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Katuk Leaf (Sauropus androgynus) Puree Incorporation in Milk Sponge Cake: Physical Properties and Consumer Acceptability

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Abstract

Background: The incorporation of plant-based ingredients into bakery products has gained increasing attention as an approach to improve product quality and consumer appeal. Katuk leaf (Sauropus androgynus) is known for its distinctive sensory characteristics, making it a potential ingredient for milk sponge cake formulation.
Objective: This study aimed to analyze the effect of katuk leaf puree addition in milk sponge cake on physical properties and consumer acceptability.
Methods: This experimental study was conducted at the Food Processing Laboratory, Culinary Education Study Program, Faculty of Engineering, Jakarta State University, from August 2021 to September 22, 2023. The population consisted of Culinary Management students who had completed organoleptic courses. A random sampling technique was applied, involving 30 student panelists. Sensory evaluation covered color, texture, aroma, katuk leaf taste, and sweetness. Data were collected using product assessments and questionnaires and analyzed using the Friedman test and the Tukey test.
Results: The results indicated that milk sponge cake with 3% katuk leaf puree was the most preferred formulation, as selected by 80% of expert panelists, while the 6% formulation was selected by 20% of panelists. Overall, the sensory attributes of color, texture, aroma, katuk leaf taste, and sweetness tended to be liked by the panelists. The 3% katuk leaf puree formulation achieved the highest average scores, ranging from 3.8 to 4.6, whereas the 6% formulation obtained lower average scores, ranging from 3.4 to 3.8.
Conclusion: The addition of katuk leaf puree significantly influenced the physical properties and consumer acceptability of milk sponge cake. A concentration of 3% katuk leaf puree was identified as the optimal formulation based on overall sensory acceptance.

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INTRODUCTION

Indonesia is known as a country with abundant local food wealth, these foods produce a diversity of vegetables, one of which is katuk leaves. In most parts of Indonesia, katuk leaves are known as vegetables and are produced throughout the year (Sugianti et al., 2024; Darmawati et al., 2023; Mien et al., 2024). This plant is known by the scientific name Sauropus androgynus and is able to grow in areas that have lowlands up to 120 meters and in highlands such as mountains with sufficient water and shade. In Indonesia, katuk leaves can also be found in several regions such as Java, Kalimantan, North Sumatra, and Bengkulu. Especially in West Java, this plant can be found in fields with an altitude of 1,300 meters.

The Ministry of Agriculture of the Republic of Indonesia, Indonesia is one of the WTO (World Trade Organization) member countries where trade between countries in the world is very open, as long as it can be mutually beneficial for both parties. In addition to being foodstuffs, Indonesia as an agricultural country still needs agricultural products from other countries, considering that there are still certain products that cannot be produced in Indonesia. For example, garlic and some types of commodities vegetables, fruits and flowers. However, not everything can be fulfilled by import. Domestic production with good quality has been routinely exported to other countries. In 2016 Indonesia exported vegetables such as katuk leaves, cabbage, mustard greens and cauliflower amounting to 40,240 tons and 76 other types of vegetables have been exported to Taiwan, Malaysia, Singapore, Thailand and the Netherlands with good economic value and trust from consumers in destination countries. Indonesia has a variety of quality fruits, vegetables and flowers and has high potential to bring in large foreign exchange for the country. Through these data, it can be shown that Indonesia's export market for horticultural products such as fruits, vegetables and flowers is in demand by many countries.

As well as the distribution and ease of obtaining katuk leaves in the Jakarta area. While in the Bogor area, Ciampea District, the demand for fresh cotton can exceed 15 tons per day. Katuk productivity can reach 21-40 tons with an economic life of plants up to 11 years. Most people consume katuk leaves as a dish (evening menu or daily menu). According to nutritional science, the content in katuk leaves turns out to be a lot of beneficial for the body, such as: protein, fat, calcium, phosphorus, iron, vitamins A, B, and C. Katuk leaves contain many nutrients such as calories, protein, fat, carbohydrates, calcium, phosphorus, iron, vitamin A, vitamin B1, vitamin C, and water (Zhang et al., 2020; Purba & Paengkoum, 2022). Katuk leaves have many benefits such as increasing milk production in nursing mothers (Mustofa et al., 2020; Indrayani et al., 2020), preventing osteoporosis, and helping to lose weight (Swain et al., 2024), and so on. Katuk leaves are widely found, but the use of katuk leaves is still very small, for example, used for daily food, namely processed clear vegetables, katuk leaf curly noodles (Fauziah et al., 2025), nori katuk leaves, and herbal tea.

In the domestic sector, local vegetable food that is famous for its abundance is katuk leaves. Katuk leaves are known as vegetables in most parts of Indonesia and are produced all year round. One of the areas in Ciampea District, Bogor Regency, the demand for fresh cotton can exceed 15 tons per day and has an economic life of up to 11 years. The community, especially housewives in Jakarta who are breastfeeding, mostly consume katuk leaf vegetables to increase breast milk intake for their babies (Darmawati et al., 2023; Indrayani et al., 2020).

In addition to increasing milk production for nursing mothers (Panjaitan et al., 2025), katuk leaves have benefits to prevent osteoporosis, and help lose weight (Purba & Paengkoum, 2022). Keep in mind the nutritional content of katuk leaves quite a lot such as calories, protein, fat, carbohydrates, calcium, phosphorus, iron, vitamin A, vitamin B1, vitamin C and water (Zhang et al., 2020). In utilizing katuk leaves, people usually process in the form of lightly processed vegetables, rolled katuk leaves, katuk leaf noodles (Fauziah et al., 2025) and herbal tea.

One of the uses of katuk leaves is described in a study by Ardiansyah et al. (2024), which explains that adding boiled and steamed katuk leaves on a household scale produces changes in the sensory profile, whereby fresh leaves have a grassy and earthy aroma, boiled leaves produce a soft and juicy texture, while steamed leaves produce moist, tender, and bland characteristics. It can be concluded that heating katuk leaves can change the composition of volatile compounds and affect the sensory profile, so it is necessary to find a suitable katuk leaf processing reference for addition to food products. Katuk leaves are used as a food additive because they have a high protein content of 22.0 grams per 100 grams, dietary fiber of 34-36 percent, and squalene content of 14-17 percent (Zhang et al., 2020; Purba & Paengkoum, 2022), which can be utilized in the manufacture of various functional food products (Trisnawati et al., 2025), including puree.

Zhang et al.'s (2020) research, the addition of katuk leaf puree to making butter cake examines the formula and process of making butter cake, testing hedonic quality in terms of color, aroma, texture, and taste. Puree is commonly used for complementary foods in infants aged 6 months but puree can be used as an addition to food. As a food additive, katuk leaves have 1.8-2 grams of dietary fiber per 100 grams which can be used in making puree (Zhang et al., 2020). In

the nutritional value of katuk leaf puree contained vitamin A and pigments which are known to be safe as natural dyes and do not cause negative impacts on health (Sugianti et al., 2024).

Anju et al. (2022) explains puree is food that has been mashed and then filtered so that the consistency of puree becomes very smooth. The mashed katuk leaves are then added full cream liquid milk as a liquid ingredient that can help soften the katuk leaves and has a very smooth texture and has a liquid content derived from liquid milk a little so that it does not change the texture, aroma, taste, size and chewiness of the cake and can be used optimally. If you want to crush katuk leaves to make puree, try to use young katuk leaves because they crumble faster than old katuk leaves. In the process of making katuk leaf puree, the ratio between liquid milk and katuk leaves is 2: 1 with an amount of 100 ml of liquid milk and 50 grams of katuk leaves.

In addition to the diversity of katuk leaves known as local food products, Indonesia has special culinary in the tourist area of Lembang, West Bandung Regency. Besides being famous for its local culinary, there are many typical Indonesian culinary stories in the tourist area of Lembang, West Bandung Regency, which has many kinds of snacks, one of which is Lembang milk sponge. Lembang milk sponge which is usually sold freely consists of original, cheese and chocolate. This sponge is a typical souvenir of Lembang that is loved by many people because of its affordable price, sweet taste and soft texture. In accordance with the jargon, "Dari Lembang Aku Ingatng", this culinary is named Lembang milk sponge. Lembang milk sponge is a typical souvenir of Lembang for tourists who visit because of its affordable price, sweet taste, soft texture so that it is liked by many people.

Lembang milk sponge was chosen in this study with the addition of katuk leaf *puree* because it has the advantage, which has been using pandan coloring (Chen et al., 2024). Bolu susu lembang is made from wheat flour, eggs, sugar, sweetened condensed cream, liquid milk, milk powder, cornstarch, *cake emulsifier*, *baking powde*r, and vanilla. In an effort to utilize the abundant potential of katuk leaves and as a local resource in the form of *puree* as an additional ingredient in making milk sponges, the novelty of this research needs to be carried out. It is expected that the results of milk sponge products with the addition of katuk leaf puree do not change the texture, aroma, taste of milk sponge and add green color variations derived from katuk leaf *puree*.

This study will also measure the volume of expanding milk sponges for the purpose of measuring the physical properties of milk sponges. In this study, milk sponge was made with the addition of *katuk leaf puree* and examined the physical properties and consumer acceptability test. To take advantage of the rich potential of katuk leaves and as a local reserve in the form of *puree* as an additional ingredient in making milk sponges, it is necessary to conduct research. In this study, milk sponge will be made with the addition of katuk leaf *puree* and tested for physical properties and consumer acceptance tests.

This study analyzes the effect of adding katuk leaf *puree* in making milk sponge on the physical properties and acceptability of consumers. First, this study aims to increase the variety of processed products from milk sponges. Thus, it is expected to provide interesting and different variations in the presentation of milk sponges, providing a richer experience for consumers. Second, this study also aims to increase insight into the results of the analysis of the effect of adding katuk leaf puree in making milk sponges on consumer acceptance. This research is specifically aimed at students of Culinary Education at the Faculty of Engineering, State University of Jakarta. Thus, it is hoped that this research can contribute useful knowledge for students in understanding the impact of adding katuk leaf puree to milk sponges, as well as enrich their knowledge in designing and processing food.

METHOD

This research method uses experimental research (Kuantitatif, 2016), which is an experiment that is carried out repeatedly according to the design made. Researchers made milk sponge by conducting experiments by adding *katuk leaf puree* with percentages of 3%, 6% and 9%. This experimental study was conducted to clarify the relationship between variables in the addition of katuk leaf puree to the quality and acceptability of milk sponge consumers.

The experiment in this study was the manufacture of milk sponge with the addition of *katuk leaf puree*. Furthermore, tests were carried out on the physical properties and consumer acceptability of milk sponges with the addition of katuk leaf *puree* using hedonic tests carried out by administering research instruments.

To determine the quality of milk sponges, consumer acceptability tests will be carried out on 30 moderately trained panelists covering aspects of color, texture, aroma, taste, and volume. While physical properties are characteristic of physical appearance in milk sponges. Physical properties in this study include measuring the level of development or volume of milk sponges in a baking dish. In this study, there are research variables which are everything in any form determined by the researcher so that information is obtained about it, then conclusions are drawn. Variables in this study include:

1. Dependent variable: consumer acceptability of milk sponge with the addition of katuk leaf *puree* which includes aspects of color, texture, aroma, and taste.
2. Free Variable: milk sponge with the addition of katuk leaf *puree*.

Research on making milk sponge with the addition of katuk leaf puree was carried out at the Food Processing Laboratory of the Culinary Education Study Program, Faculty of Engineering, State University of Jakarta, in analyzing the addition of katuk leaf *puree* to milk sponge, then continued with physical properties and organoleptic tests in the campus environment of the State University of Jakarta which was carried out to rather trained panelists, namely Culinary students who had attended the course organoleptic. The study period starts from August 2021 to September 22, 2023. Population is a generalized area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions (Kuantitatif, 2026). The population in this study was milk sponge with the addition of katuk leaf *puree*. The sample is part of the number of characteristics possessed by the population.

The sample is part of the population that is taken and used as study material, with the hope that the sample data can be *representative of* the population. The sample used in this study was a milk sponge product with the addition of different katuk leaf puree which includes aspects of color, texture, aroma, and taste to the physical quality and acceptability of consumers. In this study, a random sampling technique was carried out by giving a different code to each milk sponge which was distinguished in 3 different percentages of katuk leaf *puree* addition. The code is known only to researchers and is confidential. Consumer acceptance tests are conducted by moderately trained panelists. Data collection in consumer acceptance tests is carried out through panelists' responses to the products presented, and panelists fill in the instruments that have been given by researchers. The implementation of this consumer acceptance test is carried out by gathering panelists in a room and panelists are welcome to sit by maintaining distance between other panelists and filling in the instruments that have been given.

The design used in this study wanted to determine the effect of adding katuk leaf *puree* in making milk sponge on consumer characteristics and acceptability which includes aspects of color, texture, aroma, and taste. Physical properties in milk sponge with the addition of katuk leaf *puree* using a development volume test, namely measuring the level of development of milk sponge dough in the process before steaming and after steaming in a box pan measuring 8 cm x 8.5 cm x 4 cm. Measurement using a laboratory measuring cup for the accuracy of the data to be measured.

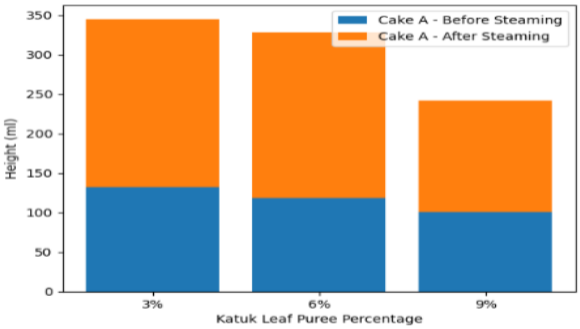

Figure 1. Cake Height

To obtain the required data, the data collection technique carried out by researchers by providing validation test instruments to assess the quality of milk sponge samples was carried out to 5 lecturers of Culinary Administration, State University of Jakarta as expert panelists. In addition, researchers gave a hedonic scale acceptability test instrument to 30 moderately trained panelists. The panelists will be given 3 samples of milk sponge with code 217 is milk sponge with the addition of 3% katuk leaf puree, code 713 is milk sponge with the addition of 6% katuk leaf puree, and code 489 is code with the addition of 9% katuk leaf puree. The panelists rated the samples given on the instrument sheet.

The data analysis technique used for the physical quality of milk sponges is description, physical test of milk sponges using two tests, namely the volume of milk sponge development to describe the results of the development rate in milk sponges using a bar chart by showing the value and fluffy rate of each percentage of milk sponges with the addition of measured katuk leaf *puree*. The data analysis used is the *Friedman* Test. The data obtained in this study were non-parametric. This analysis was used to compare the receptivity data of three samples.

RESULTS AND DISCUSSION

Result

The following is a description of the data from the calculation results of validation tests and acceptability tests for milk sponges with the addition of 3%, 6%, and 9% katuk leaf *puree*. *Milk Sponge Validation Test Results with the Addition of Katuk Leaf Puree.* The validation test in this study was carried out to expert panelists, namely 5 lecturers of Culinary Administration, State University of Jakarta. Expert panelists were asked to rate the quality of the milk sponge samples. The scoring in this validation test is based on the results of the control milk sponge that has been made.Validation was carried out to obtain an assessment of milk sponge products with the addition of 3 *different* katuk leaf purees, namely with percentages of 3% (8.70 grams), 6% (17.40 grams), and 9% (26.10 grams). Based on the assessment of expert panelists, there were 4 panelists who stated that the best milk sponge product was the addition of 3% katuk leaf puree (8.70 grams), and 1 panelist stated that milk sponge products with the addition of 6% (17.40 grams) katuk leaf *puree* were the best. The aspects assessed in the validity test include aspects of color, texture, aroma, taste of katuk leaves, and sweetness can be seen in the following table.

Color Aspects of Milk Sponge

The results of validation carried out by 5 expert panelists for the color aspect of milk sponge with the addition of katuk leaf puree towards the fact that, milk sponge with the addition of 3% katuk leaf *puree*, as many as 3 expert panelists (60%) chose pale green color and 2 expert panelists (40%) chose light green color and with *an* average obtained 4.6 with category close to pale green. Then the milk sponge added *6*% katuk leaf puree, as many as 4 expert panelists (80%) chose light green and 1 expert panelist (20%) chose green and with an average obtained 3.8 with a category close to light green. While the milk sponge with the addition of 9% katuk leaf *puree*, as many as 3 expert panelists (60%) chose light green and 2 expert panelists with pale green category (40%) chose green color and with an average obtained 3.6 with light green category.

Texture Aspects of Milk Sponge

The results of validation carried out by 5 expert panelists for the texture aspect of milk sponge with the addition of katuk leaf puree towards, milk sponge with the addition of 3 % katuk leaf *puree*, as many as 3 expert panelists (60%) chose a soft texture and 2 expert panelists (40%) chose a very soft texture and with an average obtained 4.6 with soft texture category. Then the milk sponge added 6% katuk leaf *puree*, as many as 3 expert panelists (60%) chose a slightly soft texture then 1 expert panelist (20%) chose a soft texture, and 1 expert panelist (20%) chose a very soft texture and with an average obtained 3.6 in the slightly soft category. While milk sponge with the addition of 9% katuk leaf *puree*, as many as 3 expert panelists (60%) chose a very soft texture, 1 expert panelist (20%) chose the soft texture category, and 1 expert panelist (20%) chose the slightly soft texture category, and with an average obtained 4.0 with the very soft category.

Aroma Aspects of Milk Sponge

The results of validation carried out by 5 expert panelists for the aroma aspect of milk sponge with the addition of katuk leaf puree tokkan that, milk sponge with the addition of 3% katuk leaf *puree,* as many as 3 expert panelists (60%) chose a slightly scented aroma of katuk leaves then 1 expert panelist (20%) chose the aroma of katuk leaves and 1 expert panelist chose a very scented aroma of katuk leaves with an average of 4.0 with a slightly scented katuk leaf category.

Then the milk sponge added 6% katuk leaf *puree*, as many as 2 expert panelists (40%) chose a slightly scented aroma of katuk leaves then 2 expert panelists (40%) chose a very scented aroma of katuk leaves, and 1 expert panelist (20%) chose the aroma of katuk leaves and with an average obtained of 3.8 with a slightly scented katuk leaf category. While milk sponge with the addition of 9% katuk leaf *puree*, as many as 2 expert panelists (40%) chose katuk leaf scented then 2 expert panelists (40%) chose very katuk leaf scented, and 1 expert panelist (20%) chose not to smell katuk leaves, and the average obtained was 3.6 with katuk leaf scented category.

Taste Aspects of Milk Sponge Katuk Leaves

The results of validation carried out by 5 expert panelists for the taste aspects of katuk leaves milk sponge with the addition of katuk leaf puree tokkan that, milk sponge with the addition of 3% katuk leaf *puree*, as many as 2 expert panelists (40%) chose the taste of katuk leaves and then 1 expert panelist (20%) chose the taste of katuk leaves and then 1 expert panelist chose the taste of leaves Katuk and 1 expert panelist (20%) chose the taste of katuk leaves with an average obtained of 3.8 with the category of very not felt katuk leaves.

Then the milk sponge added katuk leaf *puree* 6%, as many as 3 expert panelists (60%) chose the taste of katuk leaves and 2 expert panelists (40%) chose the taste of katuk leaves with an average obtained of 3.8 with the category of katuk leaf felt. While milk sponge with the addition of 9% katuk leaf *puree*, as many as 2 expert panelists (40%) chose the taste of katuk leaves and 2 expert panelists (40%) chose the slightly felt taste of katuk leaves and 1 expert panelist (20%) chose the taste of katuk leaves with an average obtained of 4.0 with the category of very imperceptible katuk leaves.

Sweet Taste Aspects of Milk Sponge

The results of validation carried out by 5 expert panelists for the sweet taste aspect of milk sponge with the addition of katuk leaf puree towards the fact that, milk sponge with the addition of 3% katuk leaf *puree*, as many as 5 expert panelists (100%) chose sweetness with an average of 5.0 obtained in the sweet taste category.

Then the milk sponge added 6% katuk leaf *puree*, as many as 3 expert panelists (60%) chose sweetness and 2 expert panelists (40%) chose a slightly sweet taste with an average obtained 4.6 with the sweet taste category. *While* milk sponge with the addition of 9% katuk leaf *puree*, as many as 3 expert panelists (60%) chose sweetness and 2 expert panelists (40%) chose non-sweet taste with an average of 3.8 in the sweet category.

Recapitulation of Validation Test Calculations

The best sample of milk sponge with the addition of katuk leaf *puree* according to expert panelists is with a percentage of 3% as many as 4 panelists (80%) and a percentage of 6% as many as 1 panelist (20%). Based on the recapitulation of the expert panelists' validation tests, the selected milk sponge products with the addition of 3% katuk leaf *puree* show the criteria of light green color, very soft texture, slightly aromatic aroma of katuk leaves, the taste of katuk leaves is very imperceptible katuk leaves, and sweetness.

Physical Test Results

The results of physical tests that have been carried out by researchers produce data in the form of bar charts with the following explanation:

1. Milk sponges with the addition of 3% katuk leaf puree to the dough before steaming have a development volume in a baking dish of 132 ml and an increase in development volume after steaming to 213 ml. These results are consistent with the findings of Belorio and Gómez (2022), who explained that the absence of gluten in bakery formulations typically results in reduced volume, denser texture, and shorter shelf life due to the lack of viscoelastic properties that gluten provides. Gluten forms a three-dimensional network capable of maintaining gas, thus ensuring sufficient volume, shape, and texture in bakery products. The addition of non-gluten ingredients like katuk leaf puree further challenges the dough's ability to develop and retain volume during baking.
2. Milk sponge with the addition of 6% katuk leaf *puree* to the dough before steaming has a development volume in a baking dish of 140 ml and an increase in development volume after steaming to 210 ml.
3. Milk sponges with the addition of 9% katuk leaf *puree* to the dough before steaming have a development volume in a baking dish of 101 ml and an increase in development volume after steaming to 141 ml.

From the results of physical tests through bar charts, it is known that the addition of katuk leaf *puree* in making milk sponges has a significant effect on the volume of milk sponges. So, it can be interpreted that the addition of *katuk leaf puree* affects the volume of milk *sponge*. The Tuckey test showed that the 3% treatment of milk sponge was significantly different from the 6% treatment, the 3% treatment was significantly different from the 9% treatment, and the 6% treatment was significantly different from the 9% treatment. The use of katuk leaf puree to add in the manufacture of milk sponges which the greater the percentage will produce a smaller sponge volume. This is because katuk leaf *puree* does not contain gluten. Because gluten is able to withstand developer gas and dough can rise. The decrease in gluten content in milk sponge dough with the addition of *katuk leaf puree* then the ability of the dough to rise is reduced. Along with the large percentage of additions used, it will decrease the volume of milk sponges produced.

Conclusion of Physical Test Results

So, the conclusion of the physical tests that have been carried out is that the greater the addition of katuk leaf puree into the sponge dough, the smaller the development volume and the smaller the addition of katuk leaf puree into the sponge dough, the higher the development volume produced. Milk sponge with the addition of 3% katuk leaf puree in accordance with the milk sponge standard. These results are consistent with the findings of Belorio and Gómez (2022), who explained that the absence of gluten in bakery formulations typically results in reduced volume, denser texture, and shorter shelf life due to the lack of viscoelastic properties that gluten provides. Gluten forms a three-dimensional network capable of maintaining gas, thus ensuring sufficient volume, shape, and texture in bakery products. The addition of non-gluten ingredients like katuk leaf puree further challenges the dough's ability to develop and retain volume during baking.

Milk Sponge Acceptability Test Results with the Addition of Katuk Leaf Puree

The acceptability test in this study is a hedonic test or favorability test with a rating scale of very likes to very dislikes. The acceptability test was conducted on 30 moderately trained panelists who gave a level of preference for the assessment aspect of milk sponge with the addition of 3%, 6%, and 9% katuk leaf puree. The following is a table of scoring on the acceptance test assessment.

Assessment of Color Aspect Acceptability Test Results

Assessment of the acceptability test of milk sponge samples with the addition of katuk leaf *puree* on the color aspect with 3% treatment, there were 14 panelists (56%) who chose very like and liked it, and 2 panelists (8%) chose to like it somewhat. In the 6% treatment, there were 14 panelists (56%) who chose very like and liked it, and 2 panelists (8%) chose a bit like. While in the 9% treatment, there were 5 panelists (20%) who chose very like, 9 panelists (36%) chose to like, 1 5 panelists (6 0%) chose to like somewhat, and 1 panelist (4%) chose not to like.

The average assessment score of the color aspect acceptability test results on milk sponges with the addition of katuk leaf puree showed that, in milk sponges with the addition of katuk leaf *puree* with 3% treatment with a score of 4.4 was included in the category close to like. The average assessment score on milk sponge with the addition of katuk leaf *puree* with 6 % treatment with a score of 3.6 is included in the category close to like. While milk sponge with the addition of katuk leaf *puree* with 9% treatment with a score of 3.6 is included in the like category. The largest average value of the color aspect acceptability test assessment on milk sponge with the addition of katuk leaf *puree* was with 3% treatment.

Assessment of Texture Aspect Acceptability Test Results

Assessment of the acceptability test of milk sponge samples with the addition of katuk leaf *puree* on the texture aspect with 3% treatment, there were 8 panelists (32%) who chose very likes, 16 panelists (64%) chose likes and 3 panelists (12%) chose rather likes and dislikes. In the 6% treatment, there were 6 panelists (24%) who liked it very much, 15 panelists (60%) liked it, 8 panelists (32%) liked it and 1 panelist (4%) liked it a lot. While in the 9% treatment, there were 2 panelists (8%) who chose very like, 13 panelists (52%) chose like and somewhat like, and 2 panelists (8%) chose not to like it.

The average assessment score of the textural aspect acceptability test results on milk sponges with the addition of katuk leaf puree showed that, in milk sponges with the addition of katuk leaf *puree* with 3 % treatment with a score of 3.9 included in the category close to like. The average assessment score on milk sponge with the addition of katuk leaf *puree* with 6% treatment with a score of 3.8 is included in the category close to like. While milk sponge with the addition of katuk leaf *puree* with 9% treatment with a score of 3.5 is included in the like category. The largest average value of the color aspect acceptability test assessment on milk sponge with the addition of katuk leaf *puree* was with 3% treatment.

Assessment of Aroma Aspect Acceptability Test Results

Assessment of the acceptability test of milk sponge samples with the addition of katuk leaf *puree* on the aroma aspect with 3% treatment, there were 8 panelists (32%) who chose very likes, 16 panelists (64%) chose likes and 3 panelists (12%) chose rather likes and dislikes. In the 6% treatment, there were 6 panelists (24%) who liked it very much, 15 panelists (60%) liked it, 8 panelists (32%) liked it and 1 panelist (4%) liked it a lot. While in the 9% treatment, there were 2 panelists (8%) who chose very like, 13 panelists (52%) chose like and somewhat like, and 2 panelists (8%) chose not to like it.

The average assessment score of the results of the aroma aspect acceptability test on milk sponge with the addition of katuk leaf puree showed that, in milk sponge with the addition of katuk leaf *puree* with 3% treatment with a score of 4.3 included in the category close to very like. The average assessment score on milk sponge with the addition of katuk leaf *puree* with 6% treatment with a score of 3.5 is included in the category close to like. While milk sponge with the addition of katuk leaf *puree* with 9% treatment with a score of 3.5 is included in the like category. The largest average value of the color aspect acceptability test assessment on milk sponge with the addition of katuk leaf *puree* was with 3% treatment.

Assessment of the Acceptability Test Results of the Taste Aspects of Katuk Leaves

Assessment of the acceptability test of milk sponge samples with the addition of katuk leaf *puree* on the taste aspect of katuk leaves with 3% treatment, there were 8 panelists (32%) who chose very likes, 16 panelists (64%) chose likes and 3 panelists (12%) chose rather likes and dislikes. In the 6% treatment, there were 6 panelists (24%) who liked it very much, 15 panelists

(60%) liked it, 8 panelists (32%) liked it and 1 panelist (4%) liked it a lot. While in the 9% treatment, there were 2 panelists (8%) who chose very like, 13 panelists (52%) chose like and somewhat like, and 2 panelists (8%) chose not to like it.

The average assessment score of the results of the katuk leaf taste test on milk sponge with the addition of katuk leaf *puree* showed that, in milk sponge with the addition of katuk leaf *puree* with 3% treatment with a score of 4.1 was included in the category close to very like. The average assessment score on milk sponge with the addition of katuk leaf *puree* with 6% treatment with a score of 3.4 is included in the category close to like. While milk sponge with the addition of katuk leaf *puree* with 9% treatment with a score of 3.5 is included in the like category. The largest average value of the color aspect acceptability test assessment on milk sponge with the addition of katuk leaf *puree* was with 3% treatment.

Assessment of Acceptability Test Results of Sweet Taste Aspects

Assessment of the acceptability test of milk sponge samples with the addition of katuk leaf *puree* on the aspect of sweetness with 3% treatment, there were 9 panelists (32%) chose very like, 16 panelists (64%) chose like and 5 panelists (20 %) chose slightly difficult. In the 6% treatment, there was 1 panelist (4%) who liked it very much, 15 panelists (60%) liked it, 11 panelists (44%) liked it and 3 panelists (12%) liked it badly. While in the 9% treatment, there were 2 panelists (8%) who chose very like, 14 panelists (52%) chose to like, 12 panelists (48%) chose to like somewhat, and 2 panelists (8%) chose not to like it.

The average assessment score of the results of the sweetness aspect acceptance test on milk sponge with the addition of katuk leaf puree showed that, in milk sponge with the addition of katuk leaf *puree* with 3 % treatment with a score of 4.1 was included in the category close to very like. The average assessment score on milk sponge with the addition of katuk leaf *puree* with 6% treatment with a score of 3.4 is included in the category close to like. While milk sponge with the addition of katuk leaf *puree* with 9% treatment with a score of 3.5 is included in the like category. The largest average value of the color aspect acceptability test assessment on milk sponge with the addition of katuk leaf *puree* was with 3% treatment.

Hypothesis Testing

Hypothesis testing on the acceptability of milk sponge with the addition of katuk leaf *puree* in the calculation results with the Friedman test. At a significant level $\alpha = 0.05$ with degrees of freedom df = 3-1=2, which is 5.991 which is x^2Table. If x 2 Calculate < x 2 Table then H0 is accepted, but if x 2 Calculate > x^2Table then H0 is rejected.

Hypothesis Testing Color Aspect Acceptability Test

Based on the calculation of the Friedman test on the color aspect of the milk sponge sample with the addition of katuk leaf *puree* in annex 6, it shows that the result x 2 count is 19.7698 while the value x^2table at the significance level α=0.05 with a confidence degree df=3-1=2 is 5.991.

The result x 2 Count is greater than x^2The table shows that H1 is accepted, that is, there is an effect of adding katuk leaf *puree* on the strength of milk sponge in the color aspect. Therefore, the test continued with the Tuckey test to find out the real different data groups on the color aspect.

Color aspect Tuckey test results**:**

K1 = |A − B| = |4.3666-3.4666| = |0.9| > 0.4963 → differs markedly
K2 = |A − C| = |4.3666-3.6| = |0.7666| > 0.4963 → real difference
K3 = |B − C| = |3.4666-3.6| = |-0.1334| < 0.4963 → no real difference

The calculation results of the Tuckey test showed the calculation K1: data group A (milk sponge with the addition of 3% katuk leaf puree) compared to data group B (milk sponge with the addition of 6% katuk leaf *puree*) the results were significantly different. The K2 calculation showed that data group A (milk sponge with 3% addition of katuk leaf puree) compared to data group C (milk sponge with 9% addition of katuk leaf *puree*) the results were significantly different. The K3 calculation shows that data group B (milk sponge with the addition of 6% katuk leaf puree)

compared to group C data (milk sponge with the addition of 9% katuk leaf *puree*), the results are not significantly different. So that of the three products that are most preferred in the aspect of milk sponge color is milk sponge with the addition of 3% katuk leaf *puree*.

Hypothesis Testing Texture Aspect Acceptability Test

Based on the calculation of the Friedman test on the texture aspect of the milk sponge sample with the addition of katuk leaf *puree* in annex 7, it shows that the result x 2 count is 2.4935 while the value x^2table at the significance level α=0.05 with a confidence degree df=3-1=2 is 5.991.

The result x 2 Count is smaller than x^2The table shows that H0 is accepted, that is, there is no effect of adding katuk leaf *puree* on the strength of milk sponge on the texture aspect, then it is not continued with the Tuckey test.

Hypothesis Testing Aroma Aspect Acceptability Test

Based on the calculation of the Friedman test on the aroma aspect of milk sponge samples with the addition of katuk leaf *puree* in annex 8, it shows that the result of x 2 count is 9.6 while the value x 2 table at the level of significance α = 0.05 with a confidence degree df = 3-1 = 2 which is 5.991.

The result x 2 Count is greater than x^2The table shows that H1 is accepted, that is, there is an effect of adding katuk leaf *puree* on the strength of milk sponge on the aroma aspect. Therefore, the test continued with the Tuckey test to find out the real different data groups on the aroma aspect.

Tuckey aroma aspect test results:

K1 = |A − B| = |4.2-3.6| = |0.6| > 0.4076 → real difference
K2 = |A − C| = |4.2-3.7| = |0.5| > 0.4076 → real difference
K3 = |B − C| = |3.6-3.7| = |0.01| < 0.4076 → no real difference

The calculation results of the Tuckey test showed the calculation K1: data group A (milk sponge with the addition of 3% katuk leaf puree) compared to data group B (milk sponge with the addition of 6% katuk leaf *puree*) the results were significantly different. The K2 calculation showed that data group A (milk sponge with 3% addition of katuk leaf puree) compared to data group C (milk sponge with 9% addition of katuk leaf *puree*) the results were significantly different. The K3 calculation shows that data group B (milk sponge with the addition of 6% katuk leaf puree) compared to group C data (milk sponge with the addition of 9% katuk leaf *puree*), the results are not significantly different. So that of the three products that are most preferred in the aspect of milk sponge color is milk sponge with the addition of 3% katuk leaf *puree*.

Hypothesis Testing Acceptability Test of Katuk Leaf Taste Aspects

Based on the calculation of the Friedman test on the taste aspect of katuk leaves, milk sponge samples with the addition of katuk leaf *puree* in annex 9, showed that the results of x 2 count were 16.225 while the value x^2 of the table at the level of significance α=0.05 with a confidence degree df=3-1=2 was 5.991.

The result x 2 Count is greater than x^2Table which shows that H1 is accepted, that is, there is an effect of adding katuk leaf *puree* on the strength of milk sponge on the taste aspect of katuk leaves. Therefore, the test continued with the Tuckey test to find out the real different data groups on the aroma aspect.

Tulkey test results of taste aspects of katuk leaves:

K1 = |A − B| = |4.1666-3.5666| = |0.6| > 0.4352 → real difference
K2 = |A − C| = |4.1666-3.6| = |0.5666| > 0.4352 → real difference
K3 = |B − C| = |3.5666-3.6| = |-0.0334| < 0.4076 → no real difference

The calculation results of the Tuckey test showed the calculation K1: data group A (milk sponge with the addition of 3% katuk leaf puree) compared to data group B (milk sponge with the addition of 6% katuk leaf *puree*) the results were significantly different. The K2 calculation

showed that data group A (milk sponge with 3% addition of katuk leaf puree) compared to data group C (milk sponge with 9% addition of katuk leaf *puree*) the results were significantly different. The K3 calculation shows that data group B (milk sponge with the addition of 6% katuk leaf puree) compared to group C data (milk sponge with the addition of 9% katuk leaf *puree*), the results are not significantly different. So that of the three products that are most preferred in the aspect of the taste of katuk leaves, milk sponges are milk sponges with the addition of 3% katuk leaf *puree*.

Hypothesis Testing of Acceptability Test of Sweet Taste Aspects

Based on the calculation of the Friedman test on the texture aspect of milk sponge samples with the addition of katuk leaf *puree* in annex 10, it shows that the result of x 2 count is 5.4250 while the value $x^2$of the table at the level of significance α=0.05 with a confidence degree df=3-1=2 is 5.991.

The result x 2 Count is smaller than x^2The table shows that H0 is accepted, that is, there is no effect of adding katuk leaf *puree* on the ability of milk sponge on the aspect of sweetness, then it is not continued with the Tuckey test.

Discussion

Discussion of Milk Sponge with the Addition of Puree Katuk Leaves Color Aspect

Chen et al. (2024) in their study showed that thermal temperature changes in the baking process affect the characteristic aroma profile of pandan and the intensity of the green colour produced from the chlorophyll content in pandan leaves. This study used a holistic approach by conducting analyses using GC-O-MS, E-nose, and GC-IMS to identify the active aroma compounds from pandan leaves and evaluate the effect of thermal treatment on their aroma profile. This study is relevant to research on katuk leaves because both are green leaves that function as natural colorants and influence consumer acceptability of bakery products, particularly in terms of the colour and visual appearance of the final product. This influence can be caused by the use of a greater percentage of katuk leaf puree, the brighter the green color produced. The color produced from katuk leaf puree can be affected during the dough kneading process. Dough that is not stirred evenly will produce a color that appears striped and lumpy.

The correct and proper use of a spatula greatly affects the process of kneading the dough that has been mixed with katuk leaf puree. So that the milk sponge has a bright green color and looks uniform. In line with this finding, Costa et al. (2023) emphasize that chlorophyll stability is highly affected by thermal processing, where exposure to high temperatures during baking can lead to chlorophyll degradation through the substitution of the central magnesium ion, resulting in color changes from green to brown. This degradation mechanism underscores the importance of proper processing conditions to maintain the green color intensity in bakery products fortified with chlorophyll-rich ingredients.

Discussion of Milk Sponge with the Addition of Katuk Leaf Puree Texture Aspect

The milk content used in katuk leaf puree in milk sponge is less, making the texture of milk sponge remain soft. This finding aligns with Gonçalves et al. (2022), who reported that texture evaluation is one of the most frequently measured physical properties in bakery products, with both instrumental and sensory methods being essential for comprehensive quality assessment. Their review highlighted that texture plays a pivotal role in consumer acceptance and that the incorporation of different ingredients into bakery products can significantly affect textural properties through alterations in dough rheology and product structure.

Discussion of Milk Sponge with the Addition of Puree Katuk Leaves Aroma Aspect

The content of essential oils in katuk leaves that causes a distinctive aroma in katuk leaves so that the more use of katuk leaves, the aroma produced will also be more pungent and less desirable. Based on hypothesis testing that has been done, it shows that there is an effect of adding katuk leaf *puree* on the acceptability of milk sponge in the aroma aspect. In this study, the effect of adding katuk leaf *puree* to milk sponge on the aroma aspect looks significant because there is an enzyme lip oxidase.

The enzyme produces the aroma of katuk leaves and is minimized into the bleaching process. The greater the percentage of katuk leaf *puree*, the stronger the katuk leaf aroma in making milk sponges.

Discussion of Milk Sponge with the Addition of Katuk Leaf Puree Taste Aspects of Katuk Leaves

Based on hypothesis testing that has been done, it shows that there is an effect of adding katuk leaf puree on the acceptability of milk sponge on the taste aspect of katuk leaves. The ingredients used in making milk sponges will affect the final result of the milk sponges made. During the process of making sponge dough, the taste of katuk leaves that have a bitter taste is converted into a tasteless taste with several processes, namely the blanching process and the mixing process using full cream liquid milk liquid. The results obtained by the taste of katuk leaves become somewhat leaf-felt, then the taste of katuk leaves which is getting greater in percentage in making milk sponges will be stronger, so this result is much better than before.

Discussion of Milk Sponge with the Addition of Katuk Leaf Puree Sweet Taste Aspect

Dhakal & Nandwani (2021) state that sensory evaluation of green vegetables such as collard greens, kale, lettuce, and Swiss chard includes assessment of attributes such as colour, texture, taste, Odor, and flavour, which can be measured using instrumental methods or consumer panel tests. Based on hypothesis testing that has been done, it shows that there is no effect of adding katuk leaf *puree* on the acceptability of milk sponge that is significant in the aspect of sweetness. The sweetness in milk sponges is affected due to the use of sugar. The effect of *mailard* and caramelization on sugar plays a role in the formation of sweetness. The percentage of sugar used to make the three milk sponge samples is the same, which is 2 4.2% so that the resulting sweetness is no different. The process of adding katuk leaf puree in making milk sponge does not affect the sweetness of the milk sponge produced. Similarly, Austin et al. (2021) emphasized that sensory evaluation using hedonic scales is a critical methodology for assessing consumer acceptability of composite flour-based products, as it provides comprehensive insights into multiple sensory attributes including color, texture, taste, and overall acceptability. Their study on cassava-cowpea composite flour cookies demonstrated that systematic sensory assessment is essential for optimizing formulations and ensuring commercial viability of alternative flour-based bakery products.

CONCLUSION

Based on the results of research that has been done, katuk leaf puree processed from katuk leaves can be used as an addition to making milk sponge, the addition of katuk leaf *puree* up to 9% can still produce good milk sponge products. After testing the acceptability of milk sponge samples, milk sponge with the addition of 3 % katuk leaf puree had the highest average in all aspects of assessment with an average score of 3.8 to 4.6. While milk sponge with the addition of 6% katuk leaf puree has an average of 3.4 to 3.8.

Based on the results of the calculation of the Friedman test that has been carried out, there is an effect of adding katuk leaf *puree* in making milk sponge on the level of consumer preference in the assessment aspect which includes: color, aroma, and taste of katuk leaves.

(1) In the aspect of milk sponge color, the 3% treatment has an average value of 3.46 with a markedly different like category with 6% treatment. (2) In the aspect of milk sponge aroma, the 3% treatment has an average value of 3.6 with a real different like category with 6% treatment, and also the 3% treatment is significantly different from the 9% treatment. (3) In the aspect of the taste of milk sponge katuk leaves, the 3% treatment has an average value of 3.56 with a real different like category with 6% treatment, and also the 3% treatment is significantly different from the 9% treatment. (4) The aspect of texture and sweetness is not significantly influenced by katuk leaf *puree* as an addition to the manufacture of milk sponge to the level of consumer acceptability.

Based on the average level of liking for milk sponge samples, it can be concluded that milk sponges with the addition of 3%, 6%, and 9% katuk leaf puree can be accepted by consumers because they have an average score that is in the category of somewhat like to like. The best milk sponge with the addition of katuk leaf *puree* based on statistical calculations is the 3% treatment.

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AUTHOR CONTRIBUTION STATEMENT

Both authors contributed equally to the conception and design of the study. T.E. was responsible for experimental procedures, data collection, and sensory evaluation, while M.Y.Y. contributed to data analysis, interpretation of results, and methodological supervision. Both authors jointly drafted, reviewed, and approved the final version of the manuscript.

REFERENCES

Anju, T., Rai, N. S. R., & Kumar, A. (2022). Sauropus androgynus (L.) Merr.: A multipurpose plant with multiple uses in traditional ethnic culinary and ethnomedicinal preparations. Journal of Ethnic Foods, 9(1), 8. https://doi.org/10.1186/s42779-022-00125-8

Ardiansyah, A., Advisa, D. A., Asiah, N., David, W., & Kusbiantoro, B. (2024). Volatile compounds content and sensory profile of katuk (*Sauropus androgynus*) leaves after household scale heating. *AgriTECH, 44*(1). https://doi.org/10.22146/agritech.76773

Austin, I., Chidinma, I., & Canice Obioma Obinna, K. (2021). Production and Quality Evaluation of Cookies Using Cassava-Grey Speckled Palapye Cowpea Composite Flour.

Belorio, M., & Gómez, M. (2022). Gluten-free bread and bakery products technology. Foods, 11(3), 480. https://www.mdpi.com/2304-8158/11/3/480

Chen, X., Cao, Y., Lan, W., Gu, Z., He, W., He, J., & Zhao, L. (2024). Quality-driven design of pandan-flavored sponge cake: Unraveling the role of thermal processing on typical pandan aroma. *Foods, 13*(19), 3074. https://www.mdpi.com/2304-8158/13/19/3074

Costa, E. N. V., Ciudad-Mulero, M., Fernández-Ruiz, V., Barros, L., & Morales, P. (2023). Natural sources of food colorants as potential substitutes for artificial additives. Foods, 12(22), 4102. https://www.mdpi.com/2304-8158/12/22/4102

Darmawati, D., Kamil, H., Rosmawati, R., Rizkia, M., & Fajri, N. (2023). The effectiveness of katuk leaf extract (*Sauropus androgynus*) on breast milk production. *Jurnal Keperawatan Soedirman, 18*(2). https://jos.unsoed.ac.id/index.php/jks/article/view/7296

Dhakal, S., & Nandwani, D. (2021). Comparative study of sensory attributes of leafy green vegetables grown under organic and conventional management. *International Journal on Food, Agriculture and Natural Resources, 2*(1), 19–26.

Fauziah, M. A., Mustofa, A., & Nuraini, V. (2025). Katuk leaf dried noodles (Sauropus androgynus (L) Merr) with different combinations of wheat and banana flour (Musa paradisiaca L.). Agrobioteknologi, 2(1), 48-56. https://doi.org/10.31002/agro.v2i1.9835

Gonçalves, B. J., Pereira, R. N., Moreira, S. A., Vicente, A. A., & Pereira, J. A. (2022). Textural properties of bakery products: A review of instrumental and sensory evaluation studies. Applied Sciences, 12(17), 8628. https://doi.org/10.3390/app12178628

Indrayani, D., Shahib, M. N., & Husin, F. (2020). The effect of katuk (Sauropus androgynus (L) Merr) leaf biscuit on increasing prolactin levels of breastfeeding mother. Jurnal Kesehatan Masyarakat, 16(1), 1-7. https://doi.org/10.15294/kemas.v16i1.11324

Kuantitatif, P. P. (2016). Metode penelitian kunatitatif kualitatif dan R&D. Alfabeta, Bandung

Mien, M., Hasrima, H., & Narmi, N. (2024). Eksplorasi pengetahuan lokal etnomedisin daun katuk (*Sauropus androgynus* (L.) Merr) sebagai booster ASI pada ibu menyusui. *Jurnal Ilmiah Universitas Batanghari Jambi, 24*(1). https://ji.unbari.ac.id/index.php/ilmiah/article/view/4604

Mustofa, Yuliani, F. S., Purwono, S., Sadewa, A. H., Damayanti, E., & Heriyanto, D. S. (2020). Polyherbal formula (ASILACT®) induces milk production in lactating rats through

upregulation of α-lactalbumin and aquaporin expression. BMC Complementary Medicine and Therapies, 20(1), 368. https://doi.org/10.1186/s12906-020-03166-4

Panjaitan, R. G. P., Aprilianti, M., Titin, & Deslisari, D. (2025). Genetic potential of medicinal plants and their role in improving colostrum production in Dayak Kanayatn tribe, Bengkayang Regency, Indonesia. SABRAO Journal of Breeding and Genetics, 57(1), 115-125. http://doi.org/10.54910/sabrao2025.57.1.12

Purba, R. A. P., & Paengkoum, P. (2022). Exploring the phytochemical profiles and antioxidant, antidiabetic, and antihemolytic properties of Sauropus androgynus dried leaf extracts for ruminant health and production. Veterinary Sciences, 9(12), 707. https://doi.org/10.3390/vetsci9120707

Sugianti, E., Putri, B. D., & Buanasita, A. (2024). The Effect of Food Bars Made from Katuk Leaf and Torbangun Leaf on the Toxicity Profile of White Rats. Amerta Nutrition, 8.

Swain, D., Sahoo, B. K., Pattanaik, A., Mahapatra, S. K., & Rout, G. R. (2024). Pharmacological and biotechnological overview of Sauropus androgynus L. Merr.: An underexploited perennial shrub. Journal of Applied Biology and Biotechnology, 12(6), 21-28. http://doi.org/10.7324/JABB.2024.177942

Trisnawati, A., Nuraini, V., & Karyantina, M. (2025). Characteristics of putu ayu a combination of wheat flour and soybeans flour (Glycine max) with the addition of katuk leaves (Sauropus androgynus (L) Merr.). Agrobioteknologi, 2(1), 33-47.

Zhang, B. D., Cheng, J. X., Zhang, C. F., Bai, Y. D., Liu, W. Y., Li, W., Koike, K., Akihisa, T., Feng, F., & Zhang, J. (2020). Sauropus androgynus L. Merr.—A phytochemical, pharmacological and toxicological review. Journal of Ethnopharmacology, 257, 112778. https://doi.org/10.1016/j.jep.2020.112778