



RESEARCH PAPER

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## Formulation of aramang baked products enriched with malunggay

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### Abstract

The modification of an existing product or the formulation of a new product to fill a newly identified market niche or customer need are both examples of product development. This study generally developed and conducted the formulation of aramang baked products enriched with malunggay conducted by the researchers. Specifically, it answered the acceptability level in terms of taste, texture, flavor, odor, and color also the overall acceptability of enriched aramang baked products. The study used the frequency distribution for evaluators to determine the acceptability of enriched aramang baked products enriched with malunggay. As per sensory evaluation conducted by the researchers, it was proven that aramang baked products enriched with malunggay was acceptable in terms of Odor, Taste, Flavor, Color, and Texture. Based on the results of sensory evaluation of enriched aramang baked products proven that three (3) treatments were all highly acceptable in terms of variable Odor, Taste, Flavor, Color and Textures conducted by the researchers.

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## Introduction

The popularity of baked goods is growing daily. They are so well-liked because they are tasty and simple to digest. Everyone generally like baked goods. Because people these days don't have lot of time to spend making breakfast or snacks, bread and pastries have replaced other types of food. Without bakery goods, a happy occasion cannot truly be celebrated. They make excellent snacks and are widely accessible.

Most people have had the pleasurable experience of entering a bakery and breathing in the lovely aroma of freshly baked pastries straight from the oven. A refreshing alternative and a wide selection of delectable sweets are offered by bakeries in an era where prepackaged and frozen meals dominate the retail supermarket industry. According to the business consulting firm Hoovers, the popularity of bakeries is evidenced by the fact that there are more than 2,500 commercial bakeries in the US that generate more than \$25 billion in yearly sales.

An exotic and delectable soft-shelled shrimp known as "aramang" is year-round sustainably farmed in Aparri; export-quality dried "aramang" is sold in Japan, Taiwan, and other regions of the Philippines. A fluvial parade of more than a hundred fishing boats showing the way of life of fishermen is also part of the event. Aramang "Nematopalaemon tenuipes" is a marine crustacean that is found at the bottom of the water in nearly every environment around the world. Aramang species are tiny in size, therefore many aquatic animals tend not to see them. There are 2,000 different species of aramang worldwide, all of which are invertebrates which means that Aramang don't have a hard exoskeleton (the shell of the aramang) which is often transparent and colorless making difficult to be visible in the water.

The famous Cagayan aramang (Nematopalaemon tenuipes) or spider shrimp, a soft-shelled species exclusively endowed to Aparri, has undoubtedly made its way to international cuisine from its role as an essential and integral part of the Aparriano diet to its status as an exportable shrimp in modern times.

In reality, aramang has established itself as the unquestionable One Town, One Product of the town and a tourism emblem, just like the name of its May festival. It must be Aparri if it's aramang. The size and color of the Cagayan aramang make it simple to differentiate it from other shrimp species. Although fishing is a significant source of income, aramang are primarily caught around the mouth of the Cagayan River from August to December, when they gather in visible numbers along the shore. According to the Bureau of Fisheries and Aquatic Resources, the turbidity of the water caused by the runoff pouring down the Cagayan River and its tributaries into the sea is the cause of the observed seasonality of capturing. This is brought on by severe monsoon rains and weather changes.

Aramang's mouthwatering flavor is primarily responsible for its rising demand. It can be preserved by adding salt to create bagoong aramang (shrimp paste). When combined with fresh Super Manila and other Philippine mango kinds, the bagoong aramang has been hailed as a superb appetizer. It is a crucial component of kare-kare. Because of its distinctive flavor and natural flavoring, sun-dried aramang is a beloved and preferred flavour in mixed vegetable cooking among the Ilocano 'dingdeng' and Ibanag 'inabraw' in Cagayan.

Nowadays, innovation of product is one of the fast growing industries in the world. Producers and manufacturers find new products to introduce in the market in exchange of today's new trend and continuously providing high quality products. Baked products such as cookies, cakes, cupcakes, tarts and the like are into innovations. This shows that food innovation in the country is one of the fast growing industries. The formulation of enriched aramang baked products tried to innovate one of the Filipinos' favorite desserts. Filipinos are good in discovering and innovating food recipes. Discovering recipes is not just as eating foods. They always try new things in everyday living. Filipinos are known for being avid eaters until their tummies are full. They used to upgrade usual recipes into greater products.

According to Journal of Aquaculture Research and Development, Aramang has gained its acceptability both in local and international markets like Japan and across Asian countries. Big volume of the catch sold in the marketplace as fresh, frozen, and also dried for local consumption and exportation which made the researchers chose aramang as one of their ingredients that is locally found at Aparri as the basic commodity.

The study aimed to develop aramang baked products like cookies, pandesal, ensaymada, cupcakes, muffin, and crinkles enriched with malunggay; its nutritional information of each baked products and its potential for income generating activities through its return of investment. Specifically, the study sought to answer to what is the assessment of the evaluators to the different baked products according to the sensory evaluation in terms of odor, taste, color, texture and flavor and what is the consumer's acceptability of the best treatment of baked product.

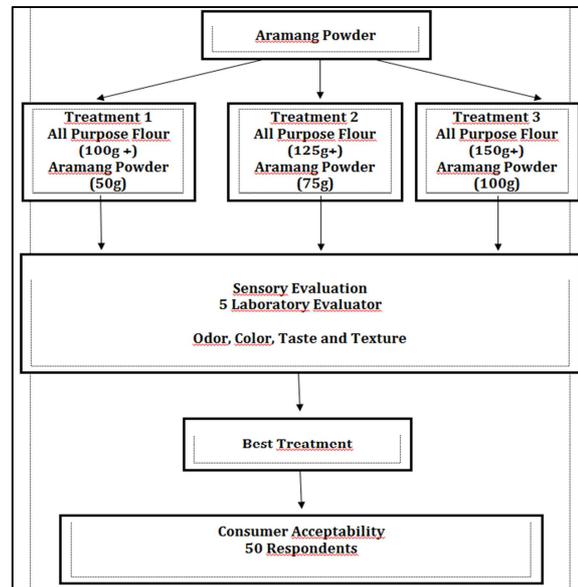
**Materials and methods**

*Research Design*

This study's methodology was product development research. This strategy involved making items with novel or distinctive features that provide customers with new or additional benefits. Business Dictionary (www.business.com, 2014) states that product development may entail the alteration of an existing product, its presentation, or the formulation of an altogether new product that fulfills a newly identified market niche or customer need. The frequency count and mean were used to calculate the product's degree of acceptance. The formulation of aramang baked products enriched with malunggay conducted by the researchers used the standardized recipe book Baking Guide for Beginners which was copyrighted on 2012 by Elvira Villaverde-Gabriel, DEM, with accurate and exact measurements to achieve the desired outcome.

The following were the process for preparing the baked products, the study used three different treatments. Treatment 1 was treated with 100g+ Flour and 50g aramang powder; Treatment 2 was treated with 125g+ Flour and 75g aramang powder; and

Treatment 3 was treated 150g+ Flour and 100g aramang powder. Five grams of Malunggay was added to the three treatments in baked products.



*Tools and Equipment*

The following were the main tools and equipment used in making aramang baked products.

Tools	Equipment
Cake tester	Hand Mixer
Drum sieve	Oven
Mixing bowls	
Measuring cups	
Measuring spoons	
Mortar and pestle	
Oven mitt	
Rubber scrapper	
Tart pan	
Wire whisk	

Here are the lists of ingredients with their corresponding measurements.

*Ingredients*

**Table 1.** Ingredients used for the 3 treatments of the Aramang Cookies.

Treatment 1	Treatment 2	Treatment 3
100g + all purpose flour	125g + all purpose flour	150g + all purpose flour
50g aramang powder	75g aramang powder	100g aramang powder
1/2 c butter	1/2 c butter	1/2 c butter
1 c sugar	1 c sugar	1 c sugar
1/3 c honey	1/3 c honey	1/3 c honey
2 pcs eggs	2 pcs eggs	2 pcs eggs
1 tsp. baking powder	1 tsp. baking powder	1 tsp. baking powder
1 tsp. salt	1 tsp. salt	1 tsp. salt
1 tsp. cinnamon powder	1 tsp. cinnamon powder	1 tsp. cinnamon powder
Malunggay dried flakes	Malunggay dried flakes	Malunggay dried flakes

*Procedures*

1. Sift all dry ingredients
2. Cream butter, sugar, honey, and eggs
3. Fold all the dry ingredients to cream the mixture
4. Add aramang powder then blend well
5. Drop into greased cookie sheet
6. Bake at 350\* F for 15 minutes or until golden brown.

**Table 2.** Ingredients used for the 3 treatments of the Aramang Muffin.

Treatment 1	Treatment 2	Treatment 3
100g + all purpose flour	125g + all purpose flour	150g + all purpose flour
50g aramang powder	75g aramang powder	100g aramang powder
1/2 c butter	1/2 c butter	1/2 c butter
2 pcs eggs	2 pcs eggs	2 pcs eggs
1 c sugar	1 c sugar	1 c sugar
1/2 tsp. salt	1/2 tsp. salt	1/2 tsp. salt
1 pack all purpose cream	1 pack all-purpose cream	1 pack all purpose cream
1 tbsp. vinegar	1 tbsp. vinegar	1 tbsp. vinegar
Vanilla	Vanilla	Vanilla
Malunggay dried flakes	Malunggay dried flakes	Malunggay dried flakes

*Procedures*

1. Sift all dry ingredients together and set aside
2. Cream butter and sugar until fluffy, and egg one at a time then add vanilla and vinegar
3. Stir in powdered aramang and all purpose cream and then mix well
4. Fold dry ingredients into the cream mixture
5. Pour into muffin pan lined with baking paper cups and bake for 20-25 minutes at 375\* F or until done.

**Table 3.** Ingredients used for the 3 treatments of the Aramang Pandesal.

Treatment 1	Treatment 2	Treatment 3
100g + all purpose flour	125g + all purpose flour	150g + all purpose flour
50g aramang powder	75g aramang powder	100g aramang powder
1 c water	1 c water	1 c water
4 tsp. instant yeast	4 tsp. instant yeast	4 tsp. instant yeast
1 tsp. honey	1 tsp. honey	1 tsp. honey
1 c fresh milk, scalded	1 c fresh milk, scalded	1 c fresh milk, scalded
1/2 c butter, melted	1/2 c butter, melted	1/2 c butter, melted
2 pcs eggs, slightly beaten	2 pcs eggs, slightly beaten	2 pcs eggs, slightly beaten
1 tsp. salt	1 tsp. salt	1 tsp. salt
1/4 c washed sugar	1/4 c washed sugar	1/4 c washed sugar
1/2kg bread crumbs	1/2kg bread crumbs	1/2kg bread crumbs
Malunggay dried flakes	Malunggay dried flakes	Malunggay dried flakes

*Procedures*

1. In a bowl, combine yeast, flour, aramang powder, malunggay, wash sugar, salt and make a well. Set aside.
2. Meanwhile, mix together the water, honey and milk and then pour over into a flour mixture.
3. Stir in the butter and eggs and mix wooden spoon until well blended. Knead the dough on the floured surface for 10 minutes.
4. Place into the greased bowl (also greased the top of the dough) and cover with a damp cloth. Let rise for 1 1/2 hours.
5. Punch down to release the excess air and divide dough into 4 parts. Flatten each part then roll it like baton. Seal edges by crimping.
6. Roll into the bread crumbs. Bench for 15 minutes. Cut into 1 inch crosswise by wooden dough scraper and dredge again into the bread crumbs.
7. Put in greased baking sheet, cut side up. Proof for 30 minutes.
8. Bake at 375\* F for 10-12 minutes.

**Table 4.** Ingredients used for the 3 treatments of the Aramang Ensaymada.

Treatment 1	Treatment 2	Treatment 3
100g + all purpose flour	125g + all purpose flour	150g + all purpose flour
50g aramang powder	75g aramang powder	100g aramang powder
Mixture I	Mixture I	Mixture I
1 c water	1 c water	1 c water
1 tbsp. instant yeast	1 tbsp. instant yeast	1 tbsp. instant yeast
1 tbsp. honey	1 tbsp. honey	1 tbsp. honey
Flour	Flour	Flour
Aramang Powder	Aramang Powder	Aramang Powder
Malunggay dried flakes	Malunggay dried flakes	Malunggay dried flakes
Mixture II	Mixture II	Mixture II
3/4 c butter, softened	3/4 c butter, softened	3/4 c butter, softened
10 pcs egg yolks	10 pcs egg yolks	10 pcs egg yolks
1 c sugar	1 c sugar	1 c sugar
1/2 c mashed potato	1/2 c mashed potato	1/2 c mashed potato
1/2 c flour for dusting	1/2 c flour for dusting	1/2 c flour for dusting
1/4 c butter, softened	1/4 c butter, softened	1/4 c butter, softened
Grated cheese for toppings	Grated cheese for toppings	Grated cheese for toppings
Egg wash	Egg wash	Egg wash

*Procedures*

1. In a bowl, combine thoroughly all ingredients of mixture I and set aside

2. In another bowl, cream butter then add the sugar, egg yolks, flour until well blended and then mix it thoroughly with mixture I.
3. Add the mashed potatoes, knead until smooth and elastic, place into a greased pan and let it rise for about 1 hour.
4. Punch down dough remove extra air cells
5. Divide into 30 pieces ball and rest for at least 5 minutes
6. Flatten each dough and brush with soften butter.
7. Roll into long thin log and swirl loosely like snail and tuck in at the end point, put into ensaymada molder and brush with egg wash and proof in for 3-4 hours
8. Bake at 375\* f for 20-25 minutes or until golden brown. Brush with butter when thoroughly cool. Sprinkle with sugar and grated cheese on top.

**Table 5.** Ingredients used for the 3 treatments of the Aramang Cupcake.

Treatment 1	Treatment 2	Treatment 3
100g + all purpose flour	125g + all purpose flour	150g + all purpose flour
50g aramang powder	75g aramang powder	100g aramang powder
1/2 c butter	1/2 c butter	1/2 c butter
1/2 c sugar	1/2 c sugar	1/2 c sugar
4 pcs egg	4 pcs egg	4 pcs egg
1 tsp. salt	1 tsp. salt	1 tsp. salt
1 1/2 tbsp. baking powder	1 1/2 tbsp. baking powder	1 1/2 tbsp. baking powder
1 c powder milk	1 c powder milk	1 c powder milk
1 can (big) condensed milk	1 can (big) condensed milk	1 can (big) condensed milk
1/2 bar cheese, grated	1/2 bar cheese, grated	1/2 bar cheese, grated
Malunggay dried flakes	Malunggay dried flakes	Malunggay dried flakes

*Procedures*

1. Sift flour, Aramang powder, malunggay, baking powder and salt aside
2. Cream butter and sugar. Add egg one at a time
3. Stir in half of the cheese, powder milk and condensed milk
4. Add the sifted dry ingredients. Blend well but do not over mix

5. Spoon 3/4 full the mixture into paper lined muffin pan and sprinkle with grated cheese on top of each cup cakes
6. Bake at preheated oven of 375\* F for 20-30 minutes.

**Table 6.** Ingredients used for the 3 treatments of the Aramang Crinkles.

Treatment 1	Treatment 2	Treatment 3
100g + all purpose flour	125g + all purpose flour	150g + all purpose flour
50g aramang powder	75g aramang powder	100g aramang powder
1 Tsp baking soda	1 Tsp baking soda	1 Tsp baking soda
3/4 cup cocoa powder	3/4 cup cocoa powder	3/4 cup cocoa powder
1/2 cup butter melted	1/2 cup butter melted	1/2 cup butter melted
1 tbsp glucose	1 tbsp glucose	1 tbsp glucose
1 cup sugar	1 cup sugar	1 cup sugar
2 pcs egg medium	2 pcs egg medium	2 pcs egg medium
2 tsp vanilla extract	2 tsp vanilla extract	2 tsp vanilla extract
1/2 cup powdered sugar, sifted	1/2 cup powdered sugar, sifted	1/2 cup powdered sugar, sifted
Malunggay dried flakes	Malunggay dried flakes	Malunggay dried flakes

*Procedures*

1. Sift together flour, aramang powder, malunggay, baking soda and cocoa powder, set aside.
2. In a mixing bowl, cream together the butter, sugar, glucose and vanilla then beat in eggs.
3. Add dry ingredients and stir until well blended.
4. Refrigerate for 30 minutes.
5. To form into balls; apply egg white on your hand so that cookie won't stick, using ice cream scooper, get one scoop of dough and shape into small ball.
6. Roll in powder sugar. Place on greased cookie sheet,
7. Baked in a preheated oven at 350F for 6-8 minutes or when the crinkles already crack.
8. Remove from sheet. While cookies are still warm, roll again in powdered sugar if desired.
9. Cool completely on a rack before storing.

**Results and discussion**

The result and findings of this study are discussed

below in terms of Odor, Taste, Color, Textures, Flavor to establish the products level of acceptability.

**Table 1.** Sensory Eyaluation for the Odor of Aramang Baked Products Enriched with Malunggay.

Evaluator	Aramang Cookies			Aramang Muffin			Aramang Pandesal			Aramang Ensaymada			Aramang Cupcake			Aramang Crinkles			Total
	Treatments			Treatments			Treatments			Treatments			Treatments			Treatments			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	3	2	2	3	2	2	3	2	2	3	2	2	3	2	2	3	2	2	42
2.	3	3	2	4	3	2	3	3	2	4	3	2	4	3	2	4	3	2	52
3.	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	36
4.	5	3	4	4	3	4	5	3	4	3	4	4	5	3	4	5	4	4	71
5.	5	4	1	5	4	1	4	4	1	5	4	1	5	4	1	4	4	1	58
6.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	71
7.	4	4	3	5	4	3	4	1	3	5	4	3	4	4	3	5	4	3	66
8.	4	4	3	4	4	3	4	4	3	4	3	5	4	4	4	4	3	3	67
9.	4	1	3	4	1	3	4	4	3	4	1	3	3	1	3	4	1	3	59
10.	4	3	2	4	3	2	4	3	2	4	3	2	4	3	2	4	3	3	65
11.	4	1	2	4	1	2	4	1	5	4	1	2	4	1	2	4	1	2	45
12.	4	3	3	4	3	3	4	3	3	4	3	3	4	3	3	4	3	3	60
13.	4	4	5	3	4	5	3	4	2	4	4	3	3	4	5	3	4	5	69
14.	4	3	3	4	3	3	4	3	3	4	3	3	4	3	3	4	3	3	60
15.	4	3	1	4	3	1	4	3	1	4	3	1	4	3	1	4	3	1	48
Mean	3.93	2.86	2.66	3.93	2.86	2.66	3.93	2.86	2.66	3.93	2.86	2.66	3.93	2.86	2.66	3.93	2.86	2.66	57.93

Legend: 1.0- 1.80= Very Strong Aramang Odor; 1.81- 2.60= Pronounced Aramang Odor; 2.61- 3.40= Distinguished Aramang Odor; 3.41- 4.20= Slight Aramang Odor; 4.21- 5.0= No Aramang Odor

Based on the sensory evaluation results of Aramang Baked Products Enriched with Malunggay, treatment 1 with 50 grams aramang powder was assessed by the evaluators, as having a slight aramang odor. The computed mean was 3.93. Treatment 2 with 75 grams of aramang powder was evaluated with a mean of 2.86 and a descriptive value of distinguished aramang odor. The enriched aramang baked products for the treatment 3 with 100 grams aramang powder was

rated as 2.66 which means it has a distinguished aramang odor. As per sensory evaluation results, treatment 1 has the got the highest level of acceptability in terms of the criterion, presence of aramang odor. DMRT also illustrate that there is a significant difference between each treatment. This suggests that the quantity of the aramang powder used in this treatment blends and complements with the other ingredients to come up with a higher acceptability of the aramang baked products.

**Table 2.** Sensory Evaluation for the Taste of Aramang Baked Products Enriched with Malunggay.

Evaluator	Aramang Cookies			Aramang Muffin			Aramang Pandesal			Aramang Ensaymada			Aramang Cupcake			Aramang Crinkles			Total
	Treatments			Treatments			Treatments			Treatments			Treatments			Treatments			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	3	3	5	5	1	2	4	4	4	3	3	4	5	4	4	1	3	3	61
2.	3	3	3	5	4	2	4	4	3	3	4	5	5	3	3	3	3	3	63
3.	1	1	2	1	3	3	1	1	2	1	1	2	1	1	2	3	5	2	33
4.	5	4	5	3	3	s	5	3	5	5	3	2	5	4	5	5	4	5	76
5.	5	4	2	3	4	2	5	3	2	5	4	2	5	3	2	4	4	2	61
6.	4	3	2	4	3	2	4	1	3	5	3	3	4	3	2	5	3	3	57
7.	4	3	3	4	3	3	4	3	2	5	1	2	4	4	3	4	3	2	57
8.	4	3	2	4	1	2	4	3	2	5	3	5	4	3	2	4	3	2	56
9.	5	1	2	5	3	4	5	3	4	5	3	4	5	5	4	5	1	5	69
10.	4	3	4	4	3	2	3	3	4	4	3	4	4	3	2	4	3	4	61
11.	4	1	2	4	3	4	3	1	2	4	1	2	4	1	5	5	1	3	50
12.	s	3	4	5	1	5	5	3	2	4	5	5	5	3	5	5	3	2	70
13.	5	5	4	5	4	5	5	4	5	4	3	5	3	1	2	4	1	5	70
14.	5	3	5	5	5	4	5	5	5	4	3	3	3	3	5	5	3	5	76
15.	4	4	5	4	3	5	4	3	5	4	4	2	4	3	4	4	4	4	70
Mean	4.06	2.93	3.33	4.06	2.93	3.33	4.06	2.93	3.33	4.06	2.93	3.33	4.06	2.93	3.33	4.06	2.93	3.33	62.00

Legend: 1.0- 1.80= Very Strong Aramang Taste; 1.81- 2.60= Pronounced Aramang Taste; 2.61- 3.40= Distinguished Aramang Taste; 3.41- 4.20= Slight Aramang Taste; 4.21- 5.0= No Aramang Taste

Based on the sensory evaluation results of the enriched aramang baked products treatment 1, with 50 grams aramang powder, a mean of 4.06 was derived. This has a descriptive value of slightly aramang taste. For treatment 2 with 75 grams aramang powder, a descriptive value of distinguished aramang taste was observed. A mean of 2.93 was computed. The enriched aramang baked products

under treatment 3, with 75 grams aramang powder was rated as having a distinguished aramang. A mean of 3.33 was derived. This result implies that among the three recipes of the aramang baked products, treatment 1 has the most acceptable taste. Further, the quantity of the aramang powder used in treatment 1 makes the aramang baked products more acceptable in terms of taste.

**Table 3.** Sensory Evaluation for the Color of Aramang Baked Products Enriched with Malunggay.

Evaluator	Aramang Cookies			Aramang Muffin			Aramang Pandesal			Aramang Ensaymada			Aramang Cupcake			Aramang Crinkles			Total
	Treatments			Treatments			Treatments			Treatments			Treatments			Treatments			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	4	4	4	2	3	4	5	3	4	3	4	2	5	4	5	4	5	4	69
2.	2	3	3	4	4	5	2	4	5	2	3	3	2	3	3	5	3	3	59
3.	5	5	5	5	4	3	4	5	3	5	5	5	5	5	5	2	4	5	80
4.	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	5	74
5.	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	4	88
6.	5	5	5	3	4	4	4	4	5	4	5	5	5	2	4	5	4	5	78
7.	5	5	4	5	5	5	5	5	5	5	5	4	3	5	4	3	5	4	82
8.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	90
9.	3	4	5	5	5	5	3	5	5	5	4	5	5	4	5	5	4	5	82
10.	5	2	3	5	2	5	5	2	2	5	2	5	5	5	3	5	5	5	71
11.	4	2	2	4	5	3	5	5	5	4	2	4	4	2	5	4	2	2	64
12.	4	5	5	5	5	5	4	5	5	5	5	5	4	5	5	4	5	5	86
13.	5	5	5	5	5	5	4	2	3	5	5	5	4	4	2	5	5	3	77
14.	5	5	5	4	2	2	5	5	5	4	5	3	4	5	5	5	5	5	79
15.	4	4	5	4	4	5	5	4	5	4	4	5	5	5	5	4	4	5	81
Mean	4.33	4.2	4.33	4.33	4.2	4.33	4.33	4.2	4.33	4.33	4.2	4.33	4.33	4.2	4.33	4.33	4.2	4.33	77.33

Legend: 1.0- 1.80= Very Strong Attractive Color; 1.81- 2.60= Pronounced Attractive Color; 2.61- 3.40= Distinguished Attractive Color; 3.41- 4.20= Slightly Attractive Color; 4.21- 5.0= Very Attractive Color

**Table 4.** Sensory Evaluation for the Texture of Aramang Baked Products Enriched with Malunggay.

Evaluator	Aramang Cookies			Aramang Muffin			Aramang Pandesal			Aramang Ensaymada			Aramang Cupcake			Aramang Crinkles			Total
	Treatments			Treatments			Treatments			Treatments			Treatments			Treatments			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	5	5	5	4	3	3	4	2	5	4	5	4	5	3	3	5	2	5	72
2.	5	2	3	5	2	3	5	5	4	5	4	3	5	2	5	5	5	3	71
3.	4	4	3	4	4	5	4	4	3	5	4	3	4	4	3	4	4	3	69
4.	5	5	4	5	5	5	4	5	5	5	5	5	4	5	5	5	5	2	84
5.	5	5	2	5	5	4	5	5	2	5	5	2	5	5	4	5	s	s	79
6.	4	4	5	s	4	4	s	4	4	4	4	4	3	4	4	4	s	4	75
7.	4	4	4	3	s	4	s	s	3	4	2	5	4	5	4	s	2	s	73
8.	4	4	4	5	4	2	4	4	4	3	4	4	4	4	2	4	s	4	69
9.	4	3	5	4	s	s	4	3	5	4	3	5	5	s	5	4	3	s	77
10.	5	5	5	5	s	5	4	5	5	5	5	5	5	5	5	5	5	4	88
11.	3	2	3	4	2	5	3	2	5	4	5	5	4	2	5	3	5	5	67
12.	4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	4	5	5	79
13.	4	5	5	4	5	3	4	5	5	4	5	3	4	4	5	4	2	3	74
14.	5	5	5	4	5	5	5	4	5	5	2	5	5	5	3	4	5	5	82
15.	4	5	5	4	4	5	5	5	3	4	5	5	4	5	5	4	4	5	81
Mean	4.33	4.13	4.2	4.33	4.13	4.2	4.33	4.13	4.2	4.33	4.13	4.2	4.33	4.13	4.2	4.33	4.13	4.2	76

Legend: 1.0- 1.80= Very Coarse Texturer; 1.81- 2.60= Pronounced Coarse Texture; 2.61- 3.40= Distinguished Coarse Texture; 3.41- 4.20= Slightly Coarse Texture; 4.21- 5.0= Not Coarse Texture

Based on the sensory evaluation results of the enriched aramang baked products treatment 1, with 50 grams aramang powder, a mean of 4.33 was derived. This has a descriptive value of very attractive in terms of color. For treatment 2 with 75 grams aramang powder, a descriptive value of slightly attractive color was assessed. A mean of 4.2 was computed. The enriched aramang baked products under treatment 3, with 100 grams aramang powder was rated as having a very attractive in terms of color. A mean of 4.33 was derived. The result of the sensory assessment of the aramang baked products on the basis of its color suggests that the amount of aramang powder on treatment 1 and 3, made the aramang baked products more acceptable. This further means that whichever amount, that is 50 grams or 100 grams, of aramang powder on the recipe of the aramang baked products more acceptable; Abraha *et al.* (2018)'s results that the color of processed goods

may depend on the temperature and time of processing would support this.

Based on the sensory evaluation results of enriched aramang baked products, treatment 1 with 50 grams aramang powder was assessed by the evaluators, as having a not coarse texture. The computed mean was 4.33. Treatment 2 with 75 grams of aramang powder was evaluated with a mean of 4.13 and a descriptive value of slightly coarse texture. The enriched aramang baked products for the treatment 3 with 100 grams aramang powder was rated as 4.2 which means it has a slightly coarse texture. As per sensory evaluation results, treatment 1 got the highest level of acceptability in terms of the criterion, to have a slightly coarse texture. Therefore, it shows based on the findings that flour has a significant role as a determinant of baked products' texture.

**Table 5.** Sensory Evaluation for the Flavor of Aramang Baked Products Enriched with Malunggay.

Evaluator	Aramang Cookies			Aramang Muffin			Aramang Pandesal			Aramang Ensaymada			Aramang Cupcake			Aramang Crinkles			Total
	Treatments			Treatments			Treatments			Treatments			Treatments			Treatments			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	3	3	2	4	2	4	5	5	2	3	3	4	5	3	2	3	1	2	56
2.	4	2	3	3	3	3	4	2	3	4	1	3	4	2	3	4	2	3	53
3.	3	1	4	3	3	2	3	1	4	3	2	2	3	1	4	3	3	2	47
4.	4	3	3	4	3	3	4	3	3	5	3	3	4	3	3	4	3	3	61
5.	5	3	2	4	3	2	3	3	2	5	3	2	3	4	2	5	3	2	56
6.	4	3	2	4	1	2	4	3	3	4	5	2	4	4	2	4	3	2	56
7.	4	3	3	5	3	3	2	4	2	4	3	3	4	3	3	4	3	3	59
8.	4	3	2	4	4	2	4	3	2	4	3	4	4	3	2	4	1	2	55
9.	2	3	4	2	3	2	4	3	4	3	3	4	2	3	4	2	3	4	55
10.	4	4	4	4	3	4	4	3	5	4	4	2	4	3	4	4	4	4	68
11.	4	1	2	5	1	4	4	1	2	5	1	2	5	1	2	4	3	4	51
12.	4	1	4	4	5	5	5	1	4	2	1	4	4	1	4	4	1	4	58
13.	5	5	5	4	4	4	5	3	4	5	5	5	5	5	5	5	5	5	84
14.	5	5	4	5	1	5	4	5	5	4	4	5	4	5	5	5	5	5	81
15.	4	4	5	4	5	4	4	4	4	4	3	4	4	3	4	4	4	4	72
Mean	3.93	2.93	3.26	3.93	2.93	3.26	3.93	2.93	3.26	3.93	2.93	3.26	3.93	2.93	3.26	3.93	2.93	3.26	60.8

Legend: 1.0- 1.80= Very Strong Aramang Flavor; 1.81- 2.60= Pronounced Aramang Flavor; 2.61- 3.40= Distinguished Aramang Flavor; 3.41- 4.20= Slight Aramang Flavor; 4.21- 5.0= No Aramang Flavor

Based on the sensory evaluation results of the enriched aramang baked products treatment 1, with 50 grams aramang powder, a mean of 3.93 was derived. This has a descriptive value of slightly aramang flavor. For treatment 2 with 75 grams aramang powder, a descriptive value of distinguished aramang flavor was observed. A mean of 2.93 was computed. The enriched aramang tart under

treatment 3, with 100 grams aramang powder was rated as having a distinguished aramang flavor. A mean of 3.26 was derived. These result imply that among the three recipes of the aramang baked products, treatment 1 has the most acceptable flavor. Further, the quantity of the aramang powder used in treatment 1 makes the aramang baked products more acceptable in terms of flavor.

**Table 6.** Level of Acceptability of Aramang Baked Products Enriched with Malunggay.

Aramang Baked Products	Treatments	Weighted mean	Descriptive Value
Aramang Cookies	Treatment 1	4.11	High Acceptability
	Treatment 2	3.41	High Acceptability
	Treatment 3	3.55	High Acceptability
Aramang muffin	Treatment 1	4.11	High Acceptability
	Treatment 2	3.41	High Acceptability
	Treatment 3	3.55	High Acceptability
Aramang Pandesal	Treatment 1	4.11	High Acceptability
	Treatment 2	3.41	High Acceptability
	Treatment 3	3.55	High Acceptability
Aramang Ensaymada	Treatment 1	4.11	High Acceptability
	Treatment 2	3.41	High Acceptability
	Treatment 3	3.55	High Acceptability
Aramang Cupcake	Treatment 1	4.11	High Acceptability
	Treatment 2	3.41	High Acceptability
	Treatment 3	3.55	High Acceptability
Aramang Crinkles	Treatment 1	4.11	High Acceptability
	Treatment 2	3.41	High Acceptability
	Treatment 3	3.55	High Acceptability

Legend: 1.0- 1.80= Very Low Acceptability; 1.81- 2.60= Low Acceptability; 2.61- 3.40= Moderate Acceptability; 3.41- 4.20= High Acceptability; 4.21- 5.0= Very High Acceptability

Based on the sensory evaluation results of enriched aramang baked products treatment 1 with a proportion of 50 grams aramang powder assessed by the evaluators, the enriched aramang baked products was found out to be highly acceptable with a weighted mean of 4.11. Also, the treatment 2 with 75 grams aramang powder gained its high acceptability with the same descriptive value of treatment 1 rated as 3.41.

It was also proven that the 3<sup>rd</sup> treatment with 100 grams aramang powder was highly acceptable and rated as 3.55. The three (3) treatments of aramang baked products enriched with malunggay conducted by the researchers were proven to be highly acceptable based on the sensory evaluation results. This result implies that among the three recipes of the aramang baked products, treatment 1 has the most acceptable qualities. J.M. Murray, I.A. Baxter *et al.*, (2003) Food acceptability is influenced by a variety of elements, some of which may be related to individual preferences, the food, or the environment in which the food is consumed. Further, the quantity of the aramang powder used in treatment 1 makes the aramang baked products more acceptable.

**Conclusions**

The primary food item of Aparri, Cagayan—Aramang "Nematopalaemon Tenuipes"—was used in research to make baked goods. The red shrimp, which is an endemic species in the river estuaries of Aparri, Cagayan, and is known locally as "Aramang" or Alamang and scientifically as "Nematopalaemon tenuipes," has gained popularity and acceptance not only in the local market but also in the international market, particularly in Japan and other Asian countries. As per sensory evaluation conducted by the researchers, it was proven that enriched aramang baked products were acceptable in terms of Odor, Taste, Flavor, Color and Textures. In terms of odor treatment 1 with 50 grams aramang powder was rated as 3.93 with a descriptive value of slightly aramang odor proven to be as highly acceptable. Based on the results, treatment 1 under criterion taste, it was proven to be highly acceptable among the three treatments which was rated as 4.06 with a descriptive value of slightly aramang taste. The treatment 1 and treatment 3 of enriched aramang baked products were very attractive in color which was rated by the evaluators as 4.33. Under texture, aramang baked products were rated as 4.33 with a descriptive value of not coarse texture. Lastly, the flavor was rated as 3.93 bearing a descriptive value of slightly aramang flavor.

Based on the result of sensory evaluation of enriched aramang baked products it was proven that the three (3) treatments were all highly acceptable in terms of variable Odor, Taste, Flavor, Color and Textures conducted by the researchers. The researchers concluded that the formulation of aramang baked products enriched with malunggay was really a successful endeavor. In addition, the three (3) treatments are highly acceptable in terms of odor, taste, texture, flavor and color. In general, the aramang baked products enriched with malunggay gained a high level of acceptability among the would-be consumers. Based on the sensory evaluation results, regardless of the amount of aramang powder, whether 50 grams, 75 grams or 100 grams the aramang baked products enriched with malunggay remains generally highly acceptable.

### Recommendations

Based on the results of sensory evaluation of aramang baked products enriched with malunggay it was proven that the three (3) treatments were all highly acceptable in terms of variable Odor, Taste, Flavor, Color and Textures conducted by the researchers.

The researchers further recommend to the fisherfolks utilizing the use of aramang. It could be fresh or dried since it was the basic commodity of Aparri, Cagayan. Baked products found to be a profitable product to develop. Since it has gained its acceptability, the researchers are proposing this aramang baked products enriched with malunggay to be one of the products available at the Aparri Pasalubong Center as a way it could be introduced and promoted in the market. This will help the fisherfolks and their spouses to generate more income by utilizing the catch of aramang.

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