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PROXIMATE NUTRIENT ANALYSIS OF GUAVA (*PsidiumGuajava)* AND BILIMBI *(Averrhoa Bilimbi)* WITH CASSAVA BASED-SAGIP NUTRI-PACK AS INNOVATIVE CONDIMENT

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ABSTRACT

This study investigates the development, preparation, analysis, and acceptability of guava and bilimbi Condiment with Cassava Based-Sagip Nutri-Pack as an innovative condiment. The research showcases a systematic approach from harvesting to packaging, emphasizing nutritional benefits and suitability for a healthy diet regimen. Sensory evaluations across different treatments reveal varying consumer perceptions in appearance, aroma, taste, and texture. Cost and return analysis demonstrate the economic feasibility of the products, with a consistent return on investment. Shelf-life observations suggest room for improvement in storage strategies to extend product freshness. The study concludes by providing recommendations to enhance product development, marketing, and distribution strategies, emphasizing the importance of continuous recipe innovation, consumer education on nutritional benefits, and sensory optimization. By leveraging these recommendations, the research aims to drive the market adoption of guava and bilimbi Condiments with Cassava Based-Sagip Nutri-Pack, catering to diverse consumer preferences and contributing to the creation of innovative, nutritious condiments.

Keywords: *condiment, guava, bilimbi, sensory evaluation, shelf-life, product development*

INTRODUCTION

In Barangay San Felipe, City of Ilagan, Isabela, guavas, and bilimbi trees flourish abundantly. However, these fruits often go to waste, rotting, and ignored. This underutilization is concerning given their potential health benefits. The local community can benefit significantly by transforming these fruits into innovative condiments, enhancing their nutritional value, and providing a healthier alternative to traditional sauces.

Condiments play a vital role in enhancing the flavor of food across various cultures. According to Aster et al. (2023), condiments can be found globally in liquid, semisolid, and solid forms. In the Philippines, common condiments include calamansi (Philippine lime), patis (fish sauce), suka (vinegar), and toyo (soy sauce). These condiments, often used as dipping sauces (sawsawan), enhance the flavor of dishes by balancing and complementing their taste profiles. Filipino cuisine is particularly noted for its concept of "linamnam," a term that signifies deep and rich flavors, adding a unique dimension to the culinary experience (Zappia, 2015).

There is a growing trend in the food industry towards enhancing the nutritional profile of foods by utilizing parts of fruits and vegetables that are typically discarded. Belović et al. (2018) highlighted the potential of food science to make these parts useful, transforming them into value-added products. Similarly, the study by Kour et al. (2018) discusses the incorporation of fruit and vegetable by-products in the development of functional foods, underscoring their potential to improve nutritional quality and reduce food waste.

In response to these findings, efforts are being made to enhance standard condiments used in community street foods, particularly for students at Isabela School of Arts and Trades-Main. In collaboration with ISU, Echague-Main Campus, the aim is to enrich condiments by incorporating a Sagip Nutri-Pack, thus enhancing their nutritional value.

The proposed condiment recipe will include guava and bilimbi combined with a Cassava-Based Sagip Nutri-Pack Powder, which consists of cassava, mung beans, sesame, cacao pod husk, malunggay, and turmeric powder. This initiative aligns with SDG 3 (Good Health and Well-being), utilizing the nutritional benefits of the Sagip Nutri-Pack powder to provide essential macro and micronutrients necessary for maintaining body functions.

The findings from this research will be beneficial not only to food manufacturers but also to consumers seeking unique and nutritious condiment options. Additionally, transforming underutilized fruits into marketable products can address local waste issues and support SDG 8 (Decent Work and Economic Growth) by creating income opportunities for local households. An extension program in partnership with local barangays and LGUs in Ilagan, Isabela, will be implemented to disseminate knowledge and skills related to this project, contributing to SDG 1 (Zero Poverty).

Guava (Psidium guajava L.) is revered as a "superfruit" due to its rich nutrient profile and medicinal benefits (Praveena et al., 2022). Belonging to the Myrtaceae family, guava is renowned for its savory taste and health-promoting properties. It is used in traditional medicine for its leaves, roots, bark, and fruit. Research by Manikandan et al. (2020) highlights the antimicrobial and antioxidant properties of guava, emphasizing its potential in health-promoting applications.

Averrhoa *bilimbi*, or *bilimbi*, commonly found in Philippine and Southeast Asian forests, is a traditional cooking ingredient (Geetha et al., 2011). Despite being often overlooked, bilimbi is rich in iron, vitamins B and C, antioxidants, and phosphorus. Its juice is used for cleaning and bleaching, while its leaves are known for their medicinal properties, such as alleviating coughs, bleeding disorders, bee sting irritation, and skin issues (Valencia & Bismark, 2015). Recent studies by Rosnah et al. (2012) have also explored the potential of bilimbi as a natural preservative in food products, highlighting its antimicrobial properties.

The increasing interest in innovative condiment ingredients has led to the exploration of tropical fruits like guava and bilimbi. These fruits offer tangy flavors, high nutritional value, and natural preservatives, potentially enhancing condiments' taste and nutritional value. However, their acceptability and development in condiment production remain understudied. Investigating the process and acceptability of incorporating guava and bilimbi with Sagip Nutri-Pack in condiments is essential for assessing their feasibility and market impact.

This study aims to investigate consumer acceptance of guava and bilimbi in condiments, optimize proportions, and formulation parameters, and conduct sensory evaluations. The results will offer valuable insights for the food industry, highlighting the potential of guava and bilimbi as innovative condiment ingredients.

Research Questions

Generally, the study aimed to determine the acceptability and nutritive value of Guava and Bilimbi with Cassava Based-Cassava Based-Sagip Nutri-Pack as Innovative ingredients in condiment production.

Specifically, it sought to address the following questions:

1. What are the processes involved in making guava and bilimbi with Cassava Based-Sagip Nutri-Pack for innovative condiments?
2. What is the proximate chemical nutrient analysis of guava and bilimbi with Cassava cassava-based-sagip Nutri-pack for innovative condiments?
3. What is the level of acceptability of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack for innovative condiments with proportions of 1,150g, 1,100g, 1,050g, and the original (TI to T4) in terms of (a) appearance (b) aroma (c) taste, and (d) texture
4. Is there a significant difference in the evaluation of the food experts, food technology students, and consumers on the prepared guava and bilimbi with Cassava Based-Sagip Nutri-Pack as a condiment?
5. What is the cost analysis computed for the different treatments?

6. What is the shelf-life of guava and bilimbi with Cassava Based-Sagip Nutri-Pack as a condiment at cold and warm room temperatures?

METHODOLOGY

A. Materials

1. Ingredient

Table 1 shows the ingredients and their proportions in the preparation of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri-Pack for Innovative Condiment. Which will be used in the study.

Table 1. Proportions of Ingredients Used in Making Innovative Condiment

Ingredients	T1 Bilimbi	T1 Guava	T 2	T3	T 4
Cassava Based Nutri-pack Powder			120g	120g	120g
Ripe Guavas		2400g	1150g	1100g	1050g
Bilimbi	2400 g		1150g	1100g	1050g
Sugar	170grams	170grams	170grams	170grams	170grams
Salt	11.4grams	11.4grams	11.4grams	11.4grams	11.4grams
Pepper	2.8grams	2.8grams	2.8grams	2.8grams	2.8grams
Citric Acid	3 grams	3 grams	3 grams	3 grams	3 grams
Garlic	5 grams	5 grams	5 grams	5 grams	5 grams
Xanthan Gum	1 gram	1 gram	1 gram	1 gram	1 gram
Artificial Lemon Flavor	5 grams	5 grams	5 grams	5 grams	5 grams
Artificial Food Color	1 g	1 g	1 g	1 g	1 g
Sodium Benzoate (Food Grade)	1 g	1 g	1 g	1 g	1 g

2. Equipment Tools and Utensils

To carry out the study, some equipment, materials, and components were utilized. These were used for measurement, mixing, cooking, packaging, and cutting. They are described in the following table.

Table 2. Equipment and tools to be used in the preparation of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri Pack for Innovative Condiment

PREPARATION TOOLS	MEASURING TOOLS	CUTTING TOOLS	PACKAGING AND LABELING	EQUIPMENT
Stainless Steel Mixing Bowls (2-3)	Measuring cup	Sharp Kitchen Knife	Sterilized Glass with Lids	Blender or Food Processor
Colander	Measuring spoon	Peeler	Plastic sealer	Gas range
Saucepan or Cooking Pot	Digital Weighing Scale			Heat blower
Wooden Spoon				
Chopping boards				
Disposable gloves				
Spoons				
Funnel				

Table 2, contd.

B. Procedure

The preparation of Guava and Bilimbi Enhanced with Casava Based-Sagip Nutri-Pack for Innovative Condiment involves a meticulous process to harness the unique flavors and nutritional benefits of these tropical fruits. Cassava-Based-Sagip Nutri-Pack Powder will be bought at Isabela State University-Echague Campus, and all other ingredients were bought From the City of Ilagan Public Market, before measuring the different proportions for the treatments. The flowchart for making condiments is shown in Figure 1 below.

C. Treatment of the Study

The proportion of ingredients of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri Pack for Innovative Condiment shows the different ratios in making a model for Condiment used as treatment in this study.

T1 = Guava Condiment

TI = Bilimbi Condiment

T2 = Cassava Based Sagip Nutri-pack (120g), Ripe Guava (1150g), Bilimbi (1150)

T3 = Cassava Based Sagip Nutri-pack (120g), Ripe Guava (1100g), Bilimbi (1100)
T4 = Cassava Based Sagip Nutri-pack (120g), Ripe Guava (1050g), Bilimbi (1050)

Analysis

The treatment products of Guava and Bilimbi Enhanced with Cassava Sagip Nutri Pack for Innovative Condiment samples were subjected to proximate chemical and nutrient analysis to be conducted at the SGS Philippines, Inc. 2F Alegria Building, 2229 Chino Roses Avenue, Bangkal, Makati City.

E. Sensory Evaluation

Sensory Evaluation was conducted at Isabela School of Arts and Trades – Main, and ISAT-TESDA, City of Ilagan, Isabela to determine the consumers' acceptability of the experimental product in terms of color/appearance, taste/flavor, texture, and odor/aroma, of model recipe for Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri-Pack for Innovative Condiment as a nutritious saucing agent. The instrument for data gathering is the 9-Point-Hedonic Scale.

` The range of scale is interpreted as follows:

Scale	Range	Descriptive Rating
9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.50 – 7.49	Like Moderately
6	5.50 – 6.49	Like Slightly
5	4.50 – 5.49	Neither Like nor Dislike
4	3.50 - 4. 49	Dislike Slightly
3	2.50 - 3.49	Dislike Moderately
2	1.50 - 2.49	Dislike Very Much
1	1.50 - 1.49	Dislike Extremely

A sensory panel was composed of sixty (60) individuals randomly selected among the (20) food experts, (20) food technology students, and (20) consumers. The qualification of the panelists in terms of age should be 12 to 60 years old. They were screened to be non-smokers, not liquor drinkers, and in good health during the sensory evaluation. They were purposely selected and properly oriented on what and how to evaluate the products using evaluation instruments.

The evaluators were given treatment samples they were subjected to evaluate carefully and rate each sample according to their color/appearance, taste/flavor, texture, odor/aroma, and general acceptability. They were asked to rinse their mouth before tasting each sample. This was strictly observed as a standard procedure to ensure the credibility and validity of the results of the study.

F. Experimental Design

There were five treatments used in the study, which were assigned randomly to the experimental units within a block (BLK1.1, BLK1.2 BLK2, BLK3, and BLK4). Each treatments have a code (GT1-110, BTI-110, T2-220, T3-330, and T4-440) to eliminate bias when doing the sensory evaluation.

All the score sheets were gathered, tabulated, analyzed, and interpreted. The sensory evaluation of the data was collected and analyzed through the following randomized complete block design (RCBD).

The grouping of experimental units per block is as follows:

BLOCK	**1.1**	**$110^{1.1}$**	**$110^{1.2}$**	**220^{2}**	**330^{3}**	**440^{4}**
	1.2	**$110^{1.2}$**	**330^{3}**	**440^{4}**	**$110^{1.1}$**	**220^{2}**
	2	**220^{2}**	**440^{4}**	**330^{3}**	**$110^{1.2}$**	**$110^{1.1}$**
	3	**330^{3}**	**220^{2}**	**$110^{1.1}$**	**440^{4}**	**$110^{1.2}$**
	4	**440^{4}**	**$110^{1.1}$**	**$110^{1.2}$**	**220^{2}**	**330^{3}**

Figure 1. Arrangement of 5 treatments

G. Cost and Return Analysis

Cost analysis was performed to determine the economic feasibility of the product if it would be sold in the market. This was done by listing down all the cost, labor, and other expenses incurred in producing the different proportions of Guava and Bilimbi Enhanced with Sagip Nutri Pack for Innovative Condiment and computing the unit cost and return on investment (ROI) per treatment.

H. Statistical Data Analysis

The results of the sensory evaluation were statistically analyzed using the one-way classification of the analysis of Variance (ANOVA). F-test, mean, and descriptive statistics were used to determine if there is a significant difference among the treatments in terms of color/appearance, texture, taste/flavor, and odor/aroma.

Statistical Tools Used

All data were gathered from the questionnaire/evaluation form given to the evaluators. The variables shall be analyzed and interpreted based on the output of the Statistic Package for Social Science Software (SPSS).

1. Mean (M) was utilized to gauge the level of acceptability of the level of nutritional characteristics and sensorial properties of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri-Pack for Innovative Condiment to respondents' age groups and criteria.

2. One Way Between Groups Analysis of Variance (ANOVA) was used to determine the difference in the level of acceptability of the level of nutritional characteristics and sensorial properties of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri-Pack for Innovative Condiment across the four age groups.

Scale	Range	Descriptive Rating
9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.50 – 7.49	Like Moderately
6	5.50 – 6.49	Like Slightly
5	4.50 – 5.49	Neither Like nor Dislike
4	3.50 - 4. 49	Dislike Slightly
3	2.50 - 3.49	Dislike Moderately
2	1.50 - 2.49	Dislike Very Much
1	1.50 - 1.49	Dislike Extremely

3. Post Hoc Analysis using Scheffe Test. This was conducted only when the ANOVA revealed a significant difference between and among levels of general acceptability of the level of nutritional characteristics and sensorial properties of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri-Pack for Innovative Condiment production across the three age groups. This will be utilized to determine which among the pairs of groups have significantly different levels of acceptability of the level of nutritional characteristics and sensorial properties of Guava and Bilimbi Enhanced with Cassava Based-Sagip Nutri-Pack for Innovative Condiment.

RESULTS AND DISCUSSION

Product Development

The guava and bilimbi Condiment with cassava-based Based-Sagip Nutri-Pack underwent different stages of development starting from harvesting, washing, seed extraction, chopping, grinding, sifting, measuring, mixing, cooking, packaging, and labeling. Through these stages of development, careful observation and analysis were done to come up with guava and bilimbi with Cassava Based-Sagip Nutri-Pack as an innovative condiment.

Preparation of Guava and Bilimbi Condiment in Five Treatments

The development process started with the creation of guava and bilimbi Condiment with Cassava Based-Sagip Nutri-Pack in four different treatments. The procedure began with washing the guava and bilimbi and extracting the fruit seeds separately, chopping with a knife to easily grind the fruits with a blender then sifting to surely check their fine texture. To present the measurements and ingredients systematically, a table is provided.

Table 3. Measurements and ingredients in the preparation of Guava Condiment

Measurements	Ingredients
2400 g	Ripe Guavas
170 g	Granulated Sugar
11.4 g	Salt
2.8 g	Ground White Pepper
3 g	Citric Acid
10 g	Powdered White Garlic
1 g	Xanthan Gum
5 g	Artificial food lemon flavor
1 g	Sodium benzoate

Procedure

The process of making guava condiments begins with measuring all required ingredients, washing, chopping, and deseeding the guavas. The guava pulp is then blended to a smooth consistency and cooked on medium heat. Once it reaches a boil, the heat is reduced, and the mixture is simmered for about 16-18 minutes, with frequent stirring. Natural sweeteners, spices, and seasonings are added to taste, and the flavors are adjusted for balance. After achieving the desired consistency, the mixture is removed from the heat and allowed to cool completely. Finally, the cooled condiment is transferred to sterilized jars, which are then sealed and labeled. Proper jar sterilization is crucial to prevent contamination and extend shelf life. The proportions of ingredients can be adjusted to create a unique flavor profile, and gentle cooking helps preserve the nutritional content of the guava and other components.

Table 4. Measurements and ingredients in the preparation of Bilimbi Condiment

Measurements	Ingredients
2400 g	Ripe Bilimbi
170 g	Granulated Sugar
11.4 g	Salt

2.8 g	Ground White Pepper
3 g	Citric Acid
10 g	Powdered White Garlic
1 g	Xanthan Gum
5 g	Artificial food lemon flavor
1 g	Sodium benzoate

Procedure

The process of making a bilimbi condiment begins with measuring all required ingredients, washing, chopping, and deseeding the bilimbi. The bilimbi pulp is then blended to achieve a smooth consistency. This blended pulp is mixed well and cooked on medium heat. Once it reaches a boil, the heat is reduced and the mixture is simmered for about 16-18 minutes, with frequent stirring. Natural sweeteners, spices, and seasonings are added to taste, with flavors adjusted as needed for balance. After achieving the desired consistency, the mixture is removed from the heat and allowed to cool completely. Finally, the cooled condiment is transferred to sterilized jars, which are then sealed and labeled. Proper jar sterilization is crucial to prevent contamination and extend shelf life. The proportions of ingredients can be adjusted to create a unique flavor profile, and gentle cooking helps preserve the nutritional content of the bilimbi and other components

Table 5. Measurements and ingredients in the preparation of three different Treatments of Guava and Bilimbi Condiment with Cassava Based-Cassava Based-Sagip Nutri-Pack.

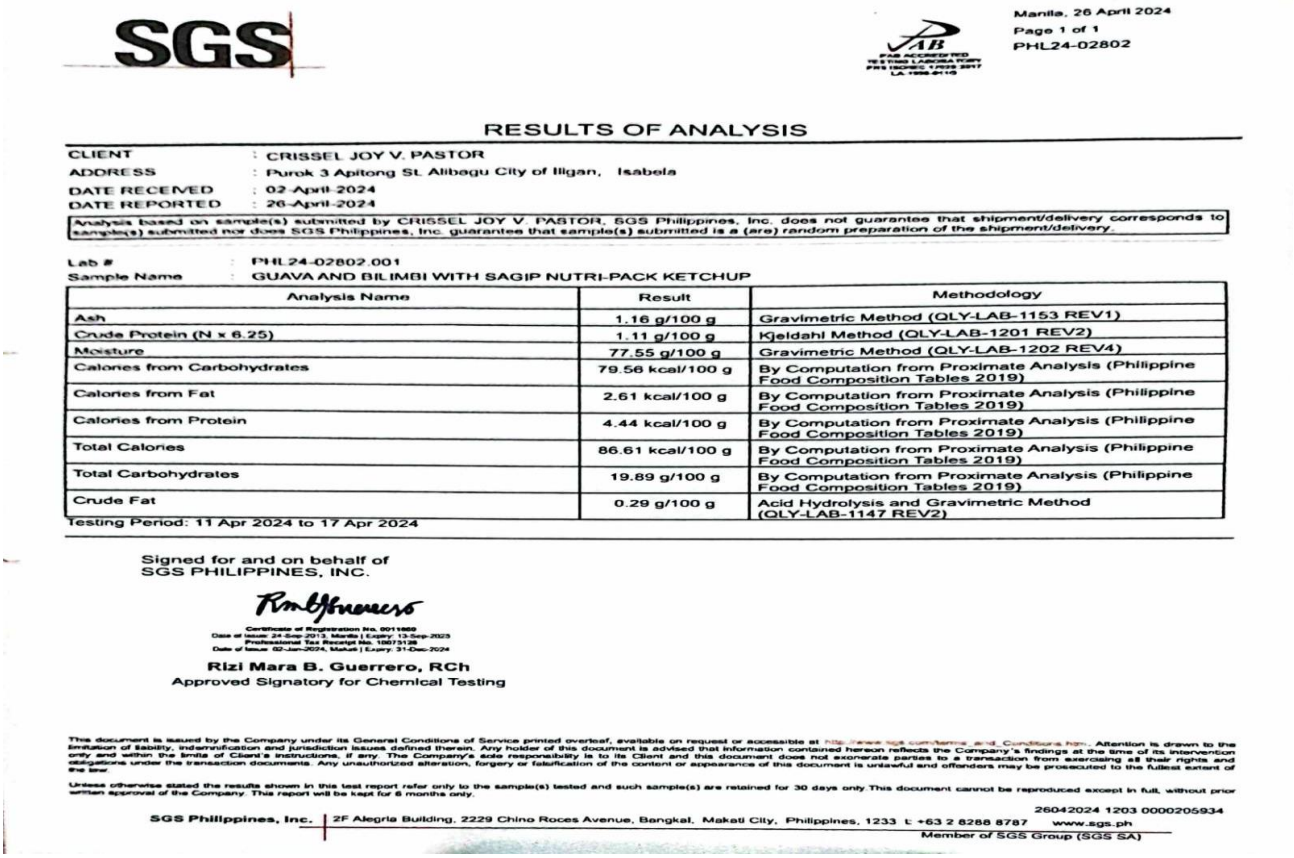
Measurements			**Ingredients**
T2	T3	T4	
120 g	120 g	120 g	Cassava Based Nutri-pack Powder
1150 g	1100 g	1050 g	Ripe Guava
1150 g	1100 g	1050 g	Ripe Kamias
170 g	170 g	170 g	Granulated Sugar
11.4 g	11.4 g	11.4 g	Salt
2.8 g	2.8 g	2.8 g	Ground White Pepper
3 g	3 g	3 g	Citric Acid
10 g	10 g	10 g	Powdered White Garlic
1 g	1 g	1 g	Xantan Gum
5 g	5 g	5 g	Artificial food lemon flavor
1 g	1 g	1 g	Sodium benzoate

Procedures

The process of making the Guava and Bilimbi Condiment involves several steps to ensure a flavorful and nutritious end product. First, measure all required ingredients and separately wash and chop guava and bilimbi for each treatment, ensuring removal of their seeds. Next, grind the fruit pulps using a blender until smooth, incorporating the Cassava Based-Sagip Nutri-Pack powder into the mixture during blending. Mix the blended ingredients thoroughly and cook on medium heat. Once the mixture reaches a boil, reduce the heat and simmer for 16-18 minutes, stirring intermittently to prevent sticking. Add natural sweeteners, spices, and seasonings to taste, adjusting flavors for a balanced profile. Once the condiment reaches the desired consistency, remove it from heat and allow it to cool completely in the pan. Finally, transfer the cooled mixture into sterilized jars, ensuring they cool before sealing and labeling for storage.

Report of Analysis on the Nutritive Value of Guava and Bilimbi Enhanced with Cassava-Based Sagip Nutri Pack for Innovative Condiment

The report analysis on the nutritive value of Guava and Bilimbi Enhanced with Cassava-based Sagip Nutri Pack for Innovative Condiment is shown in Figure 1 below.



SGS

Manila, 26 April 2024
Page 1 of 1
PHL24-02802

RESULTS OF ANALYSIS

CLIENT : CRISSEL JOY V. PASTOR
ADDRESS : Purok 3 Apitong St. Alibagu City of Iligan, Isabela
DATE RECEIVED : 02 April 2024
DATE REPORTED : 26 April 2024

Analysis based on sample(s) submitted by CRISSEL JOY V. PASTOR, SGS Philippines, Inc. does not guarantee that shipment/delivery corresponds to sample(s) submitted nor does SGS Philippines, Inc. guarantee that sample(s) submitted is a (are) random preparation of the shipment/delivery.

Lab # : PHL24-02802.001
Sample Name : GUAVA AND BILIMBI WITH SAGIP NUTRI-PACK KETCHUP

Analysis Name	Result	Methodology
Ash	1.16 g/100 g	Gravimetric Method (QLY-LAB-1153 REV1)
Crude Protein (N x 6.25)	1.11 g/100 g	Kjeldahl Method (QLY-LAB-1201 REV2)
Moisture	77.55 g/100 g	Gravimetric Method (QLY-LAB-1202 REV4)
Calories from Carbohydrates	79.56 kcal/100 g	By Computation from Proximate Analysis (Philippine Food Composition Tables 2019)
Calories from Fat	2.61 kcal/100 g	By Computation from Proximate Analysis (Philippine Food Composition Tables 2019)
Calories from Protein	4.44 kcal/100 g	By Computation from Proximate Analysis (Philippine Food Composition Tables 2019)
Total Calories	86.61 kcal/100 g	By Computation from Proximate Analysis (Philippine Food Composition Tables 2019)
Total Carbohydrates	19.89 g/100 g	By Computation from Proximate Analysis (Philippine Food Composition Tables 2019)
Crude Fat	0.29 g/100 g	Acid Hydrolysis and Gravimetric Method (QLY-LAB-1147 REV2)

Testing Period: 11 Apr 2024 to 17 Apr 2024

Signed for and on behalf of
SGS PHILIPPINES, INC.

Rizi Mara B. Guerrero, RCh
Approved Signatory for Chemical Testing

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Figure 2. Report of analysis on the nutritive value of Guava and Bilimbi Enhanced with Cassava Sagip Nutri Pack for Innovative Condiment

As a result, there was little difference found between the crude fat that was produced and the usual Condiment crude fat. Therefore, no proof eating guava with bilimbi Condiment increases the risk of obesity or other related conditions, including high blood pressure and heart disease. Based on the results, which are displayed in the table, this guava and bilimbi Condiment has a low trans fat content and is acceptable for consumption by those following a healthy diet regimen. Its crude fat level is 0.29 g/100 g, and its total carbohydrate content is 19.89 g/100 g. Because the cassava-based-Cassava-based-Sagip Nutri-Pack enriched guava and bilimbi Condiment contains carbohydrates, it can provide customers with additional energy to allow their bodies to function as intended.

Additionally, the analysis report indicates the presence of a trace amount of protein (1.11 g/100 g). Furthermore, protein contains amino acids, which the body requires to rebuild some of its bones and muscles. Protein is essential for overall health and plays a crucial role in repairing tissues and building enzymes and hormones. Adequate protein intake is necessary to support various bodily functions and maintain muscle mass.

The Level of Acceptability of Guava and Bilimbi Condiment with Cassava Based-Sagip Nutri-Pack

The following table shows the level of acceptability of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack for innovative Condiments with proportions of 1,200, 900, 600, and the original (TI to T4) in terms of appearance/color, aroma, taste, and texture.

Table 6. The level of acceptability of the original recipe of Treatment I (Guava Condiment) in terms of appearance/color, aroma, taste, and texture

TREATMENT I GUAVA CONDIMENT	Mean	Standard Deviation	Description
110[1.1]			
Appearance/Color			
a. How visually appealing do you find the color of the guava Condiment	6.90	1.70	Like Moderately
b. Does the color of the guava Condiment make it appetizing to you?	7.10	1.53	Like Moderately
c.Does the color of the guava Condiment affect your overall impression of its quality?	6.95	1.63	Like Moderately
Average	6.98	1.51	Like Moderately
Odor/Aroma			
a. How well does the aroma of the guava Condiment complement its flavor?	7.05	1.86	Like Moderately

b. How unique is the aroma of the guava Condiment compared to other condiments?	6.75	2.05	Like Moderately
c.Does the aroma of the guava Condiment influence your overall satisfaction with the product?	7.08	2.04	Like Moderately
Average	6.96	1.89	Like Moderately
Taste/Flavor			
a. How do you like the sweetness of the guava Condiment?	6.43	2.25	Like slightly
b. How do you like the sourness of the guava Condiment?	6.45	2.18	Like slightly
c.Does the taste of guava Condiment linger pleasantly on your palate?	6.55	2.36	Like Moderately
Average	6.48	2.09	Like Slightly
Texture			
a. Does the texture of the guava Condiment feel grainy or gritty to you?	6.90	2.06	Like Moderately
b. Does the texture of the guava Condiment contribute positively to your eating experience?	6.85	2.09	Like Moderately
c.Does the texture of the guava Condiment contribute positively to your eating experience?	6.73	2.02	Like Moderately
Average	6.83	1.89	Like Moderately

55

The table presents the findings of a study examining the acceptability of guava condiments with different proportions and the Cassava-Based-Sagip Nutri-Pack additive across various sensory attributes: appearance/color, odor/aroma, taste/flavor, and texture.

For Treatment I, which focuses on guava Condiment, the mean ratings and standard deviations reveal moderate likeness across the board. In terms of appearance, participants generally found the color moderately appealing (Mean: 6.98, SD: 1.51), appetizing, and impacting their overall impression of quality.

Similarly, for odor/aroma, the aroma of the guava Condiment was perceived as moderately complementing its flavor (Mean: 6.96, SD: 1.89), somewhat unique compared

to other condiments, and influencing overall satisfaction. When it came to taste/flavor, participants slightly favored the sweetness (Mean: 6.48, SD: 2.09) and sourness of the guava Condiment, with the taste moderately lingering on the palate. Regarding texture, participants found the guava Condiment to be moderately free from graininess or grittiness (Mean: 6.83, SD: 1.89), contributing positively to their eating experience.

Overall, the guava Condiment with the Cassava Based-Sagip Nutri-Pack additive demonstrated moderately positive ratings across appearance, aroma, taste, and texture, with slight variations in likability observed for taste compared to the other attributes.

Table 7. The level of acceptability of the original recipe of Treatment I (Bilimbi Condiment) in terms of appearance/color, aroma, taste, and texture

TREATMENT I BILIMBI CONDIMENT	**Mean**	**Standard Deviation**	**Description**
110[1.2]			
Appearance/Color			
a.How visually appealing do you find the color of the bilimbi Condiment	7.50	1.43	Like Very Much
b.Does the color of the bilimbi Condiment make it appetizing to you?	7.37	1.46	Like Moderately
c. Does the color of the bilimbi Condiment affect your overall impression of its quality?	7.18	1.48	Like Moderately
Average	7.35	1.29	Like Moderately
Odor/Aroma			
a. How well does the aroma of the bilimbi Condiment complement its flavor?	7.27	1.52	Like Moderately
b. How unique is the aroma of the bilimbi Condiment compared to other condiments?	7.20	1.53	Like Moderately
c.Does the aroma of the bilimbi Condiment influence your overall satisfaction with the product?	7.38	1.69	Like Moderately
Average	7.28	1.41	Like Moderately

Taste/Flavor			
a. How do you like the sweetness of the bilimbi Condiment?	7.12	2.24	Like Moderately
b. How do you like the sourness of the bilimbi Condiment?	6.85	2.20	Like Moderately
c. Does the taste of bilimbi Condiment linger pleasantly on your palate?	6.97	2.16	Like Moderately
Average	6.98	2.11	Like Mode 57
Texture			
a. Does the texture of the bilimbi Condiment feel grainy or gritty to you?	7.03	1.92	Like Moderately
b. Does the texture of the bilimbi Condiment contribute positively to your eating experience?	7.30	1.83	Like Moderately
c. Does the texture of the bilimbi Condiment contribute positively to your eating experience?	7.03	1.96	Like Moderately
Average	7.12	1.79	Like Moderately

The table presents the findings of a study examining the acceptability of Bilimbi Condiment across various sensory attributes: appearance/color, odor/aroma, taste/flavor, and texture.

The results for Treatment I, focusing on bilimbi Condiment, indicate a generally positive reception across the sensory attributes assessed. In terms of appearance/color, participants rated the bilimbi Condiment as visually appealing (Mean: 7.35, SD: 1.29), moderately appetizing, and affecting their overall impression of its quality moderately. Regarding odor/aroma, the aroma of the bilimbi Condiment was perceived as moderately complementing its flavor (Mean: 7.28, SD: 1.41), somewhat unique compared to other condiments, and influencing overall satisfaction moderately. When evaluating taste/flavor, participants moderately liked the sweetness (Mean: 6.98, SD: 2.11) and sourness of the bilimbi Condiment, with the taste moderately lingering on the palate. Texture-wise, participants found the bilimbi Condiment to be moderately free from graininess or grittiness (Mean: 7.12, SD: 1.79), contributing positively to their eating experience.

Overall, bilimbi Condiment with the Cassava Based-Sagip Nutri-Pack additive received moderately positive ratings across appearance, aroma, taste, and texture, suggesting its acceptability among participants.

Table 8. The level of acceptability of the original recipe of Treatment II (Guava and Bilimbi with Cassava-Based Condiment) in terms of appearance/color, aroma, taste, and texture

TREATMENT II GUAVA AND BILIMBI WITH CASSAVA-BASED-SAGIP NUTRI-PACK CONDIMENT	Mean	Standard Deviation	Description
220			
Appearance/Color			
a. How visually appealing do you find the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment?	7.60	1.64	Like Very Much
b. Does the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? make it appetizing to you?	7.63	1.54	Like Very Much
c. Does the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment affect your overall impression of its quality?	7.80	1.47	Like Very Much
Average	7.68	1.38	Like Very Much
Odor/Aroma			
a. How well does the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment complement its flavor?	7.45	1.63	Like Moderately
b. How unique is the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? compared to other condiments?	7.78	1.48	Like Very Much
c. Does the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? influence your overall satisfaction with the product?	7.68	1.58	Like Very Much
Average	7.64	1.46	Like Very Much
Taste/Flavor			

a. How do you like the sweetness of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment.?	7.68	1.76	Like Very Much
b. How do you like the sourness of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment.?	7.62	1.74	Like Very Much
c. Does the taste of guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment linger pleasantly on your palate?	7.70	1.73	Like Very Much
Average	7.67	1.61	Like Very Much
Texture			Like Very Much
a. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment feel grainy or gritty to you?	7.80	1.45	Like Very Much
b. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment contribute positively to your eating experience?	7.88	1.25	Like Very Much
c. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? contribute positively to your eating experience?	7.72	1.43	Like Very Much
Average	7.80	1.26	Like Very Much

The table shows the findings of a study examining the acceptability of guava and bilimbi with different proportions and the Cassava Based-Sagip Nutri-Pack additive across various sensory attributes: appearance/color, odor/aroma, taste/flavor, and texture.

Treatment II, which involves guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment, received highly favorable ratings across all sensory attributes assessed. Participants found the color of the guava and bilimbi Condiment with Cassava Based-Sagip Nutri-Pack to be very visually appealing (Mean: 7.68, SD: 1.38), highly appetizing, and significantly impacting their overall impression of its quality. Similarly, the aroma of this Condiment blend was perceived to complement its flavor moderately well (Mean: 7.64, SD: 1.46), with a high level of uniqueness compared to other condiments, and significantly influencing overall satisfaction. When evaluating taste/flavor, participants highly favored both the sweetness (Mean: 7.67, SD: 1.61) and sourness of the guava and bilimbi Condiment with Cassava Based-Sagip Nutri-Pack, with the taste lingering

pleasantly on the palate. Regarding texture, participants found the Condiment to be very free from graininess or grittiness (Mean: 7.80, SD: 1.26), significantly contributing positively to their eating experience.

Overall, the guava and bilimbi Condiment with cassava-based sagip Nutri-pack received highly positive ratings across appearance, aroma, taste, and texture, suggesting strong acceptability and preference among participants.

Table 9. The level of acceptability of the original recipe of Treatment III (Guava and Bilimbi with Cassava-Based Condiment) in terms of appearance/color, aroma, taste, and texture

TREATMENT III GUAVA AND BILIMBI WITH CASSAVA-BASED-SAGIP NUTRI-PACK CONDIMENT	Mean	Standard Deviation	Remarks
330			
Appearance/Color			
a. How visually appealing do you find the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment?	7.82	1.45	Like Very Much
b. Does the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? make it appetizing to you?	7.68	1.33	Like Very Much
c. Does the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment affect your overall impression of its quality?	7.60	1.39	Like Very Much
Average	7.70	1.30	Like Very Much
Odor/Aroma			
a. How well does the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment complement its flavor?	7.57	1.51	Like Very Much
b. How unique is the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? compared to other condiments?	7.48	1.56	Like Moderately
c. Does the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? influence your overall satisfaction with the product?	7.55	1.44	Like Very Much
Average	7.53	1.40	Like Very Much
Taste/Flavor			

a. How do you like the sweetness of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment.?	7.35	2.09	Like Mode[illegible] 61
b. How do you like the sourness of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment.?	7.37	1.90	Like Moderately
c. Does the taste of guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? linger pleasantly on your palate?	7.52	1.82	Like Very Much
Average	7.41	1.76	Like Moderately
Texture			
a. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? feel grainy or gritty to you?	7.47	1.79	Like Moderately
b. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? contribute positively to your eating experience?	7.63	1.58	Like Very Much
c. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? contribute positively to your eating experience?	7.58	1.38	Like Very Much
Average	7.56	1.48	Like Very Much

The table presents the findings of a study examining the acceptability of guava and bilimbi with different proportions and the Cassava Based-Sagip Nutri-Pack additive across various sensory attributes: appearance/color, odor/aroma, taste/flavor, and texture.

Treatment III, which involves guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment, garnered positive ratings across most sensory attributes evaluated. Participants found the color of this Condiment blend to be highly visually appealing (Mean: 7.70, SD: 1.30), significantly appetizing, and greatly affecting their overall impression of its quality. Regarding odor/aroma, the aroma was perceived to complement its flavor well (Mean: 7.53, SD: 1.40), significantly influencing overall satisfaction, although it was rated slightly lower in terms of uniqueness compared to other condiments. In terms of taste/flavor, while participants moderately liked the sweetness (Mean: 7.41, SD: 1.76) and sourness of the guava and bilimbi Condiment with Cassava Based-Sagip Nutri-Pack, the taste was not as highly favored as the other treatments, with a slightly lower average

rating. As for texture, participants found the Condiment to be moderately free from graininess or grittiness (Mean: v7.56, SD: 1.48), significantly contributing positively to their eating experience.

Overall, Treatment III received positive ratings across appearance, aroma, and texture, although taste/flavor was rated slightly lower compared to the other attributes, suggesting a slightly lower level of acceptability for taste in comparison to appearance and texture.

Table 10. The level of acceptability of the original recipe of Treatment IV (Guava and Bilimbi with Cassava-Based Condiment) in terms of appearance/color, aroma, taste, and texture

TREATMENT IV GUAVA AND BILIMBI WITH CASSAVA-BASED-SAGIP NUTRI-PACK CONDIMENT	**Like Extremely**	**Like Very Much**	**Like Moderately**
440			
Appearance/Color			
a. How visually appealing do you find the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment?	8.03	1.164	Like Very Much
b. Does the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? make it appetizing to you?	7.77	1.11	Like Very Much
c. Does the color of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment affect your overall impression of its quality?	7.80	1.34	Like Very Much
Average	7.87	1.11	Like Very Much
Odor/Aroma			
a. How well does the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? complement its flavor?	7.60	1.57	Like Very Much
b. How unique is the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? compared to other condiments?	7.70	1.39	Like Very Much
c. Does the aroma of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? influence your overall satisfaction with the product?	7.55	1.51	Like Very Much

Average	7.62	1.43	Like Very Much
Taste/Flavor			
a. How do you like the sweetness of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment.?	7.63	1.71	Like Very
b. How do you like the sourness of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment.?	7.67	1.44	Like Very Much
c.Does the taste of guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? linger pleasantly on your palate?	7.43	1.74	Like Moderately
Average	7.58	1.51	Like Very Much
Texture			
a. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? feel grainy or gritty to you?	7.65	1.58	Like Very Much
b. Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? contribute positively to your eating experience?	7.72	1.45	Like Very Much
c.Does the texture of the guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment? contribute positively to your eating experience?	7.72	1.68	Like Very Much
Average	7.69	1.45	Like Very Much

The table shows the findings of a study examining the acceptability of guava and bilimbi with different proportions and the Cassava Based-Sagip Nutri-Pack additive across various sensory attributes: appearance/color, odor/aroma, taste/flavor, and texture.

Treatment IV, featuring guava and bilimbi with Cassava-Based-Sagip Nutri-Pack Condiment, received highly positive ratings across all evaluated sensory attributes. Participants overwhelmingly found the color of this Condiment blend to be extremely visually appealing (Mean: 7.87, SD: 1.11), significantly appetizing, and greatly influencing their overall impression of its quality. Regarding odor/aroma, the aroma was perceived to complement its flavor exceptionally well (Mean: 7.62, SD: 1.43), significantly influencing overall satisfaction, and was also rated highly unique compared to other condiments. In terms of taste/flavor, participants highly favored both the sweetness (Mean: 7.58, SD: 1.51) and sourness of the guava and bilimbi Condiment with Cassava Based-Sagip Nutri-

Pack, although the taste was slightly less favored compared to appearance and aroma. Texture-wise, participants found the Condiment to be highly free from graininess or grittiness (Mean: 7.69, SD: 1.45), significantly contributing positively to their eating experience.

Overall, Treatment IV received exceptionally positive ratings across appearance, aroma, taste, and texture, indicating strong acceptability and preference among participants.

Table 11. Comparison in the evaluation of the food experts, food technology students, and consumers on the prepared guava and bilimbi with Cassava Based-Sagip Nutri-Pack as a Condiment

Treatment	F-value	p-value	Comparison	Decision	Remark
Treatment 1 Guava Appearance/Color	0.50	0.61	p-value > 0.05	accept Ho	not significant
Treatment 1 Guava Aroma	2.40	0.10	p-value > 0.05	accept Ho	not significant
Treatment 1 Guava Taste	3.75	0.03	p-value <0.05	reject Ho	Significant
Treatment 1 Guava Texture	1.42	0.25	p-value > 0.05	accept Ho	not significant
Treatment 1 Bilimbi Appearance	1.42	0.25	p-value > 0.05	accept Ho	not significant
Treatment 1 Bilimbi Aroma	2.20	0.12	p-value > 0.05	accept Ho	not significant
Treatment 1 Bilimbi Taste	4.94	0.01	p-value <0.05	reject Ho	Significant
Treatment 1 Bilimbi Texture	5.74	0.00	p-value <0.05	reject Ho	Significant
Treatment 2 Guava Bilimbi Appearance/Color	2.68	0.08	p-value > 0.05	accept Ho	not significant
Treatment 2 Guava Bilimbi Aroma	3.36	0.04	p-value <0.05	reject Ho	significant
Treatment 2 Guava Bilimbi Taste	1.52	0.28	p-value > 0.05	accept Ho	not significant
Treatment 2 Guava Bilimbi Texture	3.89	0.03	p-value <0.05	reject Ho	significant
Treatment 3 Guava Bilimbi Appearance	0.83	0.44	p-value > 0.05	accept Ho	not significant
Treatment 3 Guava Bilimbi Aroma	0.94	0.40	p-value > 0.05	accept Ho	not significant
Treatment 3 Guava Bilimbi Taste	2.23	0.12	p-value > 0.05	accept Ho	not significant
Treatment 3 Guava Bilimbi Texture	2.72	0.07	p-value > 0.05	accept Ho	not significant

Treatment 4 Guava Bilimbi Appearance	0.36	0.70	p-value > 0.05	accept Ho	not signif
Treatment 4 Guava Bilimbi Aroma	0.99	0.38	p-value > 0.05	accept Ho	not significant
Treatment 4 Guava Bilimbi Taste	1.19	0.31	p-value > 0.05	accept Ho	not significant
Treatment 4 Guava Bilimbi Texture	1.19	0.31	p-value > 0.05	accept Ho	not significant

65

The table presents the analysis of the differences in the respondents' evaluation of guava and bilimbi with Cassava-Based-Sagip Nutri-Pack Condiment.

The statistical analysis reveals differences in the evaluation of guava and bilimbi with Cassava Based-Cassava Based-Sagip Nutri-Pack Condiment among food experts, food technology students, and consumers, particularly in terms of aroma, taste, and texture across different treatments.

For Treatment 1 (Guava), the taste was found to be significantly different among the groups (F-value: 3.75, p-value: 0.03), indicating notable disparity in how they perceived the taste of guava Condiment with Cassava Based-Sagip Nutri-Pack. Similarly, for bilimbi, both taste (F-value: 4.94, p-value: 0.01) and texture (F-value: 5.74, p-value: 0.00) evaluations yielded significant differences, suggesting distinct perceptions among the evaluators.

Moving to Treatment 2 (Guava and Bilimbi), significant differences were observed in the evaluation of aroma (F-value: 3.36, p-value: 0.04) and texture (F-value: 3.89, p-value: 0.03) for guava and bilimbi Condiment, indicating varying perceptions among the groups regarding these attributes.

However, for Treatment 3 (Guava and Bilimbi) and Treatment 4 (Guava and Bilimbi), no significant differences were found in the evaluation of appearance, aroma, taste, or texture among the groups. In summary, while some treatments showed significant differences in certain sensory attributes across the groups, others did not, suggesting that perceptions of guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment can vary among food experts, food technology students, and consumers, particularly in terms of taste, aroma, and texture.

66

In summary, while some treatments showed significant differences in certain sensory attributes across the groups, others did not. These findings suggest that perceptions of guava and bilimbi with Cassava Based-Sagip Nutri-Pack Condiment can vary among food experts, food technology students, and consumers, particularly in terms of taste, aroma, and texture. Further research or exploration may be needed to understand the underlying factors contributing to these differences and to optimize the sensory attributes of the Condiment blend to better meet the preferences of the target audience.

Cost and Return Analysis of Guava and Bilimbi with Cassava Based-Sagip Nutri-Pack Condiment

Table 12. Summary of Cost and Return Analysis of Guava and Bilimbi with Cassava Based-Sagip Nutri-Pack Condiment

Ingredients	**Measurement**	**TREATMENTS**				
		GT1	**BTI**	**T2**	**T3**	**T4**
Cassava Based Cassava Based-Sagip Nutri-Pack	120 g	-	-	30	30	30
Guava	2400g, 1150g, 1100g, 1050g	72	-	28.75	27.5	26.25
Bilimbi	2400g, 1150g, 1100g, 1050g	-	72	28.75	27.5	26.25
White Sugar	170 g	19.38	19.38	19.38	19.38	19.38
Salt	11.4 g	0.57	0.57	0.57	0.57	0.57
Ground White Pepper	2.8 g	1.45	1.45	1.45	1.45	1.45
Garlic Powder	5 g	1.3	1.3	1.3	1.3	1.3
Citric Acid	3 g	2.94	2.94	2.94	2.94	2.94
Xanthan Gum	1 g	1.052	1.052	1.052	1.052	1.052
Artificial food color	1 g	2.2	2.2	2.2	2.2	2.2
Lemon Flavor	5 g	13.75	13.75	13.75	13.75	13.75
Soduim Benzoate	1 g	0.83	0.83	0.83	0.83	0.

67

Table 6. cont

Additional Expenses					
Bottle with seal and lid	76	76	76	76	76
Electricity	20	20	20	20	20
Label	4.5	4.5	4.5	4.5	4.5
TOTAL UNIT COST(Php)	215.97	215.97	201.47	198.97	196.47

As shown in Table 6, the costed and estimated recipe was 1/2 ratio of the original recipe, and the cost of the Cassava Based-Sagip Nutri-Pack used in fortifying the treatments differed. The amount of Cassava Based-Sagip Nutri-Pack Powder in treatments 2, 3, and 4 is Php 30.

The same amount of the other ingredients was allowed for the 3 treatments White Sugar Php 19.38, Salt Php 0.57, Ground White Pepper Php 1.45, Garlic Powder Php 1.3, Citric Acid Php 2.94, Xanthan Gum Php 1.052, added Artificial food color Php 2.2, Lemon Flavor Php 13.75, and, Preservative added Sodium Benzoate Php 0.83.

Treatment 1 based on ingredients for the standard recipe of Guava Condiment and Bilimbi Condiment cost for Php 37.79, each treatment, while Treatment 2, used a combination of Guava and Bilimbi with a Sagip Nutri Pack costing Php 35.25, for treatment 3 the amount costing is Php 34.81 and for treatment 4 the amount costing is Php 34.38.

Additional Expenses

Additional expenses for all treatments amounted to Php 76.00 which includes a Bottle with seal and lid; and Label at Php 5.00. In addition, other operating expenses such as Electricity at Php 20.00.

68

Summing up all of the above expenses, the cost incurred in producing the products amounted to Php 215.97, Php 201.47, Php 198.97, and Php 196.47, for T1; T2, T3, and T4 respectively.

Table 7 presents the summary computation of return on investment. It reveals that the ROI for all treatments was nearly identical, at 40%.

Table 13. Summary Computation of Return and Investment

PARTICULARS	Treatments				
	GT1	BT1	T2	T3	T4
Total Production Cost (Php)	215.97	215.97	201.47	198.97	196.47
Unit Cost (*Total Production Yield (1 Bottle of Condiment x 8 pcs*)	215.97	215.97	201.47	198.97	196.47
Selling Price (*Unit Cost x 40% + Unit Cost*)	302.35	302.35	282.05	278.55	275.058
Total Sale (*Selling Price x yield (1 Bottle of Condiment*)	302.35	302.35	282.05	278.55	275.058
Income (*Total Sales production*)	86.38	86.38	80.58	79.68	78.58
ROI (*Income x 100/Total Production Cost*)	**40.00%**	**40.00%**	**40.00%**	**40.00%**	**40.00%**

Shelf-life of the Guava and Bilimbi with Cassava Based-Sagip Nutri-Pack Condiment Production in Room Temperature

After production, the *Condiment* food products were stored at room temperature between 25°C and 30°C. Furthermore, the following table displays the observation:

a. Shelf-Life of treatment 1 guava Condiment at room temperature

Table 14. Shelf-Life of treatment 1 guava Condiment

Days of Observation	Observation Results
First day	The guava Condiment was visually appealing, sourly flavored, and sweet, and had a creamy, soft, and thick texture.
Second day	The guava Condiment, as seen on the first day, was brightly colored, sour, sweet, and vinegary, with a thick and creamy soft feel.
Third day	The second day's observations were the same: the guava had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fourth day	Similar observations were made on the third day: the guava Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fifth day	The guava Condiment had a pleasant appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture. The observations were made on the fourth day.
Sixth day	The guava Condiment had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.
Seventh day	The guava Condiment had the same observations on the sixth day: it had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.

b. Shelf-Life of treatment 1 bilimbi Condiment at room temperature

Table 15. Shelf-Life of treatment 1 bilimbi Condiment

Days of Observation	Observation Results
First day	The bilimbi Condiment was visually appealing, sourly flavored, and sweet, and had a creamy, soft, and thick texture.
Second day	The bilimbi Condiment, as seen on the first day, was brightly colored, sour, sweet, and vinegary, with a thick and creamy soft feel.
Third day	The second day's observations were the same: the bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fourth day	Similar observations were made on the third day: bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fifth day	The bilimbi Condiment had a pleasant appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture. The observations were made on the fourth day.
Sixth day	The bilimbi Condiment had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.
Seventh day	The bilimbi Condiment had the same observations on the sixth day: it had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.

c. Shelf-Life of treatment 2 guava and bilimbi with Cassava Based-Sagip Nutri-Pack for innovative Condiment

Table 16. Shelf-life of treatment 2 guava and bilimbi with Cassava Based-Cassava Based-Sagip Nutri-Pack for innovative Condiment

Days of Observation	Observation Results
First day	The guava and bilimbi condiments were visually appealing, sourly flavored, and sweet, and had a creamy, soft, and thick texture.
Second day	The guava and bilimbi Condiment, as seen on the first day, was brightly colored, sour, sweet, and vinegary, with a thick and creamy soft feel.

Third day	The second day's observations were the same: the guava and bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fourth day	Similar observations were made on the third day: the guava and bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fifth day	The guava and bilimbi Condiment had a pleasant appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture. The observations were made on the fourth day.
Sixth day	The guava and bilimbi Condiment had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.
Seventh day	The guava and bilimbi Condiment had the same observations on the sixth day: it had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.

d. Shelf-Life of treatment 3 guava and bilimbi with Cassava Based-Sagip Nutri-Pack for innovative Condiment

Table 17. Shelf-life of treatment 3 guava and bilimbi with Cassava Based-Sagip Nutri-Pack for innovative Condiment

Days of Observation	Observation Results
First day	The guava and bilimbi condiments were visually appealing, sourly flavored, and sweet, and had a creamy, soft, and thick texture.
Second day	The guava and bilimbi Condiment, as seen on the first day, was brightly colored, sour, sweet, and vinegary, with a thick and creamy soft feel.
Third day	The second day's observations were the same: the guava and bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fourth day	Similar observations were made on the third day: the guava and bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.

Fifth day	The guava and bilimbi Condiment had a pleasant appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture. The observations were made on the fourth day.
Sixth day	The guava and bilimbi Condiment had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.
Seventh day	The guava and bilimbi Condiment had the same observations on the sixth day: it had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.

e. Shelf-Life of treatment 4 guava and bilimbi with Cassava Based-Cassava Based-Sagip Nutri-Pack for innovative Condiment

72

Table 18. Shelf-life of treatment 4 guava and bilimbi with Cassava Based-Cassava Based-Sagip Nutri-Pack for innovative Condiment

Days of Observation	Observation Results
First day	The guava and bilimbi condiments were visually appealing, sourly flavored, and sweet, and had a creamy, soft, and thick texture.
Second day	The guava and bilimbi Condiment, as seen on the first day, was brightly colored, sour, sweet, and vinegary, with a thick and creamy soft feel.
Third day	The second day's observations were the same: the guava and bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fourth day	Similar observations were made on the third day: the guava and bilimbi Condiment had the same observations as the first day: it was nicely colored, smelled sour, tasted sweet and sour, and had a texture that was creamy, soft, and thick.
Fifth day	The guava and bilimbi Condiment had a pleasant appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture. The observations were made on the fourth day.
Sixth day	The guava and bilimbi Condiment had a good appearance and color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.
Seventh day	The guava and bilimbi Condiment had the same observations on the sixth day: it had a good appearance and

	color, a sour aroma, a sweet and sour flavor, and a creamy, soft, and thick texture.

The shelf-life of treatment 1 guava, treatment 1 bilimbi as well as treatment 2, 3, and 4 guavas and bilimbi with Cassava Based-Cassava Based-Sagip Nutri-Pack for innovative Condiments at room temperature will last for seven (7) days and at Refrigerated chiller temperature will lasted for one month or thirty (30) days. Refrigerated guava and bilimbi Condiments will have a longer shelf-life than room temperature.

Conclusions

In conclusion, the comprehensive study on the development, preparation, analysis, and acceptability of guava and bilimbi Condiment with Cassava Based-Sagip Nutri-Pack has provided valuable insights into creating an innovative and nutritious condiment. The meticulous process from harvesting to packaging, coupled with detailed measurements and ingredient lists, demonstrates a systematic approach to product development. The analysis of the nutritive value showcased the nutritional benefits of the condiments, emphasizing their suitability for a healthy diet regimen. The evaluation of acceptability among different treatments highlighted varying sensory perceptions, indicating the importance of considering consumer preferences. The cost and return analysis revealed the economic feasibility of the products, while the shelf-life observations offered practical guidance on storage recommendations. Overall, this study contributes significantly to the understanding of guava and bilimbi condiments with Cassava Based-Sagip Nutri-Pack, paving the way for further exploration and optimization of these innovative culinary offerings.

Recommendations

Based on the result of the study, several recommendations can be made to further enhance the development, marketing, and distribution of Proximate Nutrient Analysis of Guava and Bilimbi with Sagip Nutri-Pack as Innovative Condiments:

1. It is recommended that new items be created. To adapt to shifting dietary needs and customer tastes, the recipes for guava and bilimbi with cassava-based-sagip Nutri-pack as an Innovative Condiment must be constantly developed and improved. To grow the product range and draw in more customers, it could be required to experiment with different tastes, textures, and nutritional profiles.

2. Marketing efforts and educational materials should be used to explicitly educate customers about the nutritional advantages and adaptability of Guava and Bilimbi with cassava-based-sagip Nutri-pack as an Innovative Condiment. It is important to highlight the unique nutritional profiles of Guava and Bilimbi condiments with cassava-based-sagip Nutri-pack during production so that consumers may make educated choices based on their dietary requirements.

3. Further work must be done on improving the sensory features of Guava and Bilimbi with cassava-based-sagip Nutri-pack as Innovative condiments, such as look, scent, taste, and texture, to boost consumer satisfaction and acceptability. To identify issue areas and make necessary formula adjustments for products, sensory assessments, and consumer feedback sessions are highly recommended.

4. To cater to diverse consumer preferences, adapted marketing tactics and product offers should be developed. For example, highlighting the nutritional benefits and visual appeal of Guava and Bilimbi Condiment with cassava-based-sagip nutri-pack, a generic message should be incorporated. Collaboration with government organizations is necessary such as the Department of Agriculture, the Department of Science and Technology (DOST), and the Department of Trade and Industry (DTI) is required.

5. The use of Guava and Bilimbi with Sagip Nutri-pack as a novel Condiment is highly recommended, as it provides a greater return on investment than the food industry's marketed condiment.
6. It is advised to make use of efficient distribution and storage techniques to lengthen the shelf life of guava and bilimbi with Sagip Nutri-pack as novel condiments and reduce waste. Managing storage conditions, creating effective distribution networks, and investing in packaging technologies that increase shelf life may all be necessary to guarantee that items reach customers in the best possible shape. It is advised to work in conjunction with the Department of Trade and Industry (DTI). It is recommended that funds be set aside for further research and development projects that will investigate the possible uses of guava and bilimbi in the creation of this product. Working together with dietitians, food scientists, and culinary specialists, new guava and bilimbi cater to changing customer tastes and trends that may result from this. It is necessary to work with the DOST, the DTI, and the school's Research and Development unit.

Compliance with Ethical Standards

We, the authors, declare that informed consent was obtained from all respondents, who were also informed of their right to withdraw at any time. Anonymity and confidentiality were strictly maintained, and respondents' well-being was safeguarded throughout the study. There is no conflict of interest in this research. We strictly avoided plagiarism and ensured an unbiased interpretation of the findings. The results are intended solely for research purposes.

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REFERENCES

Aster, D., et al. (2023). Condiments of the world: An ethnographic perspective. Journal of Ethnic Foods, 10(2), 100-115.

Belović, M., et al. (2018). Utilization of fruit and vegetable processing by-products for innovative food products. Food Research International, 105, 121-131.

Geetha, G., et al. (2011). Averrhoa bilimbi: A review of its traditional uses, phytochemistry, and pharmacology. Journal of Ethnopharmacology, 137(2), 409-429.

Kour, R., et al. (2018). Fruit and vegetable by-products as functional foods: A review. Journal of Food Science and Technology, 55(3), 925-935.

Manikandan, R., et al. (2020). Antimicrobial and antioxidant properties of guava (Psidium guajava L.): A review. Journal of Medicinal Plants Research, 14(2), 68-79.

Praveena, S. M., et al. (2022). Guava (Psidium guajava L.): A superfruit with immense health benefits. Journal of Medicinal Plants Research, 16(4), 56-68.

Rosnah, S., et al. (2012). Potential of Averrhoa bilimbi as a natural preservative for food products. International Food Research Journal, 19(1), 123-130.

Valencia, N., & Bismark, R. (2015). Traditional uses and medicinal properties of Averrhoa bilimbi. Asian Pacific Journal of Tropical Medicine, 8(5), 315-321.

Zappia, C. (2015). The flavors of Filipino cuisine: A cultural perspective. Food Culture & Society, 18(4), 565-582.

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