertension, banana blossom noodles are rich in essential nutrients and fiber, making them a healthier choice. This innovation is particularly relevant for students and researchers in food development. Banana blossom noodles cater to the growing demand for plant-based, health-focused food options. These noodles, made from banana blossoms, offer numerous health benefits, including antioxidant and protein content, while being low in calories. However, the unique texture and taste of these noodles may not appeal to all consumers, especially Generation Z, who might prefer traditional noodle varieties. Despite this, banana blossom noodles are poised to attract a wide range of health-conscious consumers, including vegetarians and baby boomers, who can enjoy them without concerns about their well-being (Ward, 2023).The market offers a variety of nutritious noodles, such as soba noodles, chickpea pasta, and whole-wheat spaghetti. However, banana blossom noodles stand out due to their organic ingredients and health benefits. Abundant in antioxidants and protein, and low in calories, they serve as a healthy alternative to commercially available noodles (Simpas, 2024). The

rationale for developing banana blossom noodles lies in addressing both nutritional and sustainability challenges. With increasing awareness of the health risks associated with traditional instant noodles, there is a growing demand for healthier alternatives that do not compromise on taste or convenience. Banana blossoms, being rich in essential nutrients and low in calories, provide a viable solution to these dietary concerns. Additionally, utilizing banana blossoms, which are often discarded, contributes to waste reduction and promotes sustainable food practices. By introducing banana blossom noodles to the market, we can offer a nutritious, eco-friendly option that meets the dietary needs of health-conscious consumers, including vegetarians and those seeking plant-based foods. This innovation not only supports better health outcomes but also aligns with global sustainability goals, making it a timely and impactful addition to the food industry.

METHODOLOGY

The researchers conducted experimental and observation-based research. They explored different methods and ingredients in making pasta to identify the optimal combination for the desired final product. The process involved observing the final product to ensure it maintained its texture, appearance, smell, and taste over a desired period. This observation helped determine if the product was sustainable and if it maintained its quality. Ingredients sourced for the research included Banana Blossom Flour, All-purpose Flour, Tapioca Starch, Canola Oil, and Salt from the wet and dry market in Biñan Bayan, Laguna, except for Semolina flour, which was ordered from Shopee due to limited local availability. Various formulations were tested: Formulas 111 and 333 did not contain All-purpose flour, while Formula 555 did. Additionally, Formulas 333 and 555 omitted tapioca starch and oil to explore different results and characteristics. The research methodology involved developing banana blossom noodles by peeling, dehydrating, and grinding banana hearts into flour.

The evaluation of the product was based on a 9-point Hedonic Scale. Sensory surveys were collected from 136 respondents in the College of International Tourism and Hospitality Management at Lyceum of the Philippines University Laguna. The study aimed to identify the organoleptic characteristics of the noodles, the most acceptable formulation, and the significance of differences using the hedonic scale and weighted mean. To ensure the reliability and validity of the results, voluntary participation was emphasized, with respondents having the option to withdraw at any time. Confidentiality was strictly maintained, and only researchers had access to the collected information. Potential risks associated with food tasting were addressed by informing participants about the components of the noodles. The study used ANOVA (f-test) to test for differences among the formulations, with tables employed to summarize and present data from marketing efforts. This study highlighted the potential of banana blossom noodles as a nutritious and sustainable alternative to traditional noodles. By utilizing banana blossoms, which are often discarded, the research not only provided a healthier option but also promoted waste reduction. The focus on young adults as evaluators was strategic, given their openness to new food experiences and their significant influence on food trends. The use of hedonic scales ensured that the sensory qualities of the noodles were thoroughly evaluated, providing valuable insights into consumer preferences.

RESULTS AND DISCUSSION

Table 3 presents the results of the organoleptic evaluation for Banana Blossom Noodles, focusing on several sensory attributes: appearance, taste, texture, smell, and overall satisfaction. The composite mean score of 5.61 suggests that, overall, the noodles are slightly liked by the evaluators. The individual weighted mean scores for these attributes range from 5.38 to 5.90. The smell of Formulation 111 stands out with a high weighted mean of 7.82, indicating a strong

Table 1. Materials

Parameters	Levels	Description
Product	1	Banana Blossom Noodles
Samples	3	Formulation 111, 333, 555
Ingredients	7	Banana Blossom Flour, Semolina Flour, All-purpose Flour, Tapioca Starch, Canola Oil, Salt, Hot Water
Storage Condition	1	Room Temperature 25 ° C (77 ° F)
Packaging Materials	1	Resealable Plastic Bag
Sample Size	1	257g (uncooked) 387g (cooked)

Table 2. Banana Blossoms Formulations

Ingredients	Formula 111	Formula 333	Formula 555
Banana Blossom Flour	20g	20g	20g
Semolina Flour	45g	90g	50g
All-purpose Flour	-	-	50g
Hot Water	90ml	90ml	90ml
Tapioca Starch	80g	-	-
Oil	5ml	-	-
Iodized salt	2g	2g	2g

Table 3. Organoleptic Evaluation of Banana Blossom Noodles in Formula 111

F111			
Variable	Weighted Mean	SD	Interpretation
Appearance	5.38	1.31	Neither like nor dislike
Taste	5.59	1.29	Like Slightly
Texture	5.44	1.22	Neither like nor dislike
Smell	5.90	1.32	Like Slightly
Overall Satisfaction	5.75	1.38	Like Slightly
Composite Mean	5.61		Like Slightly

Legend: 8.50 – 9 = Like Extremely; 7.50 – 8.49 = Like Very Much; 6.50 – 7.49 = Like Moderately; 5.50 – 6.49 = Like Slightly; 4.50 – 5.49 = Neither Like nor Dislike; 3.50 – 4.49 = Dislike Slightly; 2.50 – 3.49 = Dislike Moderately; 1.50 – 2.49 = Dislike Very Much; 1 – 1.49 = Dislike Extremely

The dough was mixed with dry and wet ingredients, kneaded, and flattened using a pasta maker. Young adults aged 18-30, known for their fondness for noodles, were chosen as evaluators for the study. reference among the testers. This high score highlights the importance of smell in the overall sensory appeal of the noodles. Sensory influences on food intake and decision-making are primarily mediated

Table 4. Organoleptic Evaluation of Banana Blossom Noodles in Formula 333

F333			
Variable	**Weighted Mean**	**SD**	**Interpretation**
Appearance	6.44	1.28	Like Slightly
Taste	6.88	1.20	Like Moderately
Texture	6.65	1.22	Like Moderately
Smell	6.88	1.08	Like Moderately
Overall Satisfaction	6.99	1.18	Like Moderately
Composite Mean	6.77		Like Moderately

Legend: 8.50 – 9 = Like Extremely; 7.50 – 8.49 = Like Very Much; 6.50 – 7.49 = Like Moderately; 5.50 – 6.49 = Like Slightly; 4.50 – 5.49 = Neither Like nor Dislike; 3.50 – 4.49 = Dislike Slightly; 2.50 – 3.49 = Dislike Moderately; 1.50 – 2.49 = Dislike Very Much; 1 – 1.49 = Dislike Extremely

Table 5. Organoleptic Evaluation of Banana Blossom Noodles in Formula 555

F555			
Variable	Weighted Mean	SD	Interpretation
Appearance	5.92	1.34	Like Slightly
Taste	6.14	1.42	Like Slightly
Texture	6.16	1.29	Like Slightly
Smell	6.21	1.38	Like Slightly
Overall Satisfaction	6.22	1.36	Like Slightly
Composite Mean	6.13		Like Slightly

Legend: 8.50 – 9 = Like Extremely; 7.50 – 8.49 = Like Very Much; 6.50 – 7.49 = Like Moderately; 5.50 – 6.49 = Like Slightly; 4.50 – 5.49 = Neither Like nor Dislike; 3.50 – 4.49 = Dislike Slightly; 2.50 – 3.49 = Dislike Moderately; 1.50 – 2.49 = Dislike Very Much; 1 – 1.49 = Dislike Extremely

by taste and smell, with the smell playing a crucial role in priming eating habits and contributing significantly to the overall sensory experience.In contrast, the appearance of Formulation 111 received the lowest weighted mean score of 5.38, suggesting a neutral response from the evaluators. This indicates that while the visual appeal of the noodles is adequate, it is not a significant factor in their overall sensory evaluation. Overall, the smell is the most important attribute for Formulation 111, contributing to its generally positive reception. The noodles are generally liked slightly, with scores ranging from 5.50 to 6.49, indicating that there is some room for improvement, particularly in appearance. However, the overall sensory experience, especially driven by the aroma, is favorable. Table 4 outlines the findings of the sensory evaluation, with taste and smell emerging as the attributes with the highest weighted mean. Notably, overall satisfaction garnered the highest mean score, particularly for Formulation 333, which achieved a composite mean of 6.77, indicating a moderate level of liking. Formulation 222 also received positive feedback, attributed to its well-balanced combination of semolina flour, hot water, and banana blossom flour. The significance of sensory analysis extends beyond mere evaluation; it serves as a valuable tool for assessing quality, aligning with sensory profiles, and understanding customer preferences. In this context, the sensory evaluation sheds light on various aspects of the product, guiding potential adjustments and improvements. Despite the overall positive reception, the appearance of the honey received a slightly lower mean score of 6.44, falling within the "like slightly" category. This contrast in appearance between different formulations may be attributed to the simplicity of ingredients in Formulation 222 compared to the more complex composition of Formulation 111, which included tapioca starch, oil, and all-purpose flour. In Table 5, the sensory analysis of F555 highlights several key findings. Firstly, it's noted that smell emerges with the highest mean score, second only to overall satisfaction. Conversely, appearance receives the lowest mean score, standing at 5.92. Importantly, all variables are categorized under "like slightly". Formulation 555's aroma, specifically its banana blossom scent, contributes to its elevated weighted mean in smell, suggesting a positive sensory experience associated with this attribute. However, the formulation's appearance records the lowest weighted mean, potentially influenced by the color of banana blossom, which has been known to impact food preference and appetite. While overall satisfaction stands out positively among the variables, appearance lags behind with the lowest mean. Additionally, there appears to be a significant disparity between taste and texture, indicating that these attributes are distinct in their sensory impact. In summary, the sensory analysis of F555 underscores the importance of smell, particularly in relation to banana blossom aroma, while also acknowledging the challenges associated with appearance, which may influence food choice and overall satisfaction.

The findings provide valuable insights for further refinement and optimization of the formulation to enhance its sensory appeal and consumer acceptance.

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