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ENHANCING THE NUTRITIONAL AND SENSORY QUALITIES OF MIKI NOODLES USING MALUNGGAY (Oleifera) POWDER AND SQUASH (Cucurbita maxima) PUREE

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ABSTRACT

The rising demand for nutritious and innovative food products highlights the importance of developing alternatives incorporating locally available, health-enhancing ingredients. However, there is limited research on combining *malunggay* (Moringa oleifera) and squash (Cucurbita maxima) in noodle production to improve nutritional value and consumer acceptability. This study aimed to develop and evaluate the acceptability of malunggay and squash Miki noodle recipes. The developmental process involved preparing malunggay powder from dried and pulverized leaves and squash puree from cooked and mashed squash. These ingredients were incorporated into Miki noodle dough and processed into noodle strands. The finished products, including pancit guisado and pancit sabaw variants, were subjected to sensory evaluation by 100 evaluators using a five-point Likert scale. Attributes such as appearance, aroma, taste, texture, and general acceptability were assessed. Results revealed that malunggay and squash are effective and acceptable ingredients for Miki noodles, enhancing both nutritional value and sensory qualities. Sun-drying significantly extended shelf life to 2–3 months. The study recommends further research on nutritional analysis, cost-effectiveness, and innovative food product development to maximize the potential of these locally available ingredients.

Keywords: *Malunggay (Moringa oleifera), Squash (Cucurbita maxima), Miki noodles, Sensory evaluation, Nutritional enhancement*

INTRODUCTION

Man never ceases to discover infinite ways to utilize accessible resources to satisfy his longings for health, wellness, and overall well-being. The presence of medicinal plants, being nature's gift, has enabled the advancement of modern medicine by maximizing their utilization in capsulated herbal medicines or food supplements. It is scientifically and medically proven that numerous vitamins and minerals can be found in plants, which address the medical needs of humans. However, plants today should not just be limited to pharmaceutical production but should also be explored as ingredients for more unique and healthier foods.

In the Philippines, many poor families cannot afford nutritious food. Often, they resort to buying cheaper options that lack nutritional value (Siy Van et al., 2021). Despite their premium price, even expensive foods these days are often heavily marketed rather than truly nutritious.

Malunggay, scientifically known as *Moringa oleifera*, is a popular plant recognized for its nutritional value and medicinal properties. Once regarded as a *"poor man's vegetable,"* (Koul & Chase, 2015) it is now touted as a *"miracle tree"* or "nature's medicine cabinet" (Rao, et. al, 2018; Jain, et al, 2021) by scientists and healthcare workers globally due to its richness in vitamins and minerals. Research has shown that malunggay contains seven times the vitamin C of oranges, four times the vitamin A of carrots, three times the iron of spinach, four times as much calcium as milk, and three times the potassium of bananas (Pratibha & Virginia, 2020).

In the Philippines, malunggay is widely consumed, with its leaves readily available in markets at affordable prices. The leaves are commonly added to broths to create a simple yet nutritious soup. They are also a key ingredient in traditional dishes like *tinola*, a chicken broth with malunggay leaves and green papaya. They are increasingly used to prepare innovative dishes such as pesto sauces and malunggay-flavored drinks.

Similarly, squash (*Cucurbita maxima*) is a versatile vegetable known for its fleshy texture and high nutritional value, particularly in its winter varieties. Squash is an excellent source of beta-carotene, fiber, and other vitamins and minerals, making it a valuable addition to various dishes (Hashash, et al, 2017). In Filipino cuisine, squash is frequently used in savory dishes, enriching flavor and nutritional content.

Fresh pasta such as *Miki* noodles, commonly used in *pancit* dishes, is integral to Filipino cuisine. Miki noodles are typically made from flour and eggs, making them tender and quick to cook. These noodles are central to local dishes such as *Pancit Cabagan* and *Pancit Batil Patong*, which reflect the Filipino love for versatile and hearty meals. However, commercially available Miki noodles often lack essential nutrients, as their nutritional profile mainly comprises carbohydrates, with minimal vitamins and minerals (Chowdhury, et al, 2020).

In this context, the potential for improving the nutritional value of *Miki* noodles becomes apparent. With malunggay leaves and squash as the main ingredients, it is possible to address the issue of inadequate nutrition in one of the country's most commonly consumed foods. Studies on fortifying noodles with plant-based ingredients have shown promise, but much of the research focuses on wheat additives or other non-local ingredients (Roobab, & Maqsood, 2023; Ahmed, et al, 2023). The limited exploration of indigenous and affordable options such as malunggay and squash highlights a significant research gap.

This study aims to bridge this gap by developing malunggay-squash Miki noodles, which are enriched with the health benefits of both plants. The study will also evaluate the acceptability of this innovative product among Filipino consumers. By doing so, it seeks to offer a practical, affordable, and nutritious alternative to traditional noodles, contributing to improved dietary practices and health outcomes.

Research Questions

This research study aimed to develop Miki noodles using Malunggay leaves and Squash fruit as main ingredients and find their acceptability as noodle dishes.

Specifically, it sought to answer the following questions:

1. What are the processes involved in developing Miki noodles using malunggay leaves and squash fruit?
2. What is the acceptability of malunggay and squash Miki noodles using different mixture concentrations?
3. What is the level of acceptability of malunggay and squash Miki noodle recipes?
4. What is the level of acceptability of the malunggay and squash Miki noodle recipes in terms of taste, texture, aroma; and color/ appearance?
5. Is there a significant difference in the level of general acceptability of malunggay-squash Miki noodles among varied groups of respondents in terms of taste, texture, aroma, and color in malunggay and squash Miki noodle recipes?
6. What is the shelf life of *malunggay* and squash Miki noodles at a normal room temperature?

METHODOLOGY

Development Procedure

This study used malunggay leaves and squash fruits. The developmental procedure began with selecting malunggay leaves, which were dried, finely pulverized, and then sifted to become malunggay powder. After preparing the malunggay powder, the preparation of malunggay Miki noodles came next, followed by the preparation of malunggay pancit recipes.

Similarly, the development process for squash fruits started with gathering the squash fruits, washing, peeling, and cooking them for 15 minutes. The cooked squash was mashed until it turned into a puree. After preparing the squash puree, the preparation of squash *Miki* noodles came next, followed by the preparation of squash pancit recipes. The same process was applied to the combination of malunggay and squash *Miki* noodle recipes

Preparation of Malunggay Powder and Squash Mashed / Puree

Fresh malunggay leaves were purchased from the market, selected, and washed as required. The leaves were drained using a colander or strainer and dried in an oven dryer at a temperature of at least 50°C to 100°C (122°F to 212°F) until crispy. After drying, the malunggay leaves were finely pulverized using a mortar and pestle or blender until powdery. Then, the pulverized malunggay leaves were sifted to remove coarse particles.

Similarly, fresh squash was purchased from the market, washed under running water, peeled, and cut into cubes. The squash was cooked for 15 minutes or boiled until tender, taking care not to overcook it. After cooking, the squash was drained and left in a colander or spread out on a sheet pan until cool enough to handle. It was then mashed or blended until it turned into a smooth puree.

Preparation of Malunggay (Moringa oleifera) and Squash (Cucurbita maxima) Miki Noodles

Begin by measuring the ingredients for the Miki noodle dough. Mix these ingredients with the measured malunggay powder and squash mash according to the standard proportions indicated in Table 1. Knead the dough using the heels of your hands until it reaches the desired firmness for Miki noodles. Then, flatten the dough using a rolling pin or dough mixer, ensuring it is not too thick or too thin.

Next, insert portions of the flattened dough into the Miki maker to cut it into Miki noodle strands. Carefully separate the strips to prevent them from sticking together. At this stage, the Miki noodles can be dried to prolong their shelf life. Hang the strips over a Miki noodle rack and dry them for at least 1–2 days. Once dried, store the noodles in airtight containers or standard packaging materials to maintain freshness.

After completing the entire process, the Miki noodles are ready to be cooked with your desired recipe.

Table 1. Proportion of Ingredients Used in the Preparation of Malunggay and Squash Miki Noodle Recipes

Ingredients	RECIPES		
	Malunggay Pancit Guisado and Pancit *Sabaw*	Squash Pancit Guisado and Pancit *Sabaw*	Malunggay and Squash Pancit Guisado and *Sabaw*
Powdered Malunggay Leaves	50 g	50 g	50 g
Squash Mashed	50 g	50g	50g
APF (1st Class Flour)	1000g	1000g	1000g
Soda Ash	2.5g	2.5g	2.5g
Salt	2.5g	2.5g	2.5g
Egg	2 pcs (large)	2 pcs (large)	2 pcs (large)
Water	200g	200g	200g
Malting	250g	250g	250g

Legend: g- gram pc- piece/s APF- All Purpose Flo

Sensory Evaluation

The finished products were subjected to sensory evaluation. One hundred (100) evaluators of varying age groups were selected and properly oriented on what to evaluate and how to use the score sheet, which included sample codes for reference. The samples were arranged on a table and systematically evaluated.

The evaluators were asked to taste the samples from each dish, which were placed on trays. Data on the appearance, aroma, taste, texture, and general acceptability of each dish were collected and recorded. These data were then decoded and subjected to statistical analysis.

The instrument used for data gathering was a score sheet designed for qualitative analysis to determine the acceptability of the food products. The responses regarding the level of acceptability of the malunggay and squash Miki noodle dishes—in terms of appearance/color, texture, aroma, and taste – were solicited using a five-point Likert Scale. The weight assignments for the scale are shown in Table 2.

Table 2. The range Numerical Rating and its Equivalent Descriptive Rating

Numerical Rating	Descriptive Rating
4.50 - 5.00	Highly Acceptable
3.50 – 4.49	Moderately Acceptable
2.50 – 3.49	Acceptable
1.50 – 2.49	Slightly Acceptable
.50 – 1.49	Not Acceptable

RESULTS AND DISCUSSION

Product Development

The development of *Miki* noodle recipes underwent several stages, starting from the preparation of malunggay leaves into malunggay powder, and squash fruits into mashed squash. These ingredients were then incorporated into malunggay and squash *Miki* noodles. The resulting noodles were used to prepare six recipes: Malunggay *Pancit Guisado*, Squash *Pancit Guisado*, Malunggay and Squash *Pancit Guisado*, Malunggay *Pancit Sabaw*, Squash *Pancit Sabaw*, and Malunggay and Squash *Pancit Sabaw*. Throughout these stages, careful observation and analysis were conducted to ensure the quality and acceptability of the malunggay and squash *Miki* noodle products.

Procedure

The developmental process began with the preparation of malunggay leaves, which were dried and ground into powder, and squash fruits, which were cooked and mashed. The powdered malunggay leaves and mashed squash were then combined with all-purpose flour to create the dough for the Miki noodles. These noodles served as the primary ingredient in the various noodle recipes developed for this study.

1. Preparation of Powdered Malunggay Leaves and Mashed Squash fruits

a. Preparation of powdered malunggay leaves.

Procedure:

1. Wash malunggay leaves in a running water and drain
2. Separate malunggay leaves from its stalk.
3. Spread the malunggay leaves on baking pans and dry them in an oven dryer at a temperature of at least 50–100 degrees Celsius (122°F–212°F) until they become crispy and suitable for pulverizing.
4. Pulverize the dried malunggay leaves using a blender.
5. Sift to remove the coarse particles to produce powdered malunggay leaves.

b. Preparation of Mashed Squash fruits

Procedure:

1. Wash squash fruit with running water.
2. Peel and cut into cubed form.
3. Cook for 15 minutes or boil until tender but do not overcook.
4. Drain the squash in the colander or spread out on a sheet pan until cool enough to handle.
5. Mash until such time turns into puree or well mashes.

2. Preparation in the Development of Squash (Cucurbita Maxima) and Malunggay (Moringa Oleifera) Miki-Noodles

The following are the processes involved in the preparation of malunggay and squash Miki-noodle for noodle recipes.

1. Mise- en - place.
2. Measure the ingredients for making a dough for pasta or Miki-noodle.
3. In a large mixing bowl, combine all the ingredients according to the standard proportion indicated in Table 4, and mix well on fingertips to form a ball of dough.
4. Place the dough on a lightly floured surface; flatten slightly. Knead for 5 minutes until smooth and elastic, adding more malting flour to prevent sticking if necessary. Let rest until the dough is slightly dry but can be handled without breaking.
5. Lightly flour the dough circle, and roll loosely on a rolling pin/ dough roller.
6. Slide the rolling pin out; press the dough roll gently with your hand and cut into strips of desired width with Miki maker/. Carefully unfold strips.
7. Miki-noodles can be dried at this point. Hand strips over Miki-noodle rack. Dry for at least 1-2 days to prolong the shelf life.
8. Store in airtight containers or standard packaging materials.
9. After the process of making a Miki noodle, the product is now ready for cooking with the desired recipe. (Pancit Guisado and Pancit *Sabaw*).

3. Preparation of Malunggay and Squash Miki-Noodle Recipes

The process involved in the preparation of malunggay and squash Miki noodle recipes

Recipe No. 1 Malunggay Pancit Guisado

Ingredients:

1kg. Malunggay Miki-Noodles
½ Kg. Pork Belly (Carajay)
½ Kg. Pork Pige & Liver
½ kg. Cabbage, Julienned
½ Kg. Carrots, Julienned
¼ kg, Baguio Beans
¼ kg. Celery, Chopped
4 cloves garlic, minced
4-bulb Onion, sliced
¼ Tbsp. Salt
2 tsp. ground pepper
16 grams. Magic Sarap / MSG (optional)
1 Cup. Soy Sauce
3 Tbsp. Oyster Sauce
½ Cup Oil

3 pcs. Hard Boiled Egg
1 L. Stock

Procedure:

1. In a saucepan, put pork belly, water, and salt and pepper, let boil, then simmer until the pork is tender, drain, and cool.
2. Heat oil in a deep fryer, fry pork belly until golden brown and crispy. Set aside.
3. Sauté garlic and onion.
4. Add pork and liver. Seasoned with salt, magic/msg, dash of pepper. Cook for 10-15 minutes.
5. Add soy sauce and pork stock. Let boil.
6. Add the malunggay noodles to the mixture.
7. Add the carrots, cabbage, and celery then simmer until the noodle and vegetables are cooked. Do not overcook.
8. Transfer to a serving plate.
9. Add suitable garnishings such as hard-boiled egg and lechon kawali
10. Serve hot.

Recipe No. 2 Squash Pancit Guisado

Ingredients:

1kg. Squash Miki- Noodles
½ Kg. Pork Belly (Carajay)
½ Kg. Pork Pige
½ kg. Cabbage, Julienned
½ Kg. Carrots, Julienned
¼ kg. Celery, Chopped
4 cloves garlic, minced
4-bulb Onion, sliced
¼ Tbsp. Salt
2 tsp. ground pepper
16 grams. Magic Sarap / MSG (optional)
1 Cup. Soy Sauce
3 Tbsp. Oyster Sauce
½ Cup Oil
3 pcs. Hard Boiled Egg
1 L. Stock

Procedure:

1. In a saucepan, put pork belly, water, and salt and pepper, let boil, then simmer until the pork is tender, drain, and cool.
2. Heat oil in a deep fryer, fry pork belly until golden brown and crispy. Set aside.
3. Sauté garlic and onion.

4. Add pork and liver. Seasoned with salt, magic/msg, dash of pepper. Cook for 10-15 minutes.
5. Add soy sauce and pork stock. Let boil.
6. Add the miki- noodles in the mixture.
7. Add the carrots, cabbage, and celery then simmer until the noodle and vegetables are cooked. Do not overcook.
8. Transfer to a serving plate.
9. Add suitable garnishings such as hard-boiled egg and lechon *kawali*
10. Serve hot.

Recipe No 3 Malunggay and Squash Pancit Guisado

Ingredients:

1kg. Malunggay and squash Miki-Noodles
½ Kg. Pork Belly (Carajay)
½ Kg. Pork Pige
½ Kg. Pork Liver
½ kg. Cabbage, Julienned
½ Kg. Carrots, Julienned
¼ kg. Celery, Chopped
4 cloves garlic, minced
4-bulb Onion, sliced
¼ Tbsp. Salt
2 tsp. ground pepper
16 grams. Magic Sarap / MSG (Optional)
1 Cup. Soy Sauce
3 Tbsp. Oyster Sauce
½ Cup Oil
3 pcs. Hard Boiled Egg
2 ½ L. Stock / Water

Procedure:

1. In a saucepan, put pork belly, water, and salt and pepper, let boil, then simmer until the pork is tender, drain, and cool.
2. Heat oil in a deep fryer, fry pork belly until golden brown and crispy. Set aside.
3. Sauté garlic and onion.
4. Add pork and liver. Seasoned with salt, magic/msg, dash of pepper. Cook for 10-15 minutes.
5. Add soy sauce and pork stock (add more water if needed). Let boil.
6. Add the miki- noodles in the mixture.
7. Add the carrots, cabbage, and celery then simmer until the noodle and vegetables are cooked. Do not overcook.
8. Transfer to a serving plate/soup bowl.

9. Add suitable garnishings such as hard-boiled egg and lechon kawali
10. Serve hot.

Recipe No.4 Malunggay Pancit Sabaw

Ingredients:

1kg. Malunggay Miki-Noodles
½ Kg. Pork Belly (Carajay)
½ Kg. Pork Pige & Liver
½ kg. Cabbage, Julienned
½ Kg. Carrots, Julienned
¼ kg, Baguio Beans
¼ kg. Celery, Chopped
4 cloves garlic, minced
4 bulb Onion, sliced
¼ Tbsp. Salt
2 tsp. ground pepper
16 grms. Magic Sarap / MSG (optional)
1 Cup. Soy Sauce
3 Tbsp. Oyster Sauce
½ Cup Oil
3 pcs. Hard Boiled Egg
1 L. Stock

Procedure:

1. In a saucepan, put pork belly, water, and salt and pepper, let boil, then simmer until the pork is tender, drain, and cool.
2. Heat oil in a deep fryer, fry pork belly until golden brown and crispy. Set aside.
3. Sauté garlic and onion.
4. Add pork and liver. Seasoned with salt, magic/msg, dash of pepper. Cook for 10-15 minutes.
5. Add soy sauce and pork stock (add more water if needed). Let boil.
6. Add the miki- noodles in the mixture.
7. Add the carrots, cabbage, and celery then simmer until the noodle and vegetables are cooked. Do not overcook.
8. Transfer to a serving plate/soup bowl.
9. Add suitable garnishings such as hard-boiled egg and lechon kawali
10. Serve hot.

Recipe No.5 Squash Pancit Sabaw

Ingredients:

1kg. Squash Miki-Noodles
½ Kg. Pork Belly (Carajay)
½ Kg. Pork Pige & Liver
½ kg. Cabbage, Julienned
½ Kg. Carrots, Julienned
¼ kg, Baguio Beans
¼ kg. Celery, Chopped
4 cloves garlic, minced
4-bulb Onion, sliced
¼ Tbsp. Salt
2 tsp. ground pepper
16 grms. Magic Sarap / MSG (Optional)
1 Cup. Soy Sauce
3 Tbsp. Oyster Sauce
½ Cup Oil
3 pcs. Hard Boiled Egg
1 L. Stock

Procedure:

1. In a saucepan, put pork belly, water, and salt and pepper, let boil, then simmer until the pork is tender, drain, and cool.
2. Heat oil in a deep fryer, fry pork belly until golden brown and crispy. Set aside.
3. Sauté garlic and onion.
4. Add pork and liver. Seasoned with salt, magic/msg, and (Optional) dash of pepper. Cook for 10-15 minutes.
5. Add soy sauce and pork stock (add more water if needed). Let boil.
6. Add the miki- noodles in the mixture.
7. Add the carrots, cabbage, and celery then simmer until the noodle and vegetables are cooked. Do not overcook.
8. Transfer to a serving plate/soup bowl.
9. Add suitable garnishings such as hard-boiled egg and lechon kawali
10. Serve hot.

Recipe No. 6 Malunggay and Squash Pancit Sabaw

Ingredients:

1kg. Malunggay and Squash Miki-Noodles
½ Kg. Pork Belly (Carajay)
½ Kg. Pork Pige & Liver

½ kg. Cabbage, Julienned
½ Kg. Carrots, Julienned
¼ kg, Baguio Beans
¼ kg. Celery, Chopped
4 cloves garlic, minced
4-bulb Onion, sliced
¼ Tbsp. Salt
2 tsp. ground pepper
16 grams. Magic Sarap / MSG (Optional)
1 Cup. Soy Sauce
3 Tbsp. Oyster Sauce
½ Cup Oil
3 pcs. Hard Boiled Egg
1 L. Stock

Procedure:

1. In a saucepan, put pork belly, water, and salt and pepper, let boil, then simmer until the pork is tender, drain, and cool.
2. Heat oil in a deep fryer, fry pork belly until golden brown and crispy. Set aside.
3. Sauté garlic and onion.
4. Add pork and liver. Seasoned with salt, magic/msg, dash of pepper. Cook for 10-15 minutes.
5. Add soy sauce and pork stock (add more water if needed). Let boil.
6. Add the miki- noodles in the mixture.
7. Add the carrots, cabbage, and celery then simmer until the noodle and vegetables are cooked. Do not overcook.
8. Transfer to a serving plate/soup bowl.
9. Add suitable garnishings such as hard-boiled egg and lechon kawali
10. Serve hot.

B. Product Evaluation

Acceptability of the Malunggay and Squash Miki-Noodles in Using Different Recipes

Table 6. Level of Acceptability of Malunggay and Squash Miki-noodles in Using Different Recipes

Recipes	Mean	Standard Deviation	Remarks
Malunggay Guisado	4.68	0.44	Highly Acceptable
Squash Guisado	4.89	0.25	Highly Acceptable
Malunggay & Squash Pancit Guisado	4.66	0.51	Highly Acceptable
Sabaw Malunggay	4.74	0.43	Highly Acceptable

Sabaw Squash	4.73	0.42	Highly Acceptable
Sabaw Malunggay and Squash	4.75	0.43	Highly Acceptable
Grand Mean	4.74	0.41	Highly Acceptable

The table shows the acceptability of Malunggay and Squash Miki-noodles using different recipes. Malunggay guisado, Squash guisado, Malunggay and Squash guisado, sabaw Malunggay, sabaw Squash, and sabaw malunggay and squash. As seen in Table 6, all recipes were rated "highly acceptable" as indicated by the grand mean of 4.74.

The reviewed studies by Buraga (2017) were found to be related to the present study in terms of the acceptability of using different recipes that were rated "highly acceptable".

Level of Acceptability of Malunggay and Squash Miki-noodle Recipes as to the Respondents' Age Group

Table 7. Level of Acceptability of Malunggay Pancit Guisado as to Respondents' Age Group

Age Group	Mean	Standard Deviation	Remarks
Children	4.76	0.36	Highly Acceptable
Adolescents	4.79	0.34	Highly Acceptable
Adults	4.69	0.39	Highly Acceptable
Experts	4.48	0.60	Moderately Acceptable
Mean	4.68	0.42	Highly Acceptable

Table 7 reflects the acceptability level of malunggay pancit guisado according to age group. Of the four age groups, only experts found the malunggay pancit guisado recipes as "moderately acceptable" at a 4.48 acceptability level. The three other groups, children, adolescents, and adults rated the recipe "highly acceptable" with a mean of 4.76, 4.79, and 4.69 respectively. In general, the recipe was "highly acceptable" with a grand acceptability level of 4.68.

Table 8. Level of Acceptability of Squash Pancit Guisado as to Respondents' Age Group

Age Group	Mean	Standard Deviation	Remarks
Children	4.84	0.39	Highly Acceptable
Adolescents	4.88	0.22	Highly Acceptable
Adults	4.89	0.19	Highly Acceptable
Experts	4.97	0.08	Highly Acceptable
Mean	4.89	0.22	Highly Acceptable

Table 8 reveals the level of acceptability of Squash Pancit Guisado according to the age groups of the respondents. It can be gleaned from the table that children, adolescents, adults, and experts rated the recipe "highly acceptable" with mean ratings

of 4.84, 4.88, 4.89, and 4.97, respectively. Overall, the recipes were “highly acceptable to all the age groups.

Table 9. Level of Acceptability of Malunggay and Squash Pancit Guisado as to Respondents’ Age Groups.

Age Group	Mean	Standard Deviation	Remarks
Children	4.74	0.46	Highly Acceptable
Adolescents	4.70	0.49	Highly Acceptable
Adults	4.73	0.40	Highly Acceptable
Experts	4.85	0.35	Highly Acceptable
Mean	4.75	0.42	Highly Acceptable

Table 9 indicates the acceptability level of Malunggay and squash Pancit Guisado according to age groups, As shown in the table, all age groups- children, adolescents, adults, and experts rated the recipe “ highly acceptable” with mean ratings of 4.74, 4.70, 4.73, and 4.85 respectively, Generally, the recipes were “highly acceptable as evidenced by a grand mean rating of 4.75.

Table 10. Level of Acceptability of Malunggay Pancit Sabaw as to the Respondents’ Age Groups.

Age Group	Mean	Standard Deviation	Remarks
Children	4.83	0.28	Highly Acceptable
Adolescents	4.52	0.66	Highly Acceptable
Adults	4.72	0.43	Highly Acceptable
Experts	4.57	0.54	Highly Acceptable
Mean	4.66	0.48	Highly Acceptable

Table 10 reveals the level of acceptability of Malunggay Pancit Sabaw according to age groups, children, adolescents, adults, and experts rated the recipe “highly acceptable with means of 4.83,4.52,4.72, and 4.75, respectively as a whole with respondents rated the recipe “ highly acceptable” with a grand mean of 4.66.

Table 11. Level of Acceptability of Squash Pancit Sabaw as to the Respondents’ Age Groups

Age Group	Mean	Standard Deviation	Remarks
Children	4.83	0.27	Highly Acceptable
Adolescents	4.60	0.61	Highly Acceptable
Adults	4.83	0.27	Highly Acceptable
Experts	4.71	0.48	Highly Acceptable
Mean	4.74	0.41	Highly Acceptable

Table 11 reflects the level of acceptability of Squash Pancit Sabaw according to age group. It can be gleaned from the table that children, adolescents, adults and experts rated the recipe “highly acceptable” with mean ratings of 4.83, 4.60, 4.83, and 4.71, respectively. The overall mean of 4.74 also shows that the respondents considered the recipe as “highly acceptable”.

Table 12. Level of Acceptability of Malunggay and Squash Pancit Sabaw as to the Respondents' Age Groups

Age Group	Mean	Standard Deviation	Remarks
Children	4.67	0.49	Highly Acceptable
Adolescents	4.67	0.51	Highly Acceptable
Adults	4.82	0.31	Highly Acceptable
Experts	4.77	0.34	Highly Acceptable
Mean	4.73	0.41	Highly Acceptable

It can be gleaned from Table 12 the acceptability level of Malunggay and Squash Pancit Sabaw according to age group. Children (4.67), adolescents (4.67), adults (4.82), and experts (4.77) rated the recipe as "highly acceptable". In general, all the respondents rated the recipe "highly acceptable". With a grand mean of 4.72.

Level of Acceptability of Malunggay and Squash Miki-Noodle Recipe in terms of Taste, Texture, Aroma, and Appearance.

Table 13. Level of Acceptability of Malunggay Pancit Guisado Per Criterion

Age Group	Mean	Standard Deviation	Remarks
Taste	4.82	0.50	Highly Acceptable
Texture	4.70	0.58	Highly Acceptable
Aroma	4.62	0.65	Highly Acceptable
Color/Appearance	4.58	0.64	Highly Acceptable
Grand Mean	4.68	0.59	Highly Acceptable

The level of acceptability of Malunggay Pancit Guisado per criterion is shown in Table 13 above. The recipe was considered "highly acceptable' by the respondents in terms of taste, texture, aroma, and appearance with a mean of 4.82, 4.70, 4.62, and 4.58, respectively.

This finding is more similar to the study conducted by Buraga (2017) in terms of appearance, aroma, taste, and texture as perceived by the evaluators with varied ages.

Table 14. Level of Acceptability of Squash Pancit Guisado Per Criterion

Age Group	Mean	Standard Deviation	Remarks
Taste	4.94	0.28	Highly Acceptable
Texture	4.89	0.34	Highly Acceptable
Aroma	4.85	0.41	Highly Acceptable
Color/Appearance	4.90	0.33	Highly Acceptable
Grand Mean	4.89	0.34	Highly Acceptable

The level of acceptability of Squash Pancit Guisado per criterion is shown in table 14 above. The recipe was considered “highly acceptable’ by the respondents in terms of taste (4.92), texture (4.89), aroma(4.85), and appearance (4.90). This means that overall the recipe is “highly acceptable” across criteria.

Table 15. Level of Acceptability of Malunggay and Squash Pancit Guisado Per Criterion

Age Group	Mean	Standard Deviation	Remarks
Taste	4.84	0.46	Highly Acceptable
Texture	4.80	0.51	Highly Acceptable
Aroma	4.71	0.52	Highly Acceptable
Color/Appearance	4.67	0.64	Highly Acceptable
Grand Mean	4.75	0.53	Highly Acceptable

Table 15 shows the level of acceptability of Malunggay and Squash Pancit Guisado as per criterion. As revealed in the table, the respondents found the recipe “highly acceptable” in terms of taste, texture, aroma, and appearance with means of 4.77, 4.70, 4.67, and 4.50 respectively. With a grand mean of 4.75, the recipe was “highly acceptable” to all respondents according to the set criteria.

Table 16. Level of Acceptability of Malunggay Pancit Sabaw Per Criterion

Age Group	Mean	Standard Deviation	Remarks
Taste	4.77	0.53	Highly Acceptable
Texture	4.70	0.63	Highly Acceptable
Aroma	4.67	0.62	Highly Acceptable
Color/Appearance	4.50	0.69	Highly Acceptable
Grand Mean	4.66	0.62	Highly Acceptable

The level of acceptability of Malunggay Pancit Sabaw per criterion is revealed in Table 16. The recipe obtained a rating of “ highly acceptable” in terms of taste (4.77), texture (4.70), and appearance (4.50) with a grand mean of 4.66.

Table 17. Level of Acceptability of Squash Pancit Sabaw Per Criterion

Age Group	Mean	Standard Deviation	Remarks
Taste	4.85	0.38	Highly Acceptable
Texture	4.70	0.61	Highly Acceptable
Aroma	4.69	0.58	Highly Acceptable
Color/Appearance	4.73	0.53	Highly Acceptable
Grand Mean	4.74	0.52	Highly Acceptable

The level of acceptability of Squash Pancit Sabaw is shown in Table 17. It can be gleaned from the table that the recipe is “highly acceptable” to the respondents in terms of taste (4.85), texture (4.70), aroma (4.69), and appearance (4.73).

Table 18. Level of Acceptability of Malunggay and Squash Pancit Sabaw Per Criterion

Age Group	Mean	Standard Deviation	Remarks
Taste	4.78	0.52	Highly Acceptable
Texture	4.70	0.58	Highly Acceptable
Aroma	4.77	0.49	Highly Acceptable
Color/Appearance	4.68	0.60	Highly Acceptable
Grand Mean	4.73	0.55	Highly Acceptable

Table 18 presents the level of acceptability of malunggay and squash pancit sabaw per criterion. Taste, texture, aroma, and appearance were found to be “highly acceptable” by the respondents having 4.78, 4.70, 4.77, and 4.68, respectively.

IV. Comparison of the Level of General Acceptability of the Malunggay and Squash Miki-Noodle Recipe Across Varied Groups.

Table 19. Comparison of the Level of General Acceptability of Malunggay Pancit Guisado Across Varied Groups

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	1.46	3	0.49	2.58	0.058
Within Groups	18.17	96	0.19		
Total	19.63	99			

Table 19 presents the comparison of the level of general acceptability of Malunggay Pancit Guisado across varied groups. With an F-test value of 2.58 and a p-value of 0.058 greater than 0.05, the null hypothesis that there is no significant difference in the acceptability of malunggay pancit guisado among varied groups is accepted. This means that the noodles had the same level of acceptability across the four age groups.

Table 20. Comparison on the Level of General Acceptability of Squash Pancit Guisado Across Varied Groups

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	0.22	3	0.07	1.20	0.31
Within Groups	5.92	96	0.06		
Total	6.14	99			

The table indicates a comparison of the level of general acceptability of squash pancit guisado across varied groups, With an F-test equal to 1.20 and a p-value of 0.31 greater than 0.05, the null hypothesis that there is no significant difference in the acceptability of squash pancit guisado among varied groups is accepted. This means that the noodles had the same level of acceptability across the four age groups.

Table 21. Comparison of the Level of General Acceptability of Malunggay and Squash Pancit Guisado Across Varied Groups

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	0.32	3	0.11	0.58	0.63
Within Groups	17.67	96	0.18		
Total	17.99	99			

The above table shows a comparison of the level of general acceptability of malunggay and squash pancit guisado across varied the F-test value to 0.58 and a p-value of 0.63 greater than 0.05 indicates acceptance of the null hypothesis that there is no significant difference on the acceptability of malunggay and squash pancit guisado among the varied groups. This means that the noodles were of the same level of acceptability across the four age groups.

Table 22. Comparison of the Level of General Acceptability of Malunggay Pancit Sabaw Across Varied Groups

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	1.50	3	0.50	2.02	0.12
Within Groups	23.81	96	0.25		
Total	25.31	99			

Table 22 indicates a comparison of the level of general acceptability of malunggay pancit sabaw across varied groups. With an F-test equal to 2.02 and a p-value of 0.12 greater than 0.05, the null hypothesis is that there is no significant difference in the acceptability of malunggay pancit sabaw among varied groups. This means that the level of acceptability of the noodles across the four age groups was the same.

Table 23. Comparison on the Level of General Acceptability of Squash Pancit Sabaw Across Varied Groups

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	0.92	3	0.31	1.64	0.18
Within Groups	17.89	96	0.19		
Total	18.81	99			

Table 23 reveals a comparison of the level of general acceptability of squash pancit sabaw across varied groups. The F-test value of 1.64 and a p-value of 0.18 greater than 0.05, led to the acceptance of the null hypothesis. This means that the noodles had the same level of acceptability across the four age groups.

Table 24. Comparison of the Level of General Acceptability of Malunggay and Squash Pancit Sabaw Across Varied Groups

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	0.42	3	0.14	0.79	0.50
Within Groups	17.11	96	0.18		
Total	17.53	99			

The table indicates the level of general acceptability of sabaw malunggay and squash across varied groups. With an F-test value of 0.79 and a p-value of 0.50 greater than 0.05, the null hypothesis that there is accepted. This means that the noodles had the same level of acceptability across the four age groups.

IV. Shelf –Life of the Malunggay and Squash Miki- Noodle

After having produced malunggay and squash Miki-noodle, the following has been observed:

1. After making the malunggay and squash Miki-noodle, the researcher divided the product into three (3) and put these in separate boxes. The first box was exposed to sunlight to be dried and stored. The second in a room temperature without sun drying, and the third one was stored inside the refrigerator for cold storage.

2. After one week of observation, the following were noticed on the Miki-noodles.

   a. *First day.* The Miki noodles exposed to sunlight became wrinkled and dried, while the Miki noodles were stored at room temperature and the one stored in the refrigerator had a perfect appearance, aroma, and texture.

   b. S*econd day*. The same observations were made as on the first day. The aroma, texture and appearance of all the Miki noodles remained in good condition.

   c. *Third day.* The Miki noodles exposed to sunlight became brittle, and its color lightened compared to the original. The Miki noodles stored in the refrigerator retained their freshness and had no distinct smell. Meanwhile, the Miki noodles stored at room temperature developed a distinct and unpleasant odor.

   d. *Fourth day.* The same observations were made as on the third day for the Miki noodles exposed to sunlight and the ones stored in the refrigerator. The noodles stored at room temperature changed in color, becoming slightly darker, with a moderately distinct smell.

   e. *Fifth day.* The same observations were noted on the third and fourth days for the Miki noodles exposed to sunlight. The noodles stored in the refrigerator became wrinkled and slightly dried. On the other hand, the noodles stored at room temperature changed in color from light to dark, with green spots and

mold, particularly on the squash Miki noodles. The noodle is not recommended for cooking.

f. *Sixth day.* The same observations were made as on the fifth day regarding the dried Miki noodles. The Miki noodles stored in the refrigerator changed in color, became brittle, and developed an unpleasant smell.

g. *Seventh day.* There were no signs of spoilage or mold on the dried noodles. However, the Miki noodles stored in the refrigerator showed signs of spoilage and mold, making them unsuitable for cooking.

3. After two weeks of storage, the dried malunggay and squash Miki noodles maintained the same condition as observed during the first week. The noodles remained edible and could be safely used for two to three months or longer, provided they were stored in clean, dry packaging.

Conclusions

Based on the findings of the study, it can be concluded that malunggay leaf powder and mashed squash are effective additional ingredients for Miki noodles. The following recipes were found to be highly acceptable: Malunggay Pancit Guisado, Squash Pancit Guisado, and a combination of Malunggay and Squash Pancit Guisado. Similarly, Malunggay Pancit Sabaw, Squash Pancit Sabaw, and a combination of Malunggay and Squash Pancit Sabaw were also well-received. The appearance, aroma, taste, and texture of both the pancit guisado and pancit sabaw products were pleasing. Furthermore, the shelf life of Miki noodles is significantly extended when sun-dried, allowing them to remain edible for 2 to 3 months or longer, provided they are properly packed in clean and dry storage.

Recommendations

In light of the findings and conclusions, the following recommendations are made:

1. For better appearance and texture, malunggay and squash Miki noodles are best cooked and served immediately after preparation. However, for extended shelf life, sun drying is recommended.
2. Encourage the use of malunggay powder and squash as ingredients in Miki noodles for homemakers, professionals, students, and anyone interested in cooking.
3. Food technology teachers, students, and homemakers are encouraged to conduct further research and innovate quality food products, considering the nutritional value and availability of local materials. Specifically, the Research and Extension Office is urged to lead research initiatives on campus and within the university.
4. Develop more enriched food products to assess the acceptability of malunggay powder and mashed squash as food enhancers.

5. Comparative studies may be conducted to evaluate products using different food enhancers (e.g., Ampalaya leaf powder, mashed sweet potato) alongside malunggay leaf powder and mashed squash in various dishes.
6. Malunggay and squash Miki noodles be analyzed nutritionally. Further studies should explore optimal packaging solutions to extend the product's shelf life.
7. Similar studies should be conducted to enhance product analysis and production.
8. Cost and return analysis should be undertaken to evaluate the economic feasibility of the products.

Compliance with Ethical Standards

Following ethical standards, this research adheres to principles of integrity, respect, and responsibility towards all participants involved. Before the conduct of the study, the researcher obtained informed consent from the participants, ensuring their understanding of the study's purpose, procedures, and potential risks. Confidentiality and anonymity were preserved throughout data collection, analysis, and dissemination, safeguarding participants' privacy. Moreover, the researcher made sure that there was no conflict of interest in conducting the study, avoided plagiarism issues, and no bias was made in the interpretation of the results of the study. Finally, he ensured that the findings were used only for the research.

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