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The Effect of Adding Purple Sweet Potato (*Ipomoea batatas L*) on the Organoleptic Quality of Mocaf Flour-Based Pukis Cake

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ABSTRACT
Pukis cake is a traditional snack that is generally made from wheat flour. To reduce dependence on imported flour, mocaf is used as an alternative, along with purple sweet potato (Ipomoea batatas L.) as a natural coloring agent that also increases nutritional value and visual appeal. This study aims to investigate the effect of adding purple sweet potato (Ipomoea batatas L.) on the organoleptic properties of mocaf-based pukis cake, including color, aroma, taste, and texture. The experimental design used was a Completely Randomized Design (CRD) with three treatments: A1 (50 ml purple sweet potato), A2 (100 ml), and A3 (150 ml) per 500 ml of dough, each repeated three times. Data were analyzed descriptively and statistically using ANOVA, followed by the Least Significant Difference (LSD) test at the 5% level. Results showed that treatment A2 (100 ml purple sweet potato) yielded the best results with color values of 5.30, aroma 5.40, taste 5.40, and texture 5.25. The addition of 100 ml of purple sweet potato resulted in an attractive purple color, distinctive aroma, natural sweet taste, and soft texture that was significantly preferred by the panelists ($p<0.05$).
***Keywords**: purple sweet potato, mocaf, pukis cake, organoleptic*

INTRODUCTION
Traditional snacks are an integral part of Indonesia's rich and diverse culinary culture. As part of the archipelago's culinary heritage, traditional snacks have historical value and distinctive flavors, making them a favorite among people from all walks of life. Traditional snacks need to be preserved in every region as an effort to maintain local wisdom (Candra et al., 2022). One popular traditional snack is pukis cake. Pukis cake is one of Indonesia's traditional cakes, distinguished by its unique shape and color. The distinctive shape of pukis cake is achieved through the use of a special mold during the baking process. Baking involves pouring the batter into the mold until it reaches three-quarters of its height. The batter for pukis cake is a thick, fermented batter (Corlina, 2022).

Pukis cakes and various other food products generally use wheat flour as their main ingredient. However, wheat flour contains gluten, which cannot be consumed by everyone, especially those who are allergic to gluten. To prevent adverse health effects, people with gluten allergies must avoid this ingredient. Therefore, food diversification is an important step. The addition of purple sweet potato to pukis cakes made with mocaf flour is expected to enhance nutritional value while improving organoleptic quality, including aspects such as color, taste, aroma, and texture. Through this research, it is hoped that a deeper understanding can be gained of how the addition of purple sweet potato affects the taste, aroma, texture, and visual appearance of mocaf flour-based pukis cakes, as well as the hedonic or preference influence on the product.

METHOD
This study used a qualitative approach with a completely randomized design (CRD) consisting of three treatments and three replicates. The treatments consisted of adding purple sweet potato at different concentrations, namely 50 ml (A1), 100 ml (A2), and 150 ml (A3) for every 500 grams of pukis cake batter, as shown in Table 1. The study was conducted from December 2024 to June 2025 at the researcher's home located in Badas, Sumobito, Jombang Regency, East Java. The materials used in this study included mocaf flour (500 g), granulated sugar (150 g), chicken eggs (3 pieces), coconut milk (200 ml), margarine (50 g), instant yeast (1 tsp), vanilla (½ tsp), salt (¼ tsp), and purple sweet potato juice (50–150 ml). The tools used included a digital scale, mixing bowl, pukis cake mold, mixer, stove, and

blender.

Tabel 1. 3 treatments for pukis cakes made from mocaf flour.

Ingredients	Treatment		
	A1	A2	A3
Mocaf Flour	500 gram	500 gram	500 gram
Purple Sweet Potato	50 ml	100 ml	150 ml

The research process began with the preparation of purple sweet potato extract by blending 1 kg of purple sweet potato with 300 ml of water, then filtering it to obtain juice with a concentration according to the treatment. The dough was made by mixing dry ingredients (mocaf flour, sugar, yeast) and then adding liquid ingredients (eggs, coconut milk, purple sweet potato juice) and melted margarine. After thorough mixing, the dough is fermented for 30 minutes until it rises. The dough is then baked in a preheated pukis mold using low to medium heat for 5–10 minutes. The finished product is then tested organoleptically by 15 semi-trained panelists using a 5-point hedonic scale for four parameters: color, aroma, taste, and texture. Data collection was conducted using a closed questionnaire, and the data was converted into numerical form. The data was analyzed descriptively, and to determine the effect of the treatment, an analysis of variance (ANOVA) was performed. If significant differences were found, a Least Significant Difference (LSD) test was conducted at a 5% significance level. All analyses were performed using Microsoft Excel software.

RESULT AND DISCUSSION

This study aims to determine the effect of adding purple sweet potato (*Ipomoea batatas* L.) on the organoleptic properties of mocaf flour-based pukis cakes. Organoleptic testing was conducted on four parameters: color, aroma, taste, and texture, with three different treatments: A1 (50 ml), A2 (100 ml), and A3 (150 ml) of purple sweet potato extract per 500 g of dough. Evaluations were conducted by 15 semi-trained panelists using a 5-point hedonic scale. Data were analyzed descriptively and statistically using ANOVA and the Least Significant Difference (LSD) test at the 5% level. Results are presented in tabular form.

Result

Organoleptic Test Results

In mocaf flour-based pukis cake products, three different treatments were tested to determine the effect of adding purple sweet potato juice on the organoleptic characteristics of the product. Organoleptic testing was conducted on four parameters, namely color, taste, aroma, and texture, involving 15 semi-trained panelists using a 5-point hedonic scale. The best treatment was determined based on the highest average value of all organoleptic parameters. Each treatment represented a different volume of purple sweet potato juice addition, namely 50 ml (A1), 100 ml (A2), and 150 ml (A3) per 500 grams of pukis cake dough.

Based on the results of organoleptic testing, it was found that treatment A2, with the addition of 100 ml of purple sweet potato juice, was the best treatment compared to the other treatments. This treatment received a score of 5.30 for color, 5.40 for aroma, 5.40 for taste, and 5.25 for texture. The pukis cake produced from treatment A2 has an attractive purple color, a strong characteristic aroma of sweet potato, a balanced natural sweetness, and a soft yet firm texture. These results indicate that the addition of 100 ml of purple sweet potato juice effectively enhances the overall sensory characteristics of the mocaf pukis cake and is most preferred by the panelists.

Figure 1. Purple Sweet Potato Pukis Cake Made from Mocaf Flour

Hasil Uji ANOVA

This study uses ANOVA tables as the main analytical tool. In its application, ANOVA tables are used to analyze significant differences between the means of several groups or treatments in this study. The data analysis process involves statistical data processing, including:

- Color

  The results of organoleptic testing of the color of pukis cake analyzed using the analysis of variance (ANOVA) method showed that different treatments had a significant effect. The organoleptic assessment scores for the color of pukis cake are presented in the following table:

Table 2 Organoleptic Test Results for Color

No	Treatment	Color
1	A1	4.14 a
2	A2	5.30 b
3	A3	3.35 c
BNT 5%		0.70

Based on Table 2, it can be seen that the preference value for treatment A1 is lower than that for treatment A2, indicating that treatment A2 has a higher preference level than treatment A1, and this difference is proven to be significant based on the results of the BNT test at a confidence level of 5%. Treatment A3 shows a slight but noticeable difference compared to treatment A1, but has a significant difference when compared to treatment A2 in the BNT test at the 5% confidence level. Treatment A3 received the lowest preference score or was the least preferred among the three treatments tested, and overall, the analysis results indicate that each treatment has a significant difference at the 5% BNT test level.

- Taste

  The results of organoleptic tests on the taste of pukis analyzed using the analysis of variance (ANOVA) method with different treatments showed significant differences. The organoleptic test values for the taste of pukis are presented in the following table:

Table 3 Organoleptic Test Results on Taste

No	Treatment	Taste
1	A1	4.35 a
2	A2	5.40 b
3	A3	3.35 c
BNT 5%		0.65

Based on Table 3, treatment A2 showed a higher taste value than treatment A1, indicating that the taste of treatment A2 was more preferred and significantly different according to the BNT test at the 5% level. Conversely, treatment A3 has a lower taste value than A1 and is also significantly different based on the same test. This indicates that the taste of treatment A2 is significantly more pleasant than that of treatments A1 and A3.

- Aroma

The results of organoleptic tests on the aroma of pukis analyzed using the analysis of variance (ANOVA) method with different treatments showed significant differences. The organoleptic test values for the aroma of pukis are presented in the following table:

Table 4 Organoleptic Test Results for Aroma

No	Perlakuan	Aroma
1	A1	4.44 a
2	A2	5.40 b
3	A3	3.60 c
BNT 5%		0.75

Based on Table 4, treatments A1 and A2 showed higher aroma values than treatment A3, indicating that the aroma of the two treatments was more preferred. Although there is no significant difference between the aroma of treatments A1 and A2 according to the BNT test at the 5% level, both are significantly different when compared to the aroma of treatment A3. This confirms that the aroma of treatments A1 and A2 is more preferred than the aroma of treatment A3.

- Texture

The results of organoleptic tests on the texture of pukis analyzed using the analysis of variance (ANOVA) method with different treatments showed significant differences. The organoleptic test values for the texture of pukis are presented in the following table:

Table 5 Organoleptic Test Results for Texture

No	Treatment	Texture
1	A1	4.50 a
2	A2	5.25 b
3	A3	3.90 c
BNT 5%		0.80

Based on Table 5, it is known that treatments A1 and A2 have higher texture values than treatment A3, indicating that the texture in treatments A1 and A2 is more preferred than treatment A3. Although the texture values between treatments A1 and A2 are not significantly different based on the BNT test at the 5% level, both are significantly different from treatment A3 in the same test. This indicates that the texture of treatments A1 and A2 is more preferred than the texture of treatment A3.

- Best Treatment

In the study of mocaf flour-based pukis products, three different treatments were tested to determine the best treatment based on the average value of each organoleptic aspect. The treatment that showed the highest value compared to the other treatments was selected as the superior treatment. The values are presented in the table below:

Table 6 Average Organoleptic Test Score

Treatment	Average Organoleptic Test Score			
	Color	Taste	Aroma	Texture
A1	4.14	4.35	4.44	4.50
A2	5.30	5.40	5.40	5.25
A3	3.35	3.35	3.60	3.90

Based on the comparison of values in the graph shown in Table 6, it can be seen that the best treatment is treatment A2. Pukis made from mocaf flour with treatment A2 showed outstanding superiority in all organoleptic aspects compared to other treatments. High scores for color, taste, aroma, and texture indicate that pukis from treatment A2 are preferred by the panelists. This treatment not only enhances the product's flavor but also produces a slightly crispy texture on the outside while remaining soft and slightly chewy on the inside. Additionally, the pukis from treatment A2 also exhibits the characteristic purple color of purple sweet potatoes, making it visually appealing. Overall, this makes it the most superior and most acceptable

treatment for the panelists.

Discussion

The differences in results between treatments indicate that variations in purple sweet potato juice concentration have different effects on panelists' liking levels. This suggests that the intensity of color, aroma, taste, and texture of mocaf-based pukis cakes can be influenced by the amount of purple sweet potato added. These findings are discussed further in the context of sensory theory and previous research results.

- Color

  The organoleptic test results for color showed differences in the panelists' preferences for each treatment. Treatment A1 obtained an average score of 4.14. The color in this treatment was considered less appealing because it did not fully display the characteristic purple color of purple sweet potatoes. The pukis product in treatment A1 tended to be pale or faintly purple, which was not visually appealing to the panelists. This was likely due to the low concentration of purple sweet potato used, which was unable to produce a striking color. The highest score was obtained by treatment A2 with an average of 5.30. The color produced in this treatment was considered ideal by the panelists because it had the right intensity of purple, was evenly distributed, and was neither too pale nor too dark.

  The purple color in this pukis product comes from anthocyanin pigments that are distributed from the skin to the flesh of the tuber. Among the various types of sweet potatoes, the purple variety has the highest anthocyanin content. The anthocyanin content in the skin of the sweet potato is greater than in the flesh. The amount of anthocyanin in sweet potatoes is also influenced by color intensity; the darker the purple color, the higher the anthocyanin content (Devitria et al., 2023). Therefore, the higher the concentration of purple sweet potato added to the pukis dough, the darker the purple color produced.

- Rasa

  The 15 panelists' level of preference for the taste of mocaf flour-based pukis cake showed the lowest result in treatment A1 with an average score of 3.35, where in this treatment the purple sweet potato flavor was less noticeable, so that the pukis cake tended to be similar to regular pukis without the distinctive purple sweet potato flavor. Treatment A2 received an average score of 5.40 and was considered the most appropriate because the combination of purple sweet potato flavor and pukis batter was balanced, resulting in a delicious taste that was liked by the panelists. Meanwhile, treatment A3, which received an average score of 4.35, had a purple sweet potato flavor that was too strong, dominating the taste and making the pukis flavor less pronounced, so the pukis tasted more like pure purple sweet potato.

  The use of mocaf flour as a base ingredient in the production of pukis products does not significantly affect the final taste. This is due to the addition of purple sweet potato, which masks the distinctive cassava flavor of mocaf with its own unique taste. This aligns with research (Hidayani, 2023) stating that purple sweet potato contains higher sugar content than wheat flour, resulting in a sweeter taste.

- Aroma

  The 15 panelists' preference for the aroma of mocaf flour-based pukis cake showed the lowest result in treatment A3 (3.60), where the purple sweet potato aroma was considered too strong and dominant, thereby reducing the balance of the characteristic aroma of pukis cake. Treatment A2 obtained the highest score (5.40) with an aroma that was considered the most balanced between purple sweet potato and pukis dough. Meanwhile, A1 scored 4.44, indicating a light purple sweet potato aroma that was still acceptable as it did not interfere with the characteristic aroma of pukis cake. These results indicate that aroma intensity is significantly influenced by the concentration of purple sweet potato used.

  The results of this study indicate that preference for the aroma of mocaf flour-based pukis cake is greatly influenced by the balance between the distinctive aroma of purple sweet potato and the basic aroma of the pukis cake batter. This is because purple sweet potato has a distinctive and fragrant aroma. This aroma originates from the starch content, which undergoes degradation during the heating process, producing volatile compounds that easily evaporate and impart a distinctive aroma when processed (Permata et al., 2022).

- Texture

  The panelists' preference for the texture of the pukis cake showed the lowest value in treatment A3 (3.90), which was considered too soft and wet, losing the characteristic texture of

pukis. Treatment A2 received the highest score (5.25) because it produced an ideal texture that was slightly crispy on the outside and soft on the inside. Treatment A1 received a score of 4.50, with a texture that was still acceptable even though the effect of the purple sweet potato was not yet very noticeable, thus preserving the original character of the pukis. The texture of the pukis cake was influenced by the combination of mocaf flour and the addition of purple sweet potato. Treatment A3 produced the softest texture due to the high water content from the excessive addition of sweet potato extract. A2 showed the best texture, soft and slightly chewy inside, and slightly dry on the outside. Meanwhile, A1 had a texture close to standard pukis. These differences were primarily influenced by variations in purple sweet potato concentration, which affected the water content in the dough.

Research (Suryono et al., 2018) states that water content is one of the factors that affects the texture of food products. High water content tends to make food ingredients softer, while low water content results in a harder texture. The use of mocaf flour also contributes to a soft and slightly chewy texture in the interior of pukis cake. This is because the addition of mocaf flour to food products can produce a more chewy texture. This chewy property is influenced by the amylose and amylopectin content in the flour (Bayhaqi & Bahar, 2016).

CONCLUSIONS

The most appropriate concentration of purple sweet potato addition to produce mocaf pukis cake with the best organoleptic quality is treatment A2, which involves adding 100 ml of purple sweet potato, resulting in a score of 5.30 for attractive color, 5.40 for taste, 5.40 for aroma, and 5.25 for texture. This treatment produces a natural attractive purple color, a mild yet not overpowering characteristic aroma of purple sweet potato, a balanced taste between the sweet potato and the pukis batter, and a texture that is slightly crispy on the outside but soft and slightly chewy on the inside. These characteristics make the pukis cake with this treatment the most preferred by the panelists in the overall organoleptic test.

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