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Effect of Celery (Apium graveolens L) Addition on Organoleptic Properties of Mocaf Flour-based Wonton Stuffing.

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ABSTRACT
The use of wheat flour continues to dominate the Indonesian food industry despite growing dependency on imports. To reduce this reliance, mocaf (Modified Cassava Flour) offers a promising local alternative with similar characteristics to wheat flour. This study investigates the effect of adding celery (Apium graveolens L.) to the organoleptic properties of mocaf-based wonton filling, including aspects of color, aroma, taste, and texture. The research used a Completely Randomized Design (CRD) with three treatments: P (2 g celery), Q (4 g celery), and R (6 g celery) per 500 g dough. A descriptive qualitative method and ANOVA followed by LSD (Least Significant Difference) test were used for data analysis. Results showed that treatment R (6 g celery) yielded the most favorable sensory outcomes with color 4.60, aroma 5.12, taste 4.89, and texture 4.65. The addition of 6 g celery provided a distinctive green color, strong aroma, pleasant taste, and soft texture without mushiness, significantly improving the organoleptic properties ($p<0.05$).

***Keywords**: Wonton; Celery; Mocaf; Organoleptic*

INTRODUCTION
Indonesia still imports a large amount of wheat flour to meet the needs of the local food industry. The increasing demand for wheat flour in Indonesia will place an increasing burden on the country's foreign exchange. Therefore, to reduce Indonesia's dependence on wheat flour imports, steps to optimize the use of local food resources need to be emphasized (Hadistio & Fitri, 2019). One of them is the use of mocaf flour as a substitute for wheat flour.

Mocaf is cassava flour that has been modified through fermentation. This flour has similar characteristics to wheat flour, so it can function as an alternative or mixture of wheat flour in various food products (Fauziyah & Afifah, 2014). Currently, wontons are one of the most popular types of food in the community. Dumplings or more commonly known as wontons are a dish consisting of minced meat wrapped in a thin layer of flour dough (Trisnawati et al., 2023). Due to the increasing number of wonton enthusiasts, especially among spicy lovers, it is important to consider fortification or the addition of food ingredients. Celery is one option that can be used as an addition to improve the quality and nutritional value of wontons.

This study aims to evaluate the impact of celery addition on the organoleptic properties of wontons using mocaf as the base ingredient. Through this research, it is hoped that a deeper understanding of how the addition of celery affects the taste, aroma, texture and visual appearance of mocaf-based wontons, as well as the influence of liking or hedonics on these products, can be obtained.

METHOD
This study used a qualitative approach with a completely randomized design (CRD) consisting of three treatments and three replications. The treatments consisted of the addition of celery with different concentrations, namely 2 grams (P), 4 grams (Q), and 6 grams (R) for every 500 grams of stuffed dough which can be seen in table 1. The research was conducted in July 2024 at the researcher's home located in Surabaya, Indonesia. The ingredients used included mocaf flour (250 g), tapioca flour (50 g), chicken meat

(500 g), celery (2-6 g), garlic (4 g), salt (2 tsp), flavoring (1 tsp), pepper (½ tsp), sesame oil (1 tsp), and oyster sauce (1 tbsp). Tools used include digital scales, basin, knife, cutting board, pasta grinder, and steamer.

Tabel 1. 3 treatments of mocaf flour-based wonton filling.

Ingredients	Treatment		
	P	Q	R
Mocaf Flour	250 grams	250 grams	250 grams
Celery	2 grams	4 grams	6 grams

The stages of implementation in this study consisted of several main processes, starting from weighing ingredients, mixing skin dough and filling, forming wontons, steaming, to organoleptic tests and data analysis. The ingredients were weighed precisely using digital scales according to the predetermined composition, namely mocaf flour, tapioca flour, chicken meat, celery, and seasonings such as garlic, salt, pepper, flavoring, sesame oil, and oyster sauce. The skin dough is made by mixing mocaf flour with eggs, salt, and water until smooth. The dough is then flattened using a pasta grinder and cut into square shapes. For the filling dough, chicken meat is mixed with celery according to the treatment (2g, 4g, and 6g) and other seasonings until homogeneous.

The process of forming wontons is done by filling the skin with stuffing mixture, then folded and glued on the sides. The wontons were then steamed for 5-7 minutes using medium heat to cook evenly without making the skin texture mushy. After steaming, an organoleptic test was conducted on the products that had been made. Organoleptic tests were conducted by 15 moderately trained panelists using a 5-point hedonic scale to assess color, aroma, taste, and texture parameters. Data collection was done using a questionnaire with closed answer options. The test data were converted into numerical form, then analyzed descriptively. To determine the effect of treatment on organoleptic parameters, an ANOVA test was conducted, and if there was a significant effect, it was continued with the Least Significant Difference (BNT) test at the 5% significance level. The entire analysis process was carried out using Microsoft Excel application.

RESULT AND DISCUSSION

This study aims to determine the effect of celery (Apium graveolens L.) addition on the organoleptic properties of mocaf flour-based wonton filling. Organoleptic tests were conducted on four parameters, namely color, aroma, taste, and texture with three different treatments: P (2 grams of celery), Q (4 grams of celery), and R (6 grams of celery). The test results are presented in tables and graphs and will be analyzed in detail to facilitate understanding.

Result

Organoleptic Test Results

In mocaf flour-based wonton products, three different treatments were tested to determine the effect of celery addition on the organoleptic characteristics of the product. Organoleptic tests were carried out on four parameters, namely color, taste, aroma, and texture, involving 15 moderately trained panelists using a hedonic scale. Determination of the best treatment was based on the highest mean value of all organoleptic parameters. Each treatment represents a different amount of celery addition, namely 2 grams, 4 grams, and 6 grams for every 500 grams of wonton filling dough.

Based on the organoleptic test results, it was found that treatment R, with the addition of 6 grams of celery, was the best treatment compared to the other treatments. This treatment obtained a color score of 4.60, aroma 5.12, taste 4.89, and texture 4.65. The wontons produced from treatment R have an attractive green color appearance, a strong celery aroma, a more delicious taste, and a soft but still dense texture. These results indicate that the addition of celery in the amount of 6 grams is able to improve the overall sensory characteristics of mocaf wontons and is preferred by panelists.

Figure 1. Mocaf flour-based wonton products

ANOVA

Table test results

This study uses the ANOVA table as the main analysis tool. In use, the ANOVA table is 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:

- Colour

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

Tabel 2. Organoleptic test results on colour

No	Treatment	Colour
1	P	4,12
2	Q	4,61
3	R	4,60
BNT 5%		1,30

Source: Data processed (2024)

Description: The vertical line (Y-axis) shows the favorability value of the three treatments, while the horizontal line (X-axis) shows each treatment.

Based on table 2, it is known that the color value of treatment P is lower than treatment Q, which indicates that treatment Q has a more preferred color than treatment P, which means it is significantly different based on the 5% BNT test. Treatment R is not significantly different from treatment Q, but significantly different from treatment P at the 5% BNT test. Treatment P had the lowest color value (least preferred) among the three treatments, and all were significantly different at the 5% BNT test level.

- Taste

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

Tabel 3. Organoleptic test results on flavor

No	Treatment	flavor
1	P	4,29
2	Q	4,61
3	R	4,89
BNT 5%		1,32

Source: Data processed (2024)

Description: The vertical line (Y-axis) shows the favorability value of the three treatments, while the horizontal line (X-axis) shows each treatment.

Based on table 3, it is known that treatment Q has a higher taste value than treatment P, indicating that the taste in treatment Q is more preferred and significantly different based on the BNT test at the 5% level. Meanwhile, treatment R has a higher taste value than treatment Q and is significantly different at the 5% BNT test. This indicates that the flavor in treatment R is much more preferred than treatment P or treatment Q.

- Aroma

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

Tabel 4. Organoleptic test results on aroma

No	Treatment	Aroma
1	P	4,88
2	Q	4,72
3	R	5,12
BNT 5%		1,50

Source: Data processed (2024)

Description: The vertical line (Y-axis) shows the favorability value of the three treatments, while the horizontal line (X-axis) shows each treatment.

Based on table 4, it is known that treatments P and Q have lower values compared to treatment R, indicating that the aroma in treatments P and Q is less preferred compared to treatment R which has a more favorable aroma. Although treatment P did not show significantly different from Q at the 5% BNT test, both were significantly different from treatment R based on the BNT test at the 5% level. This shows that the aroma of treatment R is more favorable than the aroma of treatment P and treatment Q.

- Texture

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

Tabel 5. Organoleptic test results on texture

No	Treatment	Texture
1	P	4,23
2	Q	4,34
3	R	4,65

BNT 5%	1,45

Source: Data processed (2024)

Description: The vertical line (Y-axis) shows the favorability value of the three treatments, while the horizontal line (X-axis) shows each treatment.

Based on Table 5, it is known that Treatments P and Q have lower texture values compared to Treatment R, indicating that the texture in Treatments P and Q is less preferred compared to Treatment R which has a more preferred texture. Although Treatment P did not show a significant difference with Q at the BNT test at the 5% level, both were significantly different from Treatment R based on the BNT test at the 5% level. This indicates that the aroma of Treatment R is more preferred compared to the aroma of Treatment P and Treatment Q.

- Best treatment

In wmocaf-based wonton products, three treatments were tested to determine the best treatment based on the average value of each organoleptic aspect. The treatment with the most superior value compared to the other treatments will be chosen as the best treatment. Based on the results of the organoleptic test on mocaf-based wontons, the resulting average value is shown in the diagram below, which shows the preferences and organoleptic quality of each treatment that has been tested.

Tabel 6. Mean Values of Organoleptic Tests

Treatment	**Treatment Organoleptic Mean Value**			
	Colour	**Taste**	**Aroma**	**Texture**
P	4,12	4,29	4,88	4.23
Q	4,61	4,61	4,72	4,34
R	4,60	4,89	5,12	4,65

Source: Data processed (2024)

Description: The vertical line (Y-axis) shows the favorability value of the three treatments, while the horizontal line (X-axis) shows each treatment.

Judging from the comparison of the values on the graph in table 6, it is clear that the best treatment is treatment R with a celery concentration of 6 grams. Wontons with treatment R, which was chosen as the best, showed superior organoleptic quality compared to wontons from other treatments. This treatment not only enhanced the flavor, but also improved the texture and aroma, making them more preferred by the panelists.

Discussion

The differences in results between treatments indicate that variations in celery concentration have different impacts on panelists' preferences, which are further discussed in the context of theory and previous research results.

- Colour

In organoleptic tests, color is one of the sensory aspects that has an important role in assessing product quality. Color is the organoleptic parameter that is assessed first in the organoleptic test, because it gives an initial impression through the sense of sight. Attractive colors can increase the interest of panelists or consumers to taste the product (Wardhana et al., 2022). In research (Agustiana et al., 2020), stated that color is an important attraction for panelists in assessing the quality of food ingredients.

The highest value is found in treatment Q, which uses a concentration of 4 grams of celery in the filling, with an average value of 4.61 and produces a green filling color. This color change is caused by variations in celery concentration, where the more celery added to the filling, the greener the color of the wonton filling. This indicates that the use of celery directly affects the panelists' preference for the color of the wonton filling. The green color of the wonton filling using celery comes from the chlorophyll content in celery leaves. The green color of the leaves is the

main indicator of chlorophyll content (Muhiddin et al., 2023). According to the results of research (Kanza et al., 2022), using Duncan's multiple range test (DMRT α 5%), the highest chlorophyll content in celery was recorded at 39.64 ppm. These results indicate that celery has high levels of chlorophyll, which plays a role in giving intense green color to the leaves. This high chlorophyll content can also affect the visual appearance of foods that use celery as an ingredient, such as wonton fillings, giving them an attractive natural green color.

- Flavor

  The taste of the wontons after the addition of celery was a combination of salty and savory with a fresh and aromatic celery aroma. Treatment R achieved the highest score with an average of 4.89, where the wontons had the strongest celery flavor compared to the other two treatments. The use of mocaf flour-based wonton skins also affected the overall flavor. Mocaf flour still leaves a slight cassava flavor and can affect the taste of the wontons. This is caused by starch granules that undergo hydrolysis and produce monosaccharides that function as raw materials for producing organic acids. These acidic compounds will be dispersed in the material, and when the material is processed, it will produce a distinctive aroma and taste that can cover the aroma and taste of cassava by up to 70% (Wulandari & Mustofa, 2016).

  The combination of the flavors of mocaf flour and celery produces a unique and interesting taste. Mocaf flour, which has a slight sweetness and soft texture, provides a neutral base, while celery also produces a distinctive flavor. Celery basically has a bitter taste. The bitter taste found in celery leaves is due to the tannin content. The higher the tannin content, the stronger the bitter taste produced (Asyik et al., 2018). The results of this study indicate that the more celery concentration added to the filling, the better the taste of the wonton, because celery is able to neutralize the remaining cassava flavor from the mocaf skin, resulting in a more balanced and delicious flavor combination.

- Aroma

  Aroma is an odor that results from chemical stimuli detected by the olfactory nerves in the nasal cavity (Negara et al., 2016). Aroma compounds are volatile, so they can easily reach the olfactory system at the top of the nose. In order to interact with one or more olfactory receptors, sufficient concentration is required. In general, the aroma received by the nose and brain is a mixture of four types of aroma, namely fragrant, sour, rancid, and charred (Nafsiyah et al., 2022).

  Treatment R produces a very sharp celery aroma. The distinctive aroma of celery comes from phthalid derivatives, which are known to have anti-inflammatory, antitumor, and insecticidal properties. The phthalid content in celery leaves reaches 74.6-76.6%, while in the stems it ranges from 56.8-74.1%, and in the roots around 57.7-79.7% (Syahidah & Sulistiyaningsih, 2018). This is reinforced by research (Aurillia, 2023) which states that celery leaves have a distinctive aroma that is bitter and fresh, and contains one to two hydroxyl substitutes, which means that the more celery leaves are used, the stronger the distinctive aroma produced. Likewise, essential oils and acetogenin compounds in celery leaves give special characteristics to a product. The results of this study show that preference for celery aroma varies greatly among individuals. Preference is defined as a person's level of liking or disliking a product or service used (Yamalik & Hidayat, 2018). In this study some people liked the strong aroma of celery, while others liked it less. However, most of the study panelists tended to favor the stronger celery aroma suggesting that the strong aroma had a greater appeal to them.

- Texture

  Texture is an assessment that can be felt through the mouth when biting, chewing, and swallowing, or through the touch of fingers (Setyadjid & Setiyaningrum, 2022). The texture and consistency of an ingredient affect the resulting flavor, where flavor plays an important role in food quality. Changes in texture or viscosity can affect the emerging flavor, as this has an impact on the stimulation of olfactory receptor cells and salivary glands (Arziyah et al., 2022). Treatment R showed the best results with an average value of 4.65, which showed a soft but not mushy wonton texture.

  The texture of the wonton is influenced by the use of celery in the filling, this is because celery leaves have a fairly high fiber content, which is around 8.82% (Arum et al., 2023). Most of the fiber in celery is insoluble cellulose (Liu et al., 2022). Cellulose has the ability to absorb water from the surrounding environment, so it is hygroscopic. Although cellulose absorbs water

molecules and expands, its structure remains insoluble in water (Bhernama et al., 2023). Therefore, the addition of 6 grams of celery produces a denser, softer and less mushy filling than the addition of 2 and 4 grams. This is due to the ability of cellulose in celery to absorb water without dissolving, which causes the cellulose structure to expand but remain stable. Moisture content and physical properties of mocaf flour also play an important role in determining the final consistency of wontons. This is because mocaf flour has a fairly high starch content and during the gelatinization process a lot of water is trapped in it. The main components in starch are amylose and amylopectin. Low amylose content in starch-containing flour will produce products that are brittle and low in density (Januatri et al., 2022).

CONCLUSIONS

Perbedaan perlakuan dalam memberikan konsentrasi seledri dalam pembuatan wonton berbasis mocaf memberikan pengaruh nyata terhadap sifat organoleptik isian wonton. Semakin banyak konsentrasi seledri yang digunakan, warna wonton menjadi semakin hijau, aroma seledri makin tajam, rasa semakin enak dan khas, serta tekstur yang lebih lunak namun tidak lembek. Hasil penelitian ini menunjukan bahwa konsentrasi seledri yang tepat dalam pembuatan isian wonton berbasis mocaf adalah 6 gram untuk 500 gram adonan. Penggunaan seledri sebanyak 6 gram akan menghasilkan aroma khas seledri yang kuat, warna hijau yang menarik, rasa yang enak dan gurih serta tekstur yang lunak yang sangat disukai.

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