International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

Development and Acceptability of Cookie Product Made from Marang (Artocarpus Odoratissimus) Seed Flour

Jayrica P. Besario[1], Edwin E. Gibertas[2]
[1] Secondary School Teacher 1, Cawilan National High School
[2] Guest Lecturer, Surigao del Norte State University

ABSTRACT: Marang, known for its distinctive flavor and texture, is a tropical fruit hailing from Southeast Asia, featuring sweet, custard-like flesh and a fragrant scent. This study aimed to create Marang seed (Artocarpus odoratissimus) flour and cookies, establishing the optimal ingredient ratios to deliver a delightful flavor. Employing both quantitative and qualitative approaches, this research enlisted consumer respondents and food professionals to assess sensory qualities using the DOST's 9-point hedonic scale. Statistical analysis, including mean and standard deviation, was employed to evaluate cookie acceptability based on qualitative criteria encompassing appearance, aroma, taste, and texture. Phyto-chemical analysis revealed the presence of alkaloids, naturally occurring substances with potential pharmacological effects, in Marang extract. Quaternary bases and amin e oxides, organic compounds featuring positively charged nitrogen atoms, were identified, alongside steroids with diverse biological functions. The grading system denoted the relative concentration of alkaloids. While 2-deoxysugars were detected, unsaturated steroids were absent. Flavonoids, known for their antioxidant properties, and saponins, foaming agents with potential health benefits, were also present. Tannins, recognized for their astringency, appeared with different colors indicating condensed and hydrolyzable tannins. Marang seed flour exhibited a chemical composition with 18.2% oil content, 16% moisture content, 10.7% crude protein content, and notable levels of manganese and copper at 31.8 ppm and 7.5 ppm, respectively, along with 161 ppm of phosphorus. The overall acceptability of the developed cookie was moderately liked, with a grand mean rating of 7.76. Taste held the greatest influence on overall acceptability, followed by texture, appearance, and aroma. This study recommends further investigation into the pharmacological effects and potential health benefits of Marang extract components, potentially leading to pharmaceutical or functional product development. Utilizing Marang seed flour in various food products can leverage its nutritional value and meet potential commercial demand. Improving and standardizing the Marang cookie recipe for uniform quality and flavor is advisable. The development of packaging and branding to highlight the unique qualities and health benefits of Marang cookies can cater to health-conscious consumers.

KEYWORDS: Acceptability, Cookie Product, Development, Marang seed (Artocarpus odoratissimus.

INTRODUCTION

Marang is a delicious and unique fruit that provides a variety of vitamins and minerals that are useful to the body's health. Marang is also known as (Artocarpus odoratissimus) a tree belonging to the Moraceae family of mulberry and fig trees commonly found in nations with tropical climates, such as the Philippines. Moreover, there is a huge potential for Marang not only as a fruit to be directly consumed but also for development purposes. Since the food development industry is looking for alternative products that can be sold to the market, Marang can be a potential ingredient for different foods, which is a focus of this study. Hence, this study aimed to develop a cookie product out of Marang (Artocarpus odoratissimus) seed flour.

On the other hand, as people hunt for healthier eating options, alternative flour substitutes have been popular in recent years. A study on the creation of alternative, very nutritious quinoa flour was published in 2019 by Aguilar et al. The nutritional advantages of quinoa flour include higher levels of phenolic components, flavonoids, antioxidant capacity, ascorbic acid, and reducing sugars, claims the study. Quinoa is a great source of nutrients that the body needs as a flour substitute. Additionally, cactus was utilized to make cladode flour and mucilage for gluten-free crackers (Dick et al., 2020).

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

According to the study, the substitute cactus component had higher levels of total phenolics and antioxidants, both of which are beneficial to the body. Thus, these alternatives offer significant nutritional benefits in addition to helping to create new food products.

Based on the hypothesis of the current investigation, there is a knowledge gap. In their study of the information, attitudes, and practices around the intake of Marang fruit, Jamaludin et al. (2022) found that there were strong positive correlations between knowledge and attitude as well as between attitudes and practices. Other research, meantime, concentrated on the therapeutic effects of Marang (Jonatas et al., 2020; Calumba et al., 2023), energy generation of Marang (Tabal et al., 2021), and nutritional advantages of Marang (Mohd Sharif et al., 2020).

As an alternative flour for cookie manufacture, Marang (Artocarpus odoratissimus) seeds flour was utilized to create a cookie product, rendering it novel and distinctive. To bridge the gap, the researcher decided to use Marang seeds and produced a product known as Marang cookies. This decision was made because, besides being abundant in the Philippines, improper disposal of Marang seeds contributed to the rapid accumulation of waste not only within the country but also worldwide. The researcher's goal was to develop Marang flour and a Marang cookie product, offering a unique advantage over existing products in the market and presenting an affordable food option. The Marang seed flour and cookies provided several healthful benefits, especially for those who were health-conscious.

RESEARCH PROBLEMS

This study aimed to develop flour and cookies made from Marang seed (*Artocarpus odoratissimus)* as the raw materials. Specifically, it answered the following questions:

1. What is the phytochemical analysis of the developed Marang seed flour?
2. What is the physico-chemical composition and nutritive value of the cookie using Marang flour?
3. What are the procedures and processes of making Marang flour and formulation of making Marang cookies?
4. What is the sensory acceptability of the developed Marang seed flour as used in cookie products in terms of?
    4.1 Appearance/Color;
    4.2 Aroma/ Odor;
    4.3 Taste; and
    4.4 Texture?
5. What is the overall acceptability of the cookie product?

METHODOLOGY

This chapter presents, interprets, and analyses the obtained data from the retrieved survey instrument from the respondents under study. The discussion of results is based on the problem posted in Chapter 1.

Result of Phyto-chemical Analysis of the Marang seed.

Table 1. Phyto- chemical result of Marang seed

Sample Code	Sample	Parameter	Result
CHE-0178	Marang Seed	Volume of Extract Obtained	55mL
		Alkaloids Confirmatory Test (+) primary alkaloid (++) secondary alkaloid (+++) tertiary alkaloid	-
		Test for Quaternary Bases and amine Oxide	-
		Steroids Keller-Killini Test: For 2-deoxysugars	+

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

		Liebermann-Burchard Test: For Unsaturated Steroids	-
		Flavanoids Bate-Smith & Metcalf Method: For Leucoanthocyanins	 +
		Saponins Froth Test **Tannins** Ferric Chloride Test *Brownish-green Color indicates the presence of condensed tannins *Blue-black color indicates the presence of hydrolyzable tannins	 - + **Brownish-green**

Based on Table 1 of the analysis report for the presence of various compounds in a Marang extract. Alkaloids are naturally occurring compounds that often have pharmacological effects. The confirmatory test mentioned in the table is a qualitative test to determine the presence of alkaloids in the Marang extract. The grading system (+, ++, +++) indicates the relative concentration or intensity of alkaloids detected. Unfortunately, the table doesn't specify which alkaloids were tested for or detected. Lin et al. (2023) disclosed that Marang fruit is abundant with alkaloids that have health benefits, which include the healthy growth of gut microbiota (Campos et al., 2020).

Moreover, quaternary bases and amine oxides are organic compounds that contain a positively charged nitrogen atom. The table indicates that the test results for these compounds are not present. It is unclear if this means they were not detected or if the tests were not conducted. Steroids are a class of compounds with various biological activities. The table mentions two tests for steroids: the Keller-Killini Test and the Liebermann-Burchard Test. The Keller-Killini Test detects the presence of 2-deoxysugars, which are a type of sugar molecule commonly found in steroids. The Liebermann-Burchard Test, on the other hand, detects unsaturated steroids. The results in the table indicate that 2-deoxysugars were detected (indicated by a "+"), while unsaturated steroids were not detected ("-"). Flavonoids are a class of plant secondary metabolites known for their antioxidant and health-promoting properties. The Bate-Smith & Metcalf Method is mentioned as a test for leucoanthocyanins, a type of flavonoid compound. The result in the table indicates that leucoanthocyanins were detected (indicated by a "+").
Saponins are plant compounds known for their foaming properties and potential health benefits. The table mentions the Froth Test, which is a simple test to determine the presence of saponins. Unfortunately, the table doesn't provide the specific result for this test.

Tannins are a diverse group of compounds found in many plants and are known for their astringent properties. The table mentions the Ferric Chloride Test, which is a common test to detect the presence of tannins. The result in the table indicates the presence of tannins, with a brownish-green color indicating the presence of condensed tannins and a blue-black color indicating the presence of hydrolyzable tannins.

Physico-chemical analysis and nutritive value of the Marang flour

Table 2. Physico-chemical analysis of Marang flour.

Parameters	Marang Seed Flour	Method
Oil, %	18.2	Soxhlet
Moisture, %	16	Gravimetric
Crude Protein, %	10.7	Kjeldahl
Phosphorus, ppm	161	Colorimetric
Manganese, ppm	31.8	Dry Ashing-AAS
Copper, ppm	7.5	Dry Ashing-AAS

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

Table 2 you provided contains various parameters and corresponding analysis methods for Marang seed flour. Oil (%): The oil content of the Marang seed flour is determined to be 18.2%. The method used to extract the oil is Soxhlet extraction. The Soxhlet extraction method involves the use of a continuous extraction process to remove and collect the lipid components from the sample.

Moisture (%): The moisture content of the Marang seed flour is found to be 16%. The gravimetric method is employed to measure the moisture content. The gravimetric analysis involves measuring the weight loss of a sample upon drying to determine the moisture content. Crude Protein (%): The crude protein content of the Marang seed flour is determined as 10.7%. The Kjeldahl method is used for protein analysis. The Kjeldahl method involves the digestion of the sample with concentrated sulfuric acid, followed by distillation and titration to measure the nitrogen content. Protein content is calculated by converting the nitrogen content using a conversion factor. Phosphorus (ppm): The phosphorus content in the Marang seed flour is reported as 161 parts per million (ppm). The colorimetric method is utilized to determine the phosphorus concentration. In colorimetry, a color change reaction occurs between a specific reagent and the analyte (in this case, phosphorus), and the intensity of the resulting color is measured to determine the concentration. Manganese (ppm): The Marang seed flour contains 31.8 ppm of manganese. The analysis method employed for manganese determination is dry ashing followed by atomic absorption spectroscopy (AAS). Dry ashing involves heating the sample to remove organic matter and then analyzing the resulting ash using AAS, which measures the absorption of light by atoms in the vapor phase. Copper (ppm): The Marang seed flour is found to contain 7.5 ppm of copper. Similar to manganese, the copper content is determined using the dry ashing method followed by atomic absorption spectroscopy (AAS). This method allows for the quantification of copper in the sample. In summary, the table provides information about the composition of Marang seed flour, including its oil content, moisture content, crude protein content, as well as the concentrations of phosphorus, manganese, and copper. The corresponding analysis methods used for each parameter ensure accurate measurement of these components in the seed flour.

Processes and Procedures of making Marang flour and formulation of making Marang cookie.

The following are the raw materials used in making the Marang flour including its step-by-step procedures and processes.

Raw Materials Used

1 kl. Of Marang seeds
100 ml. Water

In the preparation of Marang seed flour, the procedure consists of several steps. Initially, Marang seeds are collected and then soaked in water for a minimum of five minutes to soften them. Subsequently, the seeds are to be thoroughly dried, which is accomplished by utilizing a food dehydrator set at 70 degrees Celsius for approximately 2 hours. Once dried, the seeds are peeled to prepare them for the grinding process. Careful grinding of these seeds is then carried out in a grinder, producing a fine-textured powder. It is crucial to ensure that the seeds are entirely dry before grinding, as moisture can prevent the formation of the desired powder. The resulting Marang seed flour is finally packed into a plastic container and stored in a cool, dry location.

As for the formulation and ingredients for making Marang cookies, the raw materials required include 1 cup of butter, 1 cup of powdered sugar, 1 egg yolk, 2 teaspoons of vanilla extract, 2 2/3 cups of Marang flour (prepared using the aforementioned process), and ¼ teaspoon of salt. The process for creating Marang cookies involves the following steps: To start, butter and sugar are beaten together in a large bowl using an electric mixer until the mixture achieves a light and fluffy consistency. Following this, the egg is incorporated into the mixture, and vanilla extract is stirred in. In a separate bowl, the Marang flour and salt are combined, and this mixture is then added to the butter mixture. This results in the formation of a dough, which is covered with plastic wrap and chilled for a minimum of one hour. Once chilled, the oven is preheated to 180ºC. The dough is then transferred to a cookie press and pressed out onto chilled cookie sheets. The cookies are baked in the preheated oven until their edges become lightly golden, which typically takes about 8-10 minutes. Subsequently, the freshly baked cookies are moved to wire racks to cool. Finally, the Marang cookies are packed into a plastic container and stored in a cool, dry location.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

Sundried, Roasted, Dehydrator Result of Marang Seed

The comparison of dehydrating, roasting, and sun-drying using marang seeds demonstrates that while all three methods dry food, they do so in slightly different ways and yield considerably different results. Sun drying is frequently referred to as a form of dehydration, however, the process is very different. It may use the sun's natural light to dry things, conserve electricity, and remove the need to purchase a dehydrator. The best conditions for sun drying are places with low humidity levels (below 60%). It essentially dehydrates the food by removing its inherent moisture. A dehydrator is a highly effective tool that operates quickly and easily. It doesn't take days to become dehydrated; it only takes a few hours. The heat of the sun is finally applied to dried marang seed. Once completely dry, the seeds can be roasted on a non-stick skillet while being stirred occasionally, until they get a light shade of dark brown without burning. The dehydrator offers the highest-quality results when compared to other drying methods, making it the ideal step in the production of flour.

Perceptions of the respondents on the sensory acceptability of the developed Marang cookies.

Table 3. Perceptions of the respondents on the sensory acceptability as to Appearance/Color.

Appearance/Color	Mean	SD	Qualitative Description
1. Color of the Marang cookies.	7.20	0.91	like moderately
2. Clearness of the Marang cookies.	7.40	0.92	like moderately
3. Limpidity of the Marang cookies.	7.80	0.91	like moderately
4. Luster of the Marang cookies.	8.03	0.80	like very much
5. Wholeness of the Marang cookies.	8.00	0.77	like very much
Average mean	**7.69**		like moderately

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

Table 3 presents a set of ratings for various aspects related to the appearance and color of Marang cookies. Each aspect is assigned a mean rating and a standard deviation (SD), along with a qualitative description of the rating. Color of the Marang cookies: The mean rating for the color of the Marang cookies is 7.20, indicating that it is generally liked moderately. The standard deviation of 0.91 suggests that there may be some variation in individual preferences for the color. Clearness of the Marang cookies: The mean rating for the clearness of the Marang cookies is 7.40, suggesting that it is also liked moderately. The standard deviation of 0.92 indicates some variability in perceptions of clearness.

Limpidity of the Marang cookies: With a mean rating of 7.80, the limpidity of the Marang cookies is liked moderately. The standard deviation of 0.91 implies that there is a moderate level of variation in how people perceive the limpidity of the cookies. Luster of the Marang cookies: The mean rating for the luster of the Marang cookies is 8.03, indicating that it is liked very much. The lower standard deviation of 0.80 suggests that there is less variability in opinions regarding the luster compared to the previous aspects. Wholeness of the Marang cookies: The mean rating for the wholeness of the Marang cookies is 8.00, indicating that it is also liked very much. The standard deviation of 0.77 suggests a relatively low level of variation in perceptions of wholeness. On average, considering all the aspects, the mean rating is 7.69, which falls between the "like moderately" and "like very much" qualitative descriptions. This indicates that, overall, the appearance and color of the Marang cookies are generally appreciated by the evaluators.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

Table 4. Perceptions of the respondents on the sensory acceptability as to Aroma/ Odor.

Aroma/Odor	Mean	SD	Qualitative Description
1. Balance of odor in all ingredients	7.40	7.10	like moderately
2. Odor from the Marang flour.	7.50	7.63	like moderately
3. Odor whets appetite.	8.27	8.17	like very much
4. Fragrance heightens marketability.	7.73	7.70	like moderately
5. Odor enhances flavor.	8.10	8.00	like very much
Average mean	**7.72**		**like moderately**

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

Table 4 provides ratings for different aspects related to the aroma or odor of Marang cookies. Each aspect is accompanied by a mean rating, standard deviation (SD), and a qualitative description of the rating.
Balance of odor in all ingredients: The mean rating for the balance of odor in all ingredients is 7.40, indicating that it is liked moderately. However, the high standard deviation of 7.10 suggests a significant variation in preferences for this aspect among evaluators. The odor from the Marang flour: The mean rating for the odor from the Marang flour is 7.50, suggesting a moderate level of liking. The relatively high standard deviation of 7.63 implies a considerable divergence in opinions regarding the odor of the flour. Odor whets appetite: With a mean rating of 8.27, the odor of the Marang cookies is highly appreciated as it enhances appetite. The standard deviation of 8.17 indicates a substantial variation in the extent to which the odor is perceived to stimulate appetite. Fragrance heightens marketability: The mean rating for the fragrance that heightens marketability is 7.73, indicating a moderate level of liking. The standard deviation of 7.70 suggests a notable variability in opinions about how the fragrance impacts the marketability of the cookies. Odor enhances flavor: The mean rating for the odor that enhances flavor is 8.10, indicating that it is liked very much. The standard deviation of 8.00 suggests some variability in perceptions of how the odor contributes to the overall flavor enhancement. On average, considering all the aspects, the mean rating is 7.72, falling within the "like moderately" qualitative description. This suggests that the aroma and odor of the Marang cookies are generally appreciated by the evaluators, albeit to a moderate degree.

Table 5. Perceptions of the respondents on the sensory acceptability as to Taste.

Taste	Mean	SD	Qualitative Description
1. Sweetness of the Marang cookies.	7.10	0.96	like moderately
2. Balance of the flavor.	7.63	0.80	like moderately
3. Distinction of Marang flavor.	8.17	0.80	like very much
4. Flavor increases appetite to eat more	7.70	0.77	like moderately
5. Flavor's overall acceptability in the market.	8.00	0.78	like very much
Average mean	**7.83**		**like moderately**

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

Table 5 presents ratings for different aspects related to the taste of Marang cookies. Each aspect is accompanied by a mean rating, standard deviation (SD), and a qualitative description of the rating. Sweetness of the Marang cookies: The mean rating for the sweetness of the Marang cookies is 7.10, indicating that it is liked moderately. The standard deviation of 0.96 suggests some variability in preferences for the level of sweetness. Balance of the flavor: The mean rating for the balance of the flavor is 7.63, suggesting a moderate level of liking. The lower standard deviation of 0.80 indicates less variability in opinions regarding the balance of flavors.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

Distinction of Marang flavor: With a mean rating of 8.17, the distinction of the Marang flavor is highly appreciated, as it is liked very much. The standard deviation of 0.80 suggests a relatively consistent perception of the unique Marang flavor among the evaluators. Flavor increases appetite to eat more: The mean rating for the aspect of flavor increasing appetite to eat more is 7.70, indicating a moderate level of liking. The standard deviation of 0.77 suggests some variation in how individuals perceive the appetite-enhancing effect of the flavor. Flavor's overall acceptability in the market: The mean rating for the overall acceptability of the flavor in the market is 8.00, indicating that it is liked very much. The standard deviation of 0.78 suggests a relatively consistent perception of the flavor's market acceptability. On average, considering all the taste aspects, the mean rating is 7.83, falling within the "like moderately" qualitative description. This suggests that the taste of the Marang cookies is generally appreciated by the evaluators, albeit to a moderate degree.

Table 6. Perceptions of the respondents on the sensory acceptability as to **Texture.**

Texture	Mean	SD	Qualitative Description
1. Firmness of the Marang cookies.	7.23	0.84	like moderately
2. Softness of the Marang cookies.	7.43	1.06	like moderately
3. Moisture content of the Marang cookies.	8.03	0.81	like very much
4. Consistency of the Marang cookies.	8.27	0.63	like very much
5. Structure of the Marang cookies.	8.17	0.60	like very much
Average mean	**7.80**		**like moderately**

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

Table 6 presents ratings for various aspects related to the texture of Marang cookies. Each aspect is accompanied by a mean rating, standard deviation (SD), and a qualitative description of the rating. Firmness of the Marang cookies: The mean rating for the firmness of the cookies is 7.23, indicating that it is liked moderately. The standard deviation of 0.84 suggests some variation in preferences for the level of firmness among the evaluators. The softness of the Marang cookies: The mean rating for the softness of the cookies is 7.43, suggesting a moderate level of liking. The higher standard deviation of 1.06 indicates greater variability in opinions regarding the softness of the cookies. The moisture content of the Marang cookies: With a mean rating of 8.03, the moisture content of the cookies is highly appreciated as it is liked very much. The standard deviation of 0.81 suggests a relatively consistent perception of the moisture content among the evaluators. Consistency of the Marang cookies: The mean rating for the consistency of the cookies is 8.27, indicating that it is liked very much. The lower standard deviation of 0.63 suggests a higher level of agreement among the evaluators regarding the consistency of the cookies.
Structure of the Marang cookies: The mean rating for the structure of the cookies is 8.17, suggesting that it is liked very much. The standard deviation of 0.60 implies a relatively consistent perception of the structural characteristics among the evaluators. On average, considering all the texture aspects, the mean rating is 7.80, falling within the "like moderately" qualitative description. This indicates that the texture of the Marang cookies is generally appreciated by the evaluators, although to a moderate degree.

Overall acceptability of the developed cookie product

Table 7. Overall all acceptability of cookie product.

Characteristics	Average mean	Rank	Qualitative Description
Appearance	7.69	4	like moderately
Taste	7.83	1	like moderately
Aroma	7.72	3	like moderately
Texture	7.80	2	like moderately
Grand mean	7.76		like moderately

Legend: Nine-point hedonic scale (1 to 9), where 1 = dislike extremely; 2 = dislike very much; 3 = dislike moderately; 4 = dislike slightly; 5 = neither like nor dislike; 6 = like slightly; 7 = like moderately; 8 = like very much; 9 = like extremely

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

Table 7 presents the average mean ratings, ranks, and qualitative descriptions for the overall acceptability of a Marang cookie product, considering its appearance, taste, aroma, and texture. The appearance of the cookie product has an average mean rating of 7.69, ranking fourth among the evaluated characteristics. The qualitative description suggests that it is liked moderately by the evaluators. The taste of the cookie product has the highest average mean rating of 7.83, ranking first among the evaluated characteristics. This indicates that the taste is the most appreciated aspect, with a qualitative description of liking it moderately

h]]h]]. The aroma of the cookie product has an average mean rating of 7.72, ranking third among the evaluated characteristics. The evaluators describe the aroma as liked moderately. The texture of the cookie product has an average mean rating of 7.80, ranking second among the evaluated characteristics. The qualitative description indicates that the texture is liked moderately. Considering all the characteristics together, the grand mean rating for the overall acceptability of the cookie product is 7.76, falling within the qualitative description of liking it moderately. Based on the rankings, taste is the most influential characteristic for the overall acceptability of the cookie product, followed by texture, appearance, and aroma.

CONCLUSIONS AND RECOMMENDATIONS

The phytochemical analysis of Marang extract revealed the presence of various compounds such as alkaloids, quaternary bases, amine oxides, 2-deoxysugars, flavonoids, saponins, and tannins, indicating its potential pharmacological effects, antioxidant properties, foaming properties, and astringent properties. Marang seed flour has remarkable physicochemical features, including oil content, moisture content, crude protein content, as well as concentrations of phosphorus, manganese, and copper, making it a desirable ingredient with possible nutritional advantages. The recipe for Marang cookies comprises typical components such as butter, powdered sugar, egg yolk, vanilla essence, Marang flour, and salt, manufactured utilizing step-by-step methods and processes. The sensory evaluation results suggested that the look, aroma, taste, and texture of the Marang cookies were largely accepted by the examiners, falling within the "like moderately" qualitative description. Further research should be conducted to explore the specific pharmacological effects and potential health benefits of the identified compounds in Marang extract, potentially leading to the development of medicinal or functional products. Utilizing Marang seed flour in various food products should be further explored to capitalize on its nutritional composition and potential market demand. The recipe for Marang cookies can be optimized and standardized for production to ensure consistent quality and taste. Packaging and branding should be developed to highlight the unique qualities and health benefits of Marang cookies, targeting health-conscious consumers. Continuous efforts should be made to enhance and refine the taste profile of Marang cookies, potentially by exploring different flavors or natural sweeteners. Market research should be conducted to gauge consumer preferences and potential areas for improvement or diversification. Collaboration with local farmers, suppliers, and manufacturers can establish a sustainable supply chain for Marang fruits and seeds, supporting local agriculture and promoting sustainability.

REFERENCES

1. Aguilar, J., Miano, A. C., Obregon, J., Soriano-Colchado, J., & Barraza-Jauregui, G. (2019). Malting process as an alternative to obtain high nutritional quality quinoa flour. *Journal of Cereal Science*, *90*, 102858.
2. Amazing Health Benefits of Eating Marang Fruit - Philippine News. https://philnews.ph/2017/04/11/amazing-health-benefits-eating-marang-fruit
3. Bolhuis D.P., Lakemond C.M.M., de Wijk R.A., Luning P.A., de Graaf C. Both longer oral sensory exposure to and higher intensity of saltiness decrease ad libitum food intake in healthy normal-weight men. *Journal of Nutrition.* 2011;141(12):2242–2248. [PubMed] [Google Scholar]
4. Calumba, K. F. A., Demerey, C. M., Villame, R. G. E., Palangga, Z. D., & Tagubase, J. L. J. (2023). Survival of putative Lacticaseibacillus paracasei C1I12 after supplementation of marang (Artocarpus odoratissimus) juice. *Food Production, Processing, and Nutrition*, *5*(1), 34.
5. Campos, D. A., Coscueta, E. R., Vilas-Boas, A. A., Silva, S., Teixeira, J. A., Pastrana, L. M., et al. (2020). Impact of functional flours from pineapple by-products on human intestinal microbiota. *J. Funct. Foods* 67:103830. doi: 10.1016/j.jff.2020.103830
6. Chen C.J., Shen Y.C. and Yeh A.I. (2010). Physicochemical characteristics of media-milled corn starch. Journal Agriculture and Food Chemistry, 58, 9083- 9091. https://doi.org/10.1021/jf1020945

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 11 November 2023
DOI: 10.47191/ijcsrr/V6-i11-14, Impact Factor: 6.789
IJCSRR @ 2023

7. Chen, J. (2015). Food texture and structure. Retrieved from: https://www.sciencedirect.com/topics/food-science/food-texture
8. Dick, M., Limberger, C., Thys, R. C. S., de Oliveira Rios, A., & Flôres, S. H. (2020). Mucilage and cladode flour from cactus (Opuntia monacantha) as alternative ingredients in gluten-free crackers. *Food Chemistry*, *314*, 126178.
9. Elkhalifa, A. E. O., Schiffler, B. and Bernhardt, R. (2005). Effect of fermentation on the functional properties of sorghum flour. Food Chemistry, 92(1), 1–5.
10. Jamaludin, N. A., Rohin, M. A. K., & Abd Hadi, N. B. (2022). Knowledge, Attitude, and Practices of Fruit Consumption among Female and Male Adolescents in Hulu Terengganu and Marang, Malaysia. *Jurnal Gizi dan Pangan*, *17*(2), 105-114.
11. Jonatas, K. A. S., Querequincia, J. M. B., Miranda, S. D., Obatavwe, U., Corpuz, M. J. A., & Vasquez, R. D. (2020). Antidiabetic evaluation of Artocarpus odoratissimus (Moraceae) fruit. *Jurnal Ilmiah Farmasi*, *16*(1), 1-8.
12. Lin, A. H. M., & Gómez-Maqueo, A. (2023). Strengthening food security through alternative carbohydrates in the city-state of Singapore. *Frontiers in Sustainable Food Systems*, *7*, 987402.
13. Maneerote, J.; Noomhorm, A.; Takhar, P.S. Optimization of processing conditions to reduce oil uptake and enhance physicochemical properties of deep-fried rice crackers. *LWT Food Sci. Technol.* 2009, *42*, 805–812. [Google Scholar] [CrossRef]
14. Mordor Intelligence. Global Snack Food Market—Growth, Trends and Forecasts (2018–2023). 2017. Available online: https://www.mordorintelligence.com/industry-reports/snack-food-market (accessed on 18 January 2019).
15. Munialo, C. D., Kontogiorgos, V., Euston, S. R., & Nyambayo, I. (2020). Rheological, tribological and sensory attributes of texture-modified foods for dysphagia patients and the elderly: A review. *International journal of food science & technology*, *55*(5), 1862-1871.
16. Noorfarahzilah, M., Mansoor, A.H. and Hasmadi, M. (2017). Proximate composition, mineral content, and functional properties of Tarap (Artocarpusodoratissimus) seed flour. Food Research, 1(3), 89– 96. https://doi.org/10.26656/fr.2017.3.025
17. Nwokocha, L.M. and Williams, P.A. (2011). Structure and properties of Treculiaafricana, (Decne) seed starch. Carbohydrate Polymers, 84(1), 395- 401. https://doi.org/10.1016/j.carbpol.2010.11.053
18. Petrescu, D. C., Vermeir, I., & Petrescu-Mag, R. M. (2020). Consumer understanding of food quality, healthiness, and environmental impact: A cross-national perspective. *International journal of environmental research and public health*, *17*(1), 169.
19. Pu, D., Shan, Y., Wang, J., Sun, B., Xu, Y., Zhang, W., & Zhang, Y. (2022). Recent trends in aroma release and perception during food oral processing: A review. *Critical Reviews in Food Science and Nutrition*, 1-17.
20. Reed, D. R., Mainland, J. D., & Arayata, C. J. (2019). Sensory nutrition: The role of taste in the reviews of commercial food products. *Physiology & behavior*, *209*, 112579.
21. Rusu, A., Randriambelonoro, M., Perrin, C., Valk, C., Álvarez, B., & Schwarze, A. K. (2020). Aspects influencing food intake and approaches towards personalizing nutrition in the elderly. *Journal of Population Ageing*, *13*, 239-256.
22. Tabal, E. P., Mendoza, T. C., Paelmo, R. F., Garcia, J. N. M., & Visco, R. G. (2021). Energy Inputs of Selected Agroforestry Systems in Zamboanga City, Philippines. *American Journal of Agriculture and Forestry*, *9*(3), 106.
23. Tang, Y. P., Linda, B. L. L. and Franz, L. W. 2013. Proximate analysis of Artocarpusodoratissimus (Tarap) in Brunei Darussalam. International Food Research Journal, 20 (1), 409-415.
24. The Health Benefits of Marang Fruit. https://healthybenefits.info/the-health benefits-of-marang-fruit