SJIF Impact Factor (2026): 8.863| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 11 | Issue: 4 | April 2026 - Peer Reviewed Journal

PANSIT-PANSITAN (*Peperomia pellucida*)-BASED EDIBLE WRAPPERS

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Article DOI: https://doi.org/10.36713/epra27411
DOI No: 10.36713/epra27411

ABSTRACT

The is an experimental research about Pansit-pansitan (Peperomia pellucida)-Based Edible Wrappers. The study's main goal is to create and produce an RTE food, probably an edible wrappers made of Pansit-pansitan. The study has four formulations and one control formulation for comparison. It was conducted on the S.Y 2025-2026 at Isabela State University-Main Campus, College of Education Building. The product was subjected to sensory evaluation using the 9-point Hedonic Scale acceptability test in terms of color/appearance, odor/aroma, taste/flavor, texture and, general acceptability. The sensory evaluation was conducted to trained and untrained panel composed of 75 individuals, who were randomly selected from among the students, teachers, and staff of Isabela State University-Main Campus, ages ranges 18-50 years old. Result in terms of color/appearance F4(200g Pansit-pansitan) obtained the highest mean score, as well as in odor/aroma and texture. F3(300g Pansit-pansitan) attained the highest mean score for taste/ flavor and general acceptability. The results of sensory evaluation were statistically analyzed using the ANOVA, Descriptive Statistic, and Tukey's Honestly Significant Difference (HSD). In significant differences, the results showed that there are significant differences between the modified formulations and the traditional nori sheets in terms of color/appearance, odor/aroma, taste/flavor, texture and, general acceptability. In Proximate composition, F1(500g Pansit-pansitan) is richer in nutrients as it obtained the highest percentage in moisture, ash, lipid, protein and fiber content. F4(200g Pansit-pansitan) is more energy denser as it obtained the highest percentage in carbohydrates and metabolized energy. In shelf life observation, all the modified formulation can last at least a month and more but there are slight changes on its crisp texture. While in Return-On-Expenses analysis, the results revealed that F4(200g Pansit-pansitan) achieved the highest net profit among the formulations.

KEYWORDS: *Medicinal Herb, Pansit-pansitan, Edible Wrapper, Alternative, Dehydration, RTE product, Proximate Analysis, Sensory Acceptability, Shelf-life, Return of Expenses*

INTRODUCTION

Philippines is one of the country that is blessed with an abundance of herbal plants, some of which grows anywhere and oftenly mistaken as weeds or grass. One of them is Pansit pansitan (Peperomia pellucida), a powerful medicinal herb that is proven with health benefits. According to the study of Marina Silalahi 2022, Pansit pansitan (Peperomia pellucida) has anticancer, antioxidant, antimicrobial, anti-inflammatory, analgesic, antipyretic, anti-emetogenic, antitumor and hypoglycemic content. With phytochemicals content such as alkaloids, flavonoids, glycosides, terpenoids and steroids makes it effective in treating various diseases such as high blood pressure, diabetes millitus, osteoporosis, and even cancer. Beyond its medicinal potential, Pansit pansitan (Peperomia pellucida) remains unused in food applications, most especially in Ready-to-Eat products.

Currently, the trend for making instant and convenient products is growing especially in the food industry. Data from Statista 2026, The Philippines shows a slow overall growth in convenience food market, but the demand is still elevating due to busy schedules and heavy workloads makes RTE foods a convenient food choice to satisfy hunger. On the other hand, so much intake of unhealthy RTE foods options contribute to the rise of lifestyles diseases like diabetes, hypertension, and obesity that lead to long term disability and higher healthcare costs. Latest data from WHO, lifestyle-related diseases are the major health concern in the Philippines, due to the poor diet, low physical activity and nature of work. This highlights the need for healthier, affordable, and locally sourced alternatives that help the global movement toward food-as-medicine products.

Moreover, the creation of Pansit pansitan (Peperomia pellucida)-based edible wrappers is an innovative food substiture for nori sheets seaweed, which are traditionally made from seaweed and widely imported from Korea, Japan, and China (Dedin Finatsiyatull Rosida et al., 2021). Its popular, but some challenges arise like individuals with seafood allergies, less accessible due to their imported nature. And, the availability of seaweeds in the country is limited and not all the seaweeds found is edible, making it harder to produce nori sheets locally. To address this issues, this study aims to use Pansit pansitan (Peperomia pellucida) a medicinal plant abundantly found in the Philippines, as sustainable and locally sourced alternative for edible wrappers.

To give solutions to this needs, this study aims to develop a Pansit-pansitan-based edible wrapper that look like nori sheet. In order to create an edible wrapper, the study prepared 5 formulations, one controlled sample use as basis in achieving nori like form and four modified formulation sample with the same process on wrapper formulations by measuring different amount of pansit – pansitan.

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Many existing studies have presented the health benefits of Pansit-pansitan, but there is a major research gap in the exploration of pansit pansitan's potential as food ingredient, particularly in creating edible wrappers. There are limited research exist on sensory qualities, proximate composition, consumer acceptance, product shelf life, and safety considerations when used in developing edible wrappers. There is also insufficient data on how different pansit-pansitan-based edible wrapper formulations be compared in term of quality attributes (color/appearance, odor/aroma, taste/flavor, texture, and, general acceptability) and which formulation is most acceptable. And, research on the economic studies of producing such wrappers, including the return of expenses remains limited.
To bridge these gaps, according to a review study conducted by the group of F.D. Mihafu et al 2019, stated in their study that objective tool such as physical, chemical and microbiological test, and sensory/consumer evaluation are very important in a new product development as they ensure food product quality and safety. To ensure the studies quality and safety. The study will observe and compare the different Pansit-pansitan based edible wrapper formulation including the control formulation about the color/appearance, odor/aroma, taste/flavor, texture, and, general acceptability. Acceptability results were statistically analyzed to know if there are significant differences on the mean acceptability of the quality attributes among the different formulations. The proximate composition of the pansit-pansitan-based edible wrappers were analyzed to provide nutritional information for the most acceptable formulation. The study determined the shelf life of the wrappers by monitoring changes in quality attributes and acceptability during storage under sealed conditions using textured vacuum plastic, to know how long the packed wrappers can last during storing while maintaining acceptable quality and safer consumption. And, computed the return of expenses (ROEx) for the different formulations to evaluate their economic feasibility and potential for commercial viability.

This research study is aligned with the several Sustainable Development Goals (SDGs), like SDG 3 (Good Health & Well-being) and SDG 12 (Responsible Consumption & Production), through sustainable food innovation. This research seeks to introduce a healthier, affordable, and sustainable food alternative that uses medicinal pant abundantly around us. By addressing this existing research gaps, the study aims to contribute to the growing demand for functional foods while promoting the use of indigenous plants in the Philippines. This study also supports environmental sustainability by reducing our overly reliance on imported seaweed and minimizing food waste, while also promoting economic sustainability by creating opportunities for local farmers and entrepreneurs.

STATEMENT OF THE PROBLEM

This study focused on creating an edible wrapper made from pansit pansitan, inspired by nori sheets. Specifically, it sought to address the following questions:

1. Identify which formulation is the most acceptable Pansit pansitan-based edible wrapper in terms of:
   a) color/appearance;
   b) odor/aroma;
   c) taste/flavor;
   d) texture;
   e) general acceptability?
2. Is there a significant difference on the mean acceptability of the quality attributes of pansit pansitan as alternative edible wrappers similar to nori sheets?
3. What is the proximate composition of Pansit pansitan-based edible wrappers?
4. How long can Pansit pansitan-based edible wrapper can be stored while maintaining the acceptable quality and safety?
5. What is the return of expenses (ROX) computed for the different formulations**?**

METHODOLOGY

Ingredient

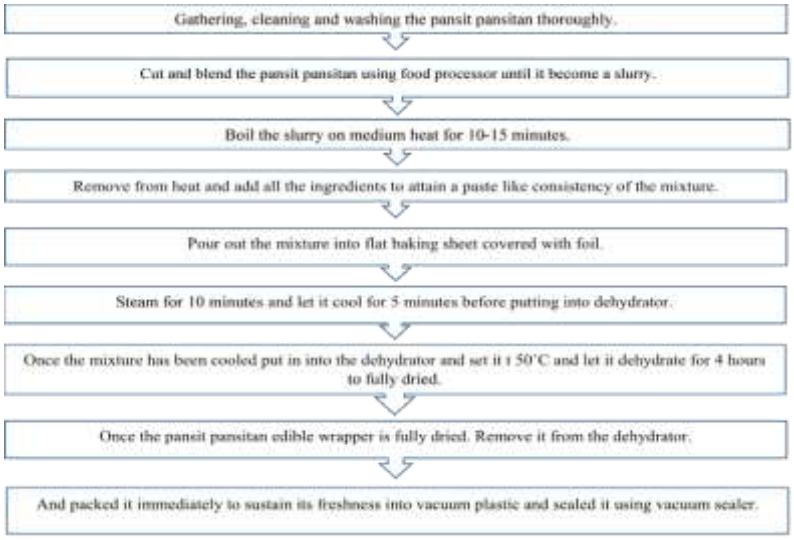
Table 1. Proportions of Ingredients Used in Making Pansit pansitan-Based Edible Wrappers used in the study.

Ingredients	F0	F1	F2	F3	F4
Seaweeds	500g	0g	0g	0g	0g
Pansit Pansitan	0g	500g	400g	300g	200g
Carrageenan Powder	0g	15g	15g	15g	15g
Water	480g	240g	240g	240g	240g
Sesame Oil	15g	15g	15g	15g	15g
Garlic Powder	15g	15g	15g	15g	15g

Preparation of Pansit pansitan-Based Edible Wrappers

The preparation of pansit pansitan-based edible wrappers involved an accurate process to harness the unique flavors and nutritional benefits of the traditional powerful herb. Pansit pansitan was collected in Quirino Province, and all the other ingredients and seasonings were bought from the Municipality of Diffun Public Market before measuring the different proportions for the formulations.

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The preparation of pansit-pansitan-based edible wrappers involved gathering, cleaning, and removing the roots and seeds of the pansit-pansitan. The cleaned pansit-pansitan was placed in a basin for thorough washing to remove dirt and was then drained using a sifter for about 5 minutes. The following ingredients and equipment were prepared in bowls with measuring cups, spoons, baking sheets or baking trays covered with foil. A food processor was used to chop and blend the pansit-pansitan into a slurry.

When the slurry was finished being mixed and blended together in the food processor, it was transferred to a pot and added 250g of water into the pot before stirring the slurry with a spatula for about 10-15 minutes by boiling it over medium heat. After boiling for 10-15 minutes, the slurry was removed from the heat, put back into a mixing bowl, and then all of the following ingredients were added 15g of garlic powder, 15g of sesame oil, and 15g of carrageenan powder, and mixed continuously until a paste-like consistency was reached.

Pouring the mixture into a flat baking sheet pan covered with foil and using a silicone brush to coat lightly with sesame oil and making sure it was spread evenly throughout the baking pan with the help of a spatula. Steaming the mixture for 10 minutes to activate the gelling agent in order to have a jelly like consistence for the quick drying process, and cooling the mixture for 5 minutes before setting it into the dehydrator. The cooled mixture was placed in the dehydrator and set to 50°C to dehydrate for 5 hours. After 5 hours of dehydration, the finished product was removed from the dehydrator and packed immediately in a sealed vacuum plastic bag and sealed using a vacuum sealer to preserve freshness.

TREATMENT OF THE STUDY

The proportions of ingredients of pansit-pansitan-based edible wrappers showed the different ratios in making edible wrappers similar to nori sheets, which were used as formulations in this study.
The formulation of this study are as follows:
F0 = Seaweeds 500g, No binding agents (traditional nori sheets)
F1 = Pansit pansitan 500g, Carrageenan Powder 15g
F2 = Pansit pansitan 400g, Carrageenan Powder 15g
F3 = Pansit pansitan 300g, Carrageenan Powder 15g
F4 Pansit pansitan 200g, Carrageenan Powder 15g

PROXIMATE ANALYSIS

The formulated products of pansit-pansitan-based edible wrapper samples were subjected to proximate analysis to determine the composition, including moisture content, ash, fiber, protein, carbohydrate, and metabolizable energy. The analysis was conducted at the College of Health and Sciences Laboratory, Quirino State University, Andres Bonifacio, Diffun, Quirino.

SENSORY EVALUATION

Sensory Evaluation were conducted at CED Building, Isabela State University, San Fabian, Echague, Isabela to determine the consumers' acceptability of the experimental product in terms of color/appearance, taste/flavor, texture, odor/aroma, and general acceptability of Pansit pansitan-based edible wrappers as food alternatives for nori sheets. The researcher seeks first a permission to the proper authority through a request letter on conducting sensory evaluation. During the sensory evaluation a short orientation was conducted to introduce and at the same time inform the panelist about the product to avoid unnecessary incidents. After the orientation, the panelist was presented an informed consent form to ensure that the participants are aware of the ingredients used in

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the products, and understood that their participation was voluntary and may withdraw from the study at any time without consequences. And, knew that their data would remain confidential.

During the sensory evaluation the panelist are given formulation samples they are subjected to evaluate carefully and rate each sample according to their color/appearance, odor/aroma taste/flavor, texture, and general acceptability. The panelist is asked to rinse their mouth before tasting each sample and strictly observed as a standard procedure to ensure the credibility and validity of the results of the study.

The sensory evaluations were conducted to 75 panelists randomly selected from those who are food and regularly tried eating foods that goes well with nori sheets. The qualification of the panelists in terms of age are 18 to 50 years old. They are screened to be non-smokers, not liquor drinkers, no false teeth, not pregnant, not breastfeeding and in good health during the sensory evaluation. The instrument for data gathering is the 9-Point-Hedonic Scale.

The range of scale of is interpreted as follows:

Scale	Range	Descriptive Rating
9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.5 – 7.00	Like Moderately
6	5.5 – 6.49	Like Slightly
5	4.5 – 5.49	Neither Like nor Dislike
4	3.5 - 4. 49	Dislike Slightly
3	2.5 - 3.49	Dislike Moderately
2	1.5 - 2.49	Dislike Very Much
1	1.0 - 1.49	Dislike Extremely

RESULTS

Table 7. Summary table on Acceptability

FORMULATION	COLOR/ APPEARANCE	ODOR/ AROMA	TASTE/ FLAVOR	TEXTURE	GENERAL ACCEPTABILITY	GRAND MEAN	RANK
F0 (500 grams Seaweeds)	7.03	6.19	7.12	6.67	7.00	6.02	5th
F1 (500g Pansit-pansitan)	7.91	8.09	7.77	7.77	7.73	7.71	4th
F2 (400g Pansit-pansitan)	7.92	8.21	8.03	7.92	7.84	7.98	3rd
F3 (300g Pansit-pansitan)	7.91	8.40	8.21	8.09	8.08	8.14	2nd
F4 (200g Pansit-pansitan)	8.05	8.57	8.08	8.13	8.01	8.17	1st

The table showed the summary of acceptability of Pansit-pansitan-Based Edible Wrappers. Each formulation was evaluated for color/appearance, odor/aroma, taste/flavor, texture and general acceptability or the overall rating. In every attribute the table shows a mean score. Grand mean is the overall average for the formulation and rank is where the formulation stands compared to others in the data the higher mean score indicates higher acceptability.

In the data F4(200g Pansit-pansitan) which has a grand mean of 8.17 rank first and appeared as the most preferred among the modified formulations. Followed by F3(300g Pansit-pansitan) with a grand mean of 8.14, F2(400g Pansit-pansitan) with a grand mean of 7.98, F1(500g Pansit-pansitan) with 7.71 grand mean and marked as the least accepted on the 4 modified formulations. It indicates that the pansit-pansitan amount decreases general acceptability increases.

The also revealed that F4 is the most acceptable formulation, followed by F3. The use of Pansit-pansitan significantly improve the sensory qualities of wrappers. Based on the results 200-300 grams of Pansit-pansitan produced best acceptability while increasing the pansit-pansitan content to 400 and 500 grams led to slightly lower acceptability. The research conducted by Dela Cruz et al. (2022) noted that when used at their appropriate level, adding plant-based functional ingredients such as pansit-pansitan (Peperomia pellucida) can dramatically increase sensory characteristics in food products. Their study showed that moderate amounts of pansit-pansitan with its mild flavor and nutritional benefits improved overall consumer acceptance of the food product, while large amounts of pansit-pansitan led to less manufacturer preference because of the stronger plant like flavor and undesirable texture. This supports

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the finding that formulations with 200–300 grams achieved the highest acceptability, while increasing the amount to 400–500 grams slightly reduced sensory appeal.

Significant Differences of Pansit-pansitan-Based Edible Wrappers

Significant Differences in terms of Color or Appearance. Table 8 presents the significant difference on the mean acceptability of the quality attributes of pansit pansitan as alternative edible wrappers similar to nori sheets in terms of color or appearance.

Table 8. Significant Difference in Terms of Color or Appearance

Formulations	Mean	Qualitative Description
F0 (500g Seaweeds)	7.03[b]	Like moderately
F1(500g Pansit-pansitan)	7.91[a]	Like very much
F2(400g Pansit-pansitan)	7.92[a]	Like very much
F3(300g Pansit-pansitan)	7.91[a]	Like very much
F4(200g Pansit-pansitan)	8.05[a]	Like very much
Grand Mean	7.76	Like very much
CV%	10.96	
F-Value	17.93	
P-Value	0.000*	

*-with significant

Legend: a-Not Significantly different from each other
b-Statistically different from "a"

The data presents the significant differences of color or appearance of pansit pansitan-based edible wrappers. It clearly shows that F0(500g Seaweeds) or the controlled formulation scored as 7.3, like moderately, significantly lower than the other formulation marked as "b" and described as statistically different, while the 4 modified formulation all scored not lesser than 7.91 described as like very much and marked as "a", it means that they are not significantly different from each other.

Furthermore, F4(200g Pansit-pansitan) had the highest mean score, but not significantly different from F1(500g Pansit-pansitan) - F3(300g Pansit-pansitan) which scored ranges between 7.91-7.92. This indicates that F4(200g Pansit-pansitan) numerically outperformed the other, but the difference is minimal and not statistically significant.

The grand mean of 7.76 describe as like very much indicates that all the modified formulations were highly acceptable in terms of color or appearance. And, the coefficient of variation is 10.96% reflects moderate variability in participant's responses, which typical for sensory evaluations and within acceptable limits. The results of ANOVA confirmed the significant differences between formulations, with an F-value of 17.93 and a p-value of 0.00, this implies that the modifications significantly improved the color or appearance of the edible wrappers. The research conducted by Martinez et al., (2023) showed that there is generally a strong preference from consumers based on a sensory evaluation score the relative score given to qualities based on their measurement across a wide range of food item types during development phases when a high mean score is achieved when developing a food product. Furthermore, the study indicates that the sensory evaluation will offer moderate variances between subjects due to differing individual characteristics. In addition, the use of ANOVA calculations to determine significant differences among groups and products based on sensory evaluation data supports the belief that modifying product formulations can lead to an enhanced level of satisfaction in eating food products.

Significant Difference in terms of Odor or Aroma. Table 8 reveals the significant difference on the mean acceptability of the quality attributes of pansit pansitan as alternative edible wrappers similar to nori sheets in terms of odor or aroma.

Table 9. Significant Difference in terms of Odor or Aroma

Formulations	Mean	Qualitative Description
F0 (500g Seaweeds)	6.19[d]	Like moderately
F1(500g Pansit-pansitan)	8.09[c]	Like very much
F2(400g Pansit-pansitan)	8.21[c]	Like very much
F3(300g Pansit-pansitan)	8.40[b]	Like very much
F4(200g Pansit-pansitan)	8.57[a]	Like extremely
Grand Mean	7.83	Like very much
CV%	9.13	
F-Value	419.58	
P-Value	0.000*	

*-with significant

Legend: a-Significantly different from other groups (highest rated)
b-Significantly lower than "a" but higher than "c" and "d"
c-Not Significantly different from each other
d-Significantly different from other groups (lowest rated)

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The table shows significant differences in the acceptability of pansit pansitan-based edible wrappers in terms of odor or aroma. The controlled formulation scored 6.19 rated as like moderately and marked as "d" that indicates significantly different to all the modified formulations. On the other hand, the 4 modified formulations (F1-F4) scored between 8.09 and 8.57 rated as like very much to like extremely demonstrating significant improvement in odor or aroma acceptability.

Furthermore, F4(200g Pansit-pansitan) appeared as the top performer which scored 8.57 rated as like extremely marked as "a" shows significantly different from other groups and the highest rated formulation, followed by F3(300g Pansit-pansitan) which scored 8.40 rated as like very much and mark as "b" shows significantly lower than F4(200g Pansit-pansitan) but higher than F1(500g Pansit-pansitan) and F2(400g Pansit-pansitan), F1(500g Pansit-pansitan) and F2(400g Pansit-pansitan) which scored 8.09 and 8.21 rated as like very much were marked as "c" shows that they are not significantly different from each other.

The grand mean of 7.83 rate as like very much implies that all the modified formulations are greatly acceptable regarding on the odor or aroma acceptability. The coefficient of variation of 9.13 % implying minimal variability in respondents rating, recommending consistent acceptability across participants. The ANOVA results confirmed that there are significant differences between formulations, with an F-value of 419.58 and p-value of 0.000 it indicates that the modifications significantly enhance odor or aroma acceptability.

Significant difference in terms of Taste of Flavor. Table 10 shows the significant difference on the mean acceptability of the quality attributes of pansit pansitan as alternative edible wrappers similar to nori sheets in terms of taste or flavor.

Table 10. Significant Difference in Terms of Taste or Flavor

Formulations	Mean	Qualitative Description
F0 (500g Seaweeds)	7.12^{c}	Like moderately
F1 (500g Pansit-pansitan)	7.77^{b}	Like very much
F2 (400g Pansit-pansitan)	8.03^{ab}	Like very much
F3(300g Pansit-pansitan)	8.21^{a}	Like very much
F4(400g Pansit-pansitan)	8.08^{ab}	Like very much
Grand Mean	7.84	Like very much
CV%	9.22	
F-Value	76.41	
P-Value	0.000*	

*-with significant

Legend: a-Significantly different (highest rated)
b-Significantly lower than "a" but higher than "c", and not significantly different from "ab"
ab-not significantly different from both "a" and "b" groups
c-Significantly less preferred (lowest rated)

The data shows significant differences in the acceptability of pansit pansitan-based edible wrappers in terms of taste or flavor. In the data F0(500g Seaweeds) or the controlled formulation scored 7.12 described as like moderately and was marked as "c" meaning it is significantly less preferred and the lowest rated among the modified formulation. While the modified formulations (F1-F4) scored significantly higher which they scored higher 8.03 to 8.21 describe as like very much, indicating a significant development in the taste or flavor.

F3(300g Pansit-pansitan) has the highest rated scored 8.21 described as like very much and marked as "a", meaning it is significantly different from the other formulation, while F4(200g Pansit-pansitan) which scored 8.08 and F2(400g Pansit-pansitan) scored 8.03 both are described as like very much mark as "ab" means that it is not significantly different from F3(300g Pansit-pansitan) and F1(500g Pansit-pansitan), and marked as "b" implying significantly lower than F3(300g Pansit-pansitan) but higher than F0(500g Seaweeds) is F1(500g Pansit-pansitan) which scored 7.77 described as like very much seen on the data result.

Supported with the grand mean of 7.84 described as like very much, indicating that the overall modifications done to the 4 formulations is highly accepted in terms of taste or flavor. The coefficient variations of 9.22 % indicating a low variability in panelist's responses, suggesting consistent preferences across evaluations. The results of ANOVA confirmed that there are significant differences on the taste/aroma of the different formulation, with the F-value of 76.41 and p-value of 0.000 this indicates that the modifications significantly enhance the taste of aroma.

According to Singh et al. (2022), sensory evaluations of foods during product development reveal that high average Hedonic scores indicate that consumers had strong acceptability towards these products in terms of flavor and taste while low Coefficient's of Variation show consistent results by panelists across all treatments performed. The authors also report that ANOVA is frequently used to evaluate significant differences between formulations. This demonstrates that changes to the ingredient or processing method often lead to increased taste acceptability of products.

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Significant difference in terms of Texture. Table 11 shows the significant difference on the mean acceptability of the quality attributes of pansit pansitan as alternative edible wrappers similar to nori sheets in terms of texture.

Table 11. Significant Difference in terms of Texture

Formulations	Mean	Qualitative Description
F0 (500g Seaweeds)	6.67[d]	Like moderately
F1(500g Pansit-pansitan)	7.77[c]	Like very much
F2(400g Pansit-pansitan)	7.92[b]	Like very much
F3(300g Pansit-pansitan)	8.09[a]	Like very much
F4(200g Pansit-pansitan)	8.13[a]	Like very much
Grand Mean	7.68	Like very much
CV%	9.62	
F-Value	150.87	
P-Value	0.000*	

*-with significant

Legend: a-Not Significantly different from each other (highest rated)
b-Significantly lower than "a" but higher than "c" and "d"
c- Significantly lower than "b" and "a", but higher than "d"
d-Significantly different from all other groups (lowest rated)

The table show the significant differences in texture of pansit-pansitan based edible wrappers. From the data we can glean that F3(300g Pansit-pansitan) and F4(200g Pansit-pansitan) scored the highest means of 8.09 and 8.13 rated as like very much and mark as "a" meaning they are not significantly different from each other and are rated the highest formulation. On the other hand, F2(400g Pansit-pansitan) which scored 7.92 also rated as like very much was marked as "b" meaning it is significantly lower than F3(300g Pansit-pansitan) but higher than FI(500g Pansit-pansitan) and F0(500g Seaweeds), meanwhile F1(500g Pansit-pansitan) was marked as "c", scored 7.77 rated as like very much, indicating it is significantly lower than F2(400g Pansit-pansitan) and F4(200g Pansit-pansitan) but higher than F0(500g Seaweeds), which marked as "d" the lowest rated and significantly different from all the other groups.

The grand mean of 7.68 rated as like very much demonstrating that all the modifications done to the 4 formulations is highly acceptable in term of texture. The result of ANOVA confirmed that there are significant differences on the texture of the different formulation with an F-value of 150.87 and a p-value of 0.000 indicating that texture differences are highly significant. The coefficient of variation is low 9.62 % indicating a consistent texture evaluation across panelist. These findings confirm the texture of the modified formulations has improved.

According to Reyes et al. (2023), sensory evaluation studies show that high mean hedonic scores indicate strong acceptability in texture, while low coefficients of variation reflect consistent panelist responses, and ANOVA is commonly used to confirm significant differences among formulations that lead to improved texture quality.

Significant difference in terms or General Acceptability. Table 12 shows the significant difference on the mean acceptability of the quality attributes of pansit pansitan as alternative edible wrappers similar to nori sheets in terms of general acceptability.

Table 12. Significant Difference in terms of General Acceptability

Formulations	Mean	Qualitative Description
F0 (500g Seaweeds)	7.00[c]	Like moderately
F1(500g Pansit-pansitan)	7.73[b]	Like very much
F2(400g Pansit-pansitan)	7.84[ab]	Like very much
F3(300g Pansit-pansitan)	8.08[a]	Like very much
F4(200g Pansit-pansitan)	8.01[a]	Like very much
Grand Mean	7.73	Like very much
CV%	10.74	
F-Value	14.0200	
P-Value	0.000*	

*-with significant

Legend: a-Not Significantly different from each other (highest rated)
b- Significantly lower than "a" but higher than "c", and not significantly different from "ab"
ab-not significantly different from both "a" and "b" groups
c-Significantly different from the other groups (lowest rated)

The table revealed the significant differences in general acceptability of pansit pansitan-based edible wrappers. The data showed that F0(500g Seaweeds) which scored 7.00 described as like moderately is the lowest rated formulation marked as "c", meaning it is significantly different from the other groups. In contrast F3(300g Pansit-pansitan) and F4(200g Pansit-pansitan) both rated the

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highest which they scored not less than 8.00 described as like very much and marked as "a" meaning they are not significantly different from each other. Meanwhile F2(400g Pansit-pansitan) which also scored of 7.84 described as like very much, was mark as "ab" which means it is not significantly different from F3(300g Pansit-pansitan), F4(200g Pansit-pansitan) and F1(500g Pansit-pansitan), which scored 7.73 described as like very much and mark as "b" indicating it is significantly lower than F3(300g Pansit-pansitan) and F4(200g Pansit-pansitan) but higher than F0(500g Seaweeds) and not significantly different from F2(400g Pansit-pansitan).

The grand mean of 7.73 described as like very much indicate strong general acceptability. The coefficient of variation is 10.74 % suggest slightly more different compared to the other attributes. The result of ANOVA, with an F-value of 14.02 with a p-value of 0.00 confirmed the significant effect of the formulation on general acceptability.

Proximate Analysis.

Table 13 displays the result of proximate analysis to show the proximate composition of each formulation.

Table 13. Proximate Analysis of Pansit pansita (Peperomia pellucida)-Based Edible Wrappers (per 1 g sample)

Component	Method	F0 (Seaweed 500g)	F1 (Pansit-Pansitan 500g)	F2 (Pansit-Pansitan 400g)	F3 (Pansit-Pansitan 300g)	F4 (Pansit-Pansitan 200g)
Moisture (%)	Moisture Analyzer	15.31	11.47	10.95	9.62	9.12
Total Ash (%)	Raghuramalu	18.20	16.50	14.80	13.10	11.40
Total Lipid (%)	Folch	4.25	4.80	4.30	3.80	3.30
Total Protein (%)	Biuret Method	12.50	13.80	12.20	10.60	9.00
Total Fiber (%)	Raghuramalu	8.35	11.20	9.80	8.40	7.00
Total Carbohydrate (%)	Difference Method	41.39	42.23	47.95	54.48	60.18
Metabolized Energy (kcal)	Randive	2.54	2.64	2.79	2.93	3.05

The data have shown the proximate composition of Pansit-pansitan-Based Edible Wrappers per 1 gram.
It can be seen in the data, F0(500g Seaweeds) obtained the highest moisture content of 15.31%, due to the seaweeds high polysaccharide content such as, alginate and carrageenan, which have water binding properties. While the four modified formulations have lower moisture content compared to F0(500g Seaweeds). Out of the 4 modified formulation F1(500g Pansit-pansitan) obtained the highest moisture content of 11.47%, followed by F2(400g Pansit-pansitan) with 10.95%, F3(300g Pansit-pansitan) with 9.62% and F4(200g Pansit-pansitan) with 9.12% marked as the driest formulation. The lower moisture in Pasit-pansitan formulations may enhance the shelf stability, as high water content accelerates microbial growth. This implies that moisture management is crucial in formulation to balance texture, stability, and nutrient retention.

In terms of ash content, serve as the indicator of mineral content, in the data F0(500g Seaweeds) with 18.20 has the highest mineral content. Indicating that seaweed is valuable for mineral fortification. On the other hand, the four modified formulations obtained 16.50 to 11.40 mineral content. This implies that the higher decrease of pansit-pansitan on the formulations had reduced mineral density.

In lipid content, it ranged from 3.30% to 4.80%, with F1(500g Pansit-pansitan) obtained the highest percentage this can be attributed in addition of sesame oil, which are rich in unsaturated fats that contribute to the energy density and health benefits, respectively followed by F2(400g Pansit-pansitan) which obtained 4.30 %, F0(500g Seaweeds) with 4.25%, F3(300g Pansit-pansitan) with 3.80%, and F4(200g Pansit-pansitan) with 3.30%. Although the differences are minimal but they highlight that lipids in plant-formulations can be manipulated through ingredient choice, that support heart-healthy, low-fat product design.

Protein is essential for tissue repair, enzyme production, and satiety. In the data F1(500g Pansit-pansitan) is the highest protein content, obtained 13.80% which outperformed F0(500g Seaweeds) which 12.80% protein only. Among the formulations F4(200g Pansit-pansitan) is the lowest which obtained 9.00%. Moderate Pansit-pansitan incorporation improves protein levels without diluting other nutrients. However, the decrease of protein levels in Pansit-panistan when formulation weight decreases, may relate to its lower inherent protein content compared to seaweeds. It indicates that careful balancing of ingredients can enhance functional nutrient profiles.

F1(500g Pansit-pansitan) which obtained 11.20% is highest in terms of fiber content and F4(200g Pansit-pansitan) obtained the lowest fiber 7.00 %, as the level of Pansit-pansitan decreases in every formulation the fiber content also decreases. Dietary fiber supports digestive health, glycemic control and satiety. Both seaweeds and Pansit-pansitan contribute soluble and insoluble fibers, with seaweeds polysaccharides promoting prebiotic activity. And F1(500g Pansit-pansitan)'s fiber-rich profile demonstrates an optimal formulation for gut and health and dietary management.

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In terms of total carbohydrate, F4(200g Pansit-pansitan) with 60.18% is the highest, followed by F3(300g Pansit-pansitan) with 54.48%, F2(400g Pansit-pansitan) with 47.95%, F1(500g Pansit-pansitan) with 42.23% and F0(500g Seaweeds) obtained the lowest carbohydrates content of 41.39%. It indicates that, as the amount of Pansit-pansitan decreases the total carbohydrates consistently increase. Carbohydrates serve as the primary energy source, and higher levels enhance the energy density of the product. This makes Pansit-pansitan-rich formulations suitable as functional snacks or meals for energy provision, especially in physically active populations.

In terms of metabolized energy, data revealed that from 2.54 kcal/g in F0(500g Seaweeds) to 3.05 kcal/g of F4(200g Pansit-pansitan). Out of the 5 formulation F4(200g Pansit-pansitan) is the energy dense formulation. Reflecting the cumulative effect of carbohydrate, protein, and lipid composition. The energy correlates with higher carbohydrate levels in Pansit-pansitan rich formulations, indicating that their potential as energy dense functional foods for both general and targeted nutrition interventions.

Shelf Life Observation

1-month Shelf Life Observation. Table 14 Shows the Result of Pansit-pansitan-Based Edible Wrappers in 1-month observation

Table 14. Result of Pansit-pansitan-Based Edible Wrappers in 1-month observation

Formulation	Storage Condition	Last Acceptable Day	Reason/symptoms (mold/off-odor/gas/color/texture)
F0	Room temp	More than a month	No molds, odor, gas bubbling, and change of color were seen and the texture remained intact.
F1	Room temp	More than a month	There were no molds, gas bubbling and change of color seen in the wrapper. No off flavors tasted. Texture remain intact but the crispiness of the wrappers is lost by week 3 of storing. The odor remains aromatic.
F2	Room temp	More than a month	There were no molds, gas bubbling and change of color seen in the wrapper. No off flavors tasted. Texture remain intact but the crispiness of the wrappers is lost by week 3 of storing. The odor remain aromatic.
F3	Room temp	More than a month	There were no molds, gas bubbling and change of color seen in the wrapper. No off flavors tasted. Texture remain intact but the crispiness of the wrappers is lost by week 3 of storing. The odor remain aromatic.
F4	Room temp	More than a month	There were no molds, gas bubbling and change of color seen in the wrapper. No off flavors tasted. Texture remain intact but the crispiness of the wrappers is lost by week 3 of storing. The odor remain aromatic.

The shelf life of Pansit-pansitan-based edible wrappers were determined to ensure the safeness of the developed product. A one-month shelf life observation was conducted. The modified formulations were sealed using vacuum sealed plastic, placed in containers and stored in a normal room temperature. Based on the table the formulations showed good microbial and quality reliability. No growth of molds was detected in any of the four modified formulation throughout the observation, and there are no foul odors or off flavors marked, clearly showed that microbial spoilage and sensory deterioration were not visible.

No gas formation was observed and no signs of bubbling on the packaging of formulation. It is eminent that the chemical and microbiological activities that can lead to spoilage were minimal during the observation period.

In terms of physical quality, all the modified formulations maintained their color with no significant discoloration or fading. The formulations also showed no surfaced defects like cracks or spot, but although the overall appearance remained acceptable, the crispiness of the formulations slightly decreased during the 3rd week of storage.

All in all, the result reveals that all the modified formulations are still safe to consume for a least a month or more, with no harmful changes in microbial, chemical, and physical properties except for the slight loss of crispiness. This performance further suggests that, under the applied storage conditions, the modified formulations were effective in prolonging its shelf life.

This is aligned with the study of L.N. Kondoli 2021, stating that the shelf life of food stuffs influences food quality. Therefore, it is necessary to ensure that the stored food is according to the correct shelf-life so that the food produces or processed can be of good quality and importantly it will not cause disease for those who consume it.

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Summary of Cost and Return Analysis

Cost of production. Table 15 shows the summary computation of cost and return analysis of Pansit-pansitan-based edible wrappers

Table 15. Summary of Cost and Return Analysis of Pansit-pansitan-Based Edible Wrappers

Items	F0	F1	F2	F3	F4
	Cost	Cost	Cost	Cost	Cost
Seaweeds	280.00	0	0	0	0
Pansit pansitan	0.00	20.00	18.00	16.00	14.00
Garlic powder	2.40	2.40	2.40	2.40	2.40
Sesame oil	4.95	4.95	4.95	4.95	4.95
Carrageenan Powder	10.05	10.05	10.05	10.05	10.05
Water	4	2	2	2	2
Sub Total	301.40	39.4	37.4	35.4	33.4
ADDITIONAL EXPENSES					
Packaging (vacuum plastic)	5.00	5.00	5.00	5.00	5.00
Label	3.00	3.00	3.00	3.00	3.00
Sub Total	8.00	8.00	8.00	8.00	8.00
OTHER OPERATING EXPENSES					
LPG	20	20	20	20	20
Transportation/Fare	10	10	10	10	10
Electricity	100	100	100	100	100
Labor	20	20	20	20	20
Sub total	150	150	150	150	150
Total Cost	459.40	197.40	195.40	193.40	191.40

As shown in the table, due to the high price of seaweeds F0(500g Seaweeds) gained the highest total cost of 459.40.00 pesos. While the other 4 modified formulations have lower cost ranging from 197.40 to 191.40, as their main ingredients is Pansit-pansitan, which is more cost effective and are available around us.

Additional expenses like packaging and labelling the 5 formulations are the same 5.00 for packaging and 3.00 for label. Other operating expenses which has subtotal of 150.00, categorized as follows 20.00 for gas range, 10.00 for fuel, and 100.00 for electricity as it need to dehydrate the product for about 5-6 hours and 20.00 for labor.

Over all, the data shows that F0(500g Seaweeds) is the least cost efficient due to the higher price of seaweed that result in the highest total production cost. On the other hand, using pansit-pansitan in the modified formulations significantly lessen the reduced total cost. Since packaging, labelling and operating expenses are all the same. The main factor affecting cost differences is the choice of primary ingredient.

According to Hernandez et al. (2022), the cost efficiency of food product formulations is largely influenced by the primary raw material used, where high-cost ingredients significantly increase total production expenses, while substituting with locally available and cheaper plant-based materials can effectively reduce overall costs without affecting other fixed expenses such as packaging and labor.

Summary Computation of Return of Expenses

Computation of Return of Expenses. Table 16 shows the summary computation of return and investment of each treatment.

Table 16. Summary Computation of Return on Expenses

Particulars		Formulation			
	F0	F1	F2	F3	F4
Total Production Cost	459.40	197.4	195.4	193.4	191.4
Number of Yields	6	29	25	21	17
Unit Cost= Total Production/ Number of Yields	76	6.79	7.8	9.20	11.59
Percentage Mark-Up (30%)	22.8	2.04	2.34	2.76	3.48
Selling Price= Unit Cost + Percentage Mark up	98.8	8.83	10.14	11.96	15.07
Total Sale= Selling Price x Number of Yields	592.8	256.07	253.5	251.16	256.19
Income= Total Sales - Total Production	133.4	58.67	58.1	57.76	64.79
ROX	28.95 %	29.72%	29.73%	29.87%	33.85%

The data shows a comparative analysis of production cost, sales and ROX among the four modified formulations Pansit-Pansitan-based edible wrapper. Based on the results, F4(200g Pansit-pansitan) were the lowest in production cost a total of 191.40 among the modified formulation produces 17 wrappers due to the reduced quantities of ingredients. On the other hand, F1(500g Pansit-

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pansitan) had the highest cost a total of 197.40 but it produces 29 wrappers suggesting better output despite its higher expenses. Followed by F2(400g Pansit-pansitan) with the total cost of 195.40 and produces 25 wrappers, F3(300g Pansit-pansitan) that has a total cost of 193.40 which produces 21 wrappers. While the controlled formulation produces only 6 wrappers and gained the highest total production cost of 459.4 due to the pricy value of seaweeds.

In terms of profitability F4(200g Pansit-pansitan) achieved the highest ROX of 33.85 %, indicating strong profitability despites fewer yields. Followed by F3(300g Pansit-pansitan) with ROX of 29.87%, F2(400g Pansit-pansitan) that has an ROX of 29.73%, F1(500g Pansit-pansitan) with 29.72%. The ROX of the modified formulations are all most with a little difference in them. While the F0 has an ROX of 28.95% pricy due to its high cost of seaweeds makes it not profitable.

F4(200g Pansit-pansitan) is the most sustainable formulation, balancing low production costs, competitive pricing and the highest profitability. While F1(500g Pansit-pansitan) offers highly yields, F4(200g Pansit-pansitan)'s financial efficiency makes it the preferred choice for sustainable production.

CONCLUSION

From the summary of results, we can conclude that:
F4 (200 g Pansit-pansitan) was more acceptable than any other formulation based on judgment of the color/appearance, odor/aroma and texture. F3 (300 g Pansit-pansitan) received the highest scores for taste/flavor and overall acceptability of consumers. Thus, it is evident that consumers preferred these formulations. There was a significant difference between the average ratings of the samples compared to those of traditional nori sheets based on (a) color/appearance, (b) odor/aroma, (c) taste/flavor, (d) texture and (e) overall acceptability. These findings demonstrated that formulation modification increased the quality of the product. A comparison of the proximate analyses showed that the control sample (F0) had the highest moisture and ash contents, while F1 (500 g Pansit-pansitan) had the largest moisture, ash, lipid, protein and fiber contents of the modified formulations, and F4 (200 g Pansit-pansitan) displayed the greatest total carbohydrate and metabolized energy contents of the modified samples.The shelf-life analysis indicated that all the modified formulations could be stored for at least one month while still maintaining sufficient quality and safety, although due to very slight loss of the crispiness occurred. Out of all the formulations, F4 (200 g of Pansit-pansitan) demonstrates the highest Return of Expenses (ROX), followed by F3 (300 g of Pansit-pansitan), F2 (400 g Pansit-pansitan), and F1 (500 g Pansit-pansitan).

RECOMMENDATIONS

1. Based on the results of this study, F4(200 g of Pansit-pansitan) be utilized as a replacement for traditional nori sheets because it produced the most ideal coloring, aroma, and texture. However, F3(300 g of Pansit-pansitan) is also preferred according to taste and overall acceptability with a high level of commercial potential. Therefore, we also recommend that F1(500 g of Pansit-pansitan) be considered for commercial purposes because it produced the largest quantity of wrappers.
2. Further research should emphasize maintaining crispiness of the edible wrapping and conducting studies on shelf stability and microbial stability to be able to determine the expiration date of fully prepared product.
3. Additional functional ingredients should be studied for use and increased health benefit.
4. Future studies should examine different types of binding agents in order to enhance the wrappers' strength while maintaining their crispness.

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