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FORMULATION, ANALYSES AND ACCEPTABILITY OF CLAM KIKIAM WITH MORINGA LEAVES

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Abstract: From bustling urban centers to small provincial towns, street food is an integral part of the Filipino lifestyle. Kikiam, is one of the most favorite street foods for people of all ages and it is more than just a snack; it is a representation of the rich cultural exchange and innovation that defines Filipino cuisine. This study aimed to develop and evaluate a healthier version of Filipino street food, kikiam, by incorporating clam shells and Moringa leaves as primary ingredients. The sensory qualities of the kikiam in terms of appearance, aroma, taste, and texture, were evaluated by a panel of 100 consumers using a 9-point hedonic scale. The study also examined the microbial safety, shelf-life, and nutritional content of the best treatment. Three different formulations of Clam Kikiam with Moringa Leaves (Treatment A with 50grams clam, B with 75grams clam, C with 100grams clam) were tested. Results showed that Treatment C, which had the highest proportion of Clam, ranked the highest in terms of appearance, aroma, taste and texture, with an overall acceptability described as "likely extremely". Treatment B also received high ratings but was slightly lower than Treatment C in all sensory attributes. Treatment A, although still highly acceptable, was rated the lowest across all parameters. However, significant differences in appearance, aroma, and taste were found, in favor for treatment C. Microbial testing results indicated that the microbial counts for the clam kikiam with moringa leaves are within the acceptable limits set by the DOST criteria for most parameters. Shelf-life analysis revealed no mold growth within 2-6 days, but by 7-14 days, signs of spoilage such as unpleasant odor and mold formation appeared, worsening by 15 days. Overall, the study demonstrated that clam kikiam with moringa leaves is a viable, nutritious and sustainable alternative to traditional kikiam, offering a healthier option for consumers while providing economic benefits to local shellfish farmers and street food vendors.

Keywords: Clam Kikiam with Moringa, Sensory Evaluation, Shelf Life, Microbial and Proximate

I. INTRODUCTION

Filipinos have a deep appreciation for food, and their enthusiasm for street food is a clear reflection of this. Whether in busy cities or quiet rural towns, street food plays a key role in daily life. These affordable, tasty, and convenient snacks do more than just to curb hunger, they represent Filipino culture, showcasing traits like community, adaptability, and culinary ingenuity. Popular choices like fishballs, squidballs, kwek-kwek, and siomai are just a few examples of the beloved street foods enjoyed by many.

Kikiam, also known as Quekiam, is one of the most favorite street foods for people of all ages and it is more than just a snack; it is a representation of the rich cultural exchange and innovation that defines Filipino cuisine. Adapted from the Chinese dish *Ngoh Hiang*, this humble yet flavorful delicacy has become a staple of Philippine Street food culture, offering a glimpse into the country's history, resourcefulness, and unique palate. According to Bebs (2021), *Ngó-hiang* is the Chinese term for this dish that originated from Fujian, China. It is traditionally made of minced pork, prawn, and veggies mixed together and seasoned with Chinese five-spice powder. The mixture is rolled in a beancurd skin, steamed then deep-fried before serving. It was introduced to the Philippines by Hokkien immigrants and has been made to adapt to local ingredients since then.

This study aims to develop and evaluate the acceptability of kikiam made with halaan clam and malunggay (moringa) leaves as alternative ingredients. The research seeks to address the need for healthier and more economical street food options, replacing traditional ground meat with locally available, nutrient-rich substitutes.

II. METHODOLOGY

The method that used in this study was the experimental method of research. Experimental method is research wherein a researcher manipulates and control one or more independent variables for variation concomitant to the manipulation of dependent variable (Gravetter and Forzano, 2021). For this study, the experimental method was used to test the acceptability of clam kikiam with malunggay *(Moringa oleifera).*

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The design used was the Complete Randomized Design (CRD) in which group of tests of clam kikiam with moringa leaves is studied only once but subsequent treatment is applied to determine the cause of change. It is a research methodology in which experimental units are randomly assigned to treatments without any systematic bias (Costello, 2023).

The three different treatments (A, B, and C) were used in formulating Clam Kikiam with Moringa Leaves. Treatment A with 50 grams of clam, treatment B with 75 grams of clam and treatment C with 100 grams of clam were evaluated by a total of 110 evaluators participated in the study, comprising 10 expert panelists and 100 consumer respondents. The investigation incorporated three distinct experimental treatments to facilitate comparative analysis.

Table 1. Treatments used in making clam kikiam with moringa leaves

Ingredients	Treatments		
	A	B	C
Clam (Halaan)	50g.	75g.	100g.
Moringa leaves	5 g.	5 g.	5 g.
Jackfruit	50 g.	50 g.	50 g.
Carrots	20 g.	20 g.	20 g.
All Purpose Flour	130g.	130g.	130g.
Onion	25 g.	25 g.	25 g.
Soy Sauce	5 ml.	5 ml.	5 ml.
Oyster Sauce	5 ml.	5 ml.	5 ml.
Five-spice powder	3 g.	3 g.	3 g.
Pepper	3 g.	3 g.	3 g.
Baking powder	5g.	5g.	5g.
Water	¼ ml.	¼ ml.	¼ ml.

The primary objective of this study was to develop and evaluate a clam kikiam formulation enriched with moringa leaves, aiming to enhance its nutritional value without compromising its sensory acceptability. The analyses focused on optimizing ingredient proportions to create a functional food product that aligns with consumer preferences while offering added health benefits.

III. RESULTS AND DISCUSSION

The sensory evaluation results for clam kikiam with moringa leaves based on appearance, aroma, taste, and texture. Treatment A (50g clam) and Treatment C (100g clam) were both rated as “extremely appealing” in appearance, with mean scores of 8.13 and 8.37 respectively, while Treatment B (75g clam) was “very much appealing” with a mean of 7.90. Aroma ratings were consistently high, with all treatments described as “extremely pleasant,” scoring 8.13 (A), 8.30 (B), and 8.70 (C). For taste, Treatment A was rated “very much delicious” with 8.07, while Treatments B and C scored higher as “extremely delicious” at 8.20 and 8.50. In terms of texture, all treatments were perceived as “very much firm and intact,” with Treatment A scoring 8.00 and Treatments B and C both scoring 8.10. Overall, Treatment C had the highest ratings across all sensory aspects, followed by B, then A. These outcomes may be influenced by cooking methods, as supported by Wang et al. (2022), who found frying and roasting enhanced smell and taste compared to boiling. This suggests that the superior qualities of Treatment C could be attributed to optimal ingredient proportions and cooking techniques

Table 1. Sensory qualities of clam kikiam with moringa leaves

Sensory Qualities	TREATMENT					
	A		B		C	
	Mean	AD	Mean	AD	Mean	AD
Appearance	8.13	EA	7.90	VMA	8.37	EA
Aroma	8.13	EP	8.30	EP	8.70	EP
Taste	8.07	VMD	8.20	ED	8.50	ED
Texture	8.00	VMFI	8.10	VMFI	8.10	VMFI

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Legend: AD – Adjectival Description

Score	*Appearance*	*Aroma*	*Taste*
8.12-9.00	*EA – Extremely Appealing*	*EP – Extremely Pleasant*	*ED – Extremely Delicious*
7.23-8.11	*VMA-Very Much Appealing*	*VMP-Very Much Pleasant*	*VMD – Very Much Delicious*
6.34-7.22	*MA – Moderately Appealing*	*MP-Moderately Pleasant*	*MD-Moderately Delicious*

Score	*Texture*
8.12-9.00	*EFI – Extremely Firm and Intact*
7.23-8.11	*VMFI-Very Much Firm and Intact*
6.34-7.22	*MFI– Moderately Firm and Intact*

The general acceptability ratings of clam kikiam in different treatments. Treatment A obtained mean scores of 7.27 for appearance, 7.40 for aroma, 7.07 for taste, and 7.87 for texture, resulting in an overall mean of 7.40 or "liked very much." Treatment B received higher scores: 7.65 (appearance), 7.82 (aroma), 7.93 (taste), and 7.75 (texture), with an acceptability rating of 7.79, also "liked very much." Treatment C, however, showed the highest acceptability scores: 8.40 (appearance), 8.46 (aroma), 8.67 (taste), and 8.47 (texture), achieving a general acceptability mean of 8.50 or "liked extremely." These results indicate a high level of consumer acceptance across all treatments, with Treatment C standing out due to optimal ingredient proportions and the distinct sensory characteristics of clams as noted by Milnes (2024) and Martelino et al. (2019).

Table 3. General acceptability of clam kikiam with moringa leaves in terms of sensory qualities

Quality Attributes	**TA**		**TB**		**TC**	
	Mean	**QD**	**Mean**	**QD**	**Mean**	**QD**
Appearance	7.27	LVM	7.65	LE	8.40	LE
Aroma	7.40	LVM	7.82	LE	8.46	LE
Taste	7.07	LVM	7.93	LE	8.67	LE
Texture	7.87	LVM	7.75	LVM	8.47	LE
Acceptability	**7.40**	LVM	**7.79**	LVM	**8.50**	LE

Legends: QD- Adjectival Description

Score	
8.12-9.00	*LE- Liked Extremely*
7.23-8.12	*LVM- Liked Very Much*
6.34-7.22	*LM – Liked Moderately*

There were no significant differences were observed in appearance, aroma, taste, and texture among Treatments A and B. For Treatment C, however, significant differences were noted in appearance (z=9.280, p=0.010) and aroma (z=10.730, p=0.005), while taste and texture did not significantly differ. This suggests that while most sensory qualities across treatments were comparable, Treatment C had distinctly superior visual and aromatic qualities. Overall, the null hypothesis stating no significant differences in sensory qualities was accepted for Treatments A and B but rejected for Treatment C in terms of appearance and aroma.

Table 4. Difference in the sensory qualities of clam kikiam with moringa leaves.

Quality Attributes		***z***	**p value**	**Remarks**
Treatment A (50 grams of clam)	Appearance	0.806	0.668	ns
	Aroma	3.588	0.166	ns
	Taste	1.280	0.527	ns
	Texture	0.571	0.752	ns
Treatment B (75 grams of clam)	Appearance	6.947	0.031	ns
	Aroma	6.401	0.041	ns
	Taste	2.950	0.229	ns
	Texture	0.541	0.763	ns

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Treatment C (100 grams of clam)	Appearance	9.280	0.010	s
	Aroma	10.730	0.005	s
	Taste	8.286	0.016	ns
	Texture	3.366	0.186	ns

There were significant differences in the general acceptability of treatments in terms of appearance, aroma, and taste, with F-values of 43.362, 33.370, and 84.590 respectively (all p-values < 0.01). No significant difference was found for texture (F=1.173, p=0.311). This indicates that the differences in clam proportions impacted the visual, aromatic, and taste-related preferences of the consumers, but not the texture. This may be attributed to the natural chewy-soft consistency of cooked clams. Therefore, the null hypothesis was rejected for appearance, aroma, and taste, and accepted for texture.

Table 5. Difference in the general acceptability of clam kikiam with moringa leaves

Quality Attributes	Sv	Ss	Df	Ms	F	P value	Remarks
APPEARANCE	Between	66.127	2	33.063	43.362	.000	s
	Within	226.460	297	.762			
	Total	292.587	299				
AROMA	Between	56.987	2	28.493	33.370	.000	s
	Within	253.600	297	.854			
	Total	310.587	299				
TASTE	Between	128.240	2	64.120	84.590	.000	s
	Within	225.130	297	.758			
	Total	353.370	299				
TEXTURE	Between	29.760	2	14.880	1.173	.311	ns
	Within	3766.970	297	12.683			
	Total	3796.730	299				
ACCEPTABILITY	Between	59.005	2	29.503	25.248	.000	s
	Within	347.047	297	1.169			
	Total	406.052	299				

Legend: p-value > .01, not significant at p-value < 0.01, significant at .01 alpha

The microbial analysis of clam kikiam with moringa leaves, conducted by the DOST Regional Standard and Testing Laboratory in Iloilo City, confirmed that the product is safe for human consumption. A 250-gram sample was tested for aerobic plate count and *Escherichia coli* (E. coli) levels. The DOST results showed an aerobic plate count of <4800 CFU/g and an E. coli count of <10 CFU/g, both within the acceptable limits set by the DOST and FDA. The FDA standards allow a maximum of 10^5 CFU/g for aerobic plate count and 11 CFU/g for E. coli. These results indicate that the microbial levels in the product are well within safety standards for processed seafood. However, the possible presence of microbes may be linked to factors such as poor food handling, contaminated water, or unsanitized equipment, as noted by Jambre (2022). According to FDA Circular No. 2022-012, microbial safety limits vary by organism, and these guidelines are specific to the Philippines.

The proximate analysis of clam kikiam with moringa leaves conducted by the Negros Prawn Producers Cooperative Analytical and Diagnostic Laboratory, Bacolod City. The sample was comprised of 50 grams per 3 pieces of clam kikiam. The manufacture date was April 20, 2025. The result showed the data for % Fat 14.8, for % carbohydrates 19.2, for % moisture 46.8, % protein 9.8 and for calories 125.

The shelf-life study of clam kikiam with moringa (Treatments A, B, and C) stored at room temperature evaluated spoilage based on mold formation and unpleasant odor. All treatments remained free from mold and odor for the first six days. However, by days 7 to 14, mold formation and unpleasant odor began to appear in all samples. By day 15, visible mold spots and stronger unpleasant odors were observed in all treatments, indicating spoilage.

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The results suggest that the product has a shelf life of up to six days at room temperature. Beyond this period, spoilage becomes evident. Further testing is recommended to identify the most effective treatment for extending shelf life. A study by Boziaris et al. (2015) on processed seafood stored at 4°C found spoilage was mainly due to off-odors/flavors, with lactic acid bacteria and yeasts as the dominant spoilage organisms, although hygiene indicators remained undetectable.

IV. CONCLUSION

This study focused on developing clam kikiam with moringa leaves and evaluating its sensory qualities, acceptability, microbial safety, and shelf-life across three different treatments labeled A, B, and C. The products were assessed by ten semi-trained panelists and 100 consumers using a nine-point Hedonic scale, and statistical analysis was conducted using one-way ANOVA. The findings revealed that all treatments had very appealing sensory characteristics, with Treatment C receiving the highest ratings for appearance, aroma, taste, and texture. Consumers liked Treatments A and B very much, while Treatment C was liked extremely. Statistical analysis showed no significant difference in aroma, taste, and texture among the treatments, but there were significant differences in appearance and aroma, particularly for Treatment C. There was also a significant difference in overall acceptability among the treatments, except for texture. Microbial testing of the best treatment, Treatment C, showed minimal presence of aerobic bacteria and E. coli, indicating that the product meets safety standards for human consumption. Proximate analysis confirmed the presence of important macronutrients such as protein, fat, carbohydrates, and calories. Shelf-life testing revealed that the clam kikiam with moringa leaves remained free from spoilage, mold, and unpleasant odors for up to six days at room temperature. However, from day seven onward, signs of mold and unpleasant odor appeared, becoming more pronounced by day fifteen. In conclusion, clam kikiam with moringa leaves has favorable sensory qualities and is highly accepted by consumers, especially Treatment C. It is safe for consumption and has potential as a nutritious and tasty snack. The shelf-life at room temperature is limited to about six days, indicating a need for improved preservation techniques for longer storage.

V. RECOMMENDATION

Based on the study's conclusions, several recommendations are made to improve clam kikiam with moringa leaves. It is suggested to conduct further experiments with different seafood formulations, concentrations, and additional local vegetables or fruits to enhance flavor variety and product appeal. Alternative cooking methods and ingredient combinations should be explored to improve sensory qualities, especially appearance and aroma, to attract more consumers. Strict quality control during manufacturing is advised to ensure consistency in product texture, flavor, and appearance. Regular sensory evaluations and consumer feedback should guide ongoing improvements. Investing in quality packaging that preserves freshness, extends shelf life, and minimizes environmental impact is important. Marketing efforts should highlight the product's natural and healthy attributes, particularly the nutritional benefits of clam and moringa, potentially through collaborations with health experts. Providing consumers with information about the health benefits, culinary uses, and recipe ideas can boost product appeal and encourage everyday consumption. Sustainability is also emphasized by sourcing ingredients ethically and using eco-friendly packaging. The development team should foster innovation by experimenting with new flavors and techniques to maintain consumer interest and increase market acceptance. Overall, the study recommends clam kikiam with moringa leaves as a healthy snack option suitable for all ages.

REFERENCES

[1] Austin, B. & Fyzul, A. (2017). Diagnosis and Control of Diseases of Fish and Shellfish.
[2] Baquiran, M. F., & Escobar, N. A. (2020). Nutritional Assessment of Filipino Street Foods: A Comparative Study of Traditional and Modern Variants.
[3] Cardosa, R. D. (2014). Street Food: Culture, economy, health and governance.
[4] Escalante, R. J. (2019). Kikiam in Filipino Street Food: A Cultural Perspective on Its Development and Regional Variants.
[5] Morris, C. E., Massey, K. S., & Morell, M. K. (2020). Recipe formulation and food quality. Food Chemistry, 312, 125-138.
[6] Hill, P. (2020). The Moringa: DISCOVER the Benefits for YOUR Health
[7] Meilgaard, M. C. (2016). Sensory Evaluation Techniques. CRC Press.
[8] Pfaff, O. (2019). The MORINGA Compilation
[9] Zorilla, M. P. (2022). Moringa Oleifera: A Comprehensive Review on Its Nutritional and Medicinal Properties.

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