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Innovation in Making Pia Cake Skin with the Addition of Purple Sweet Potato (Ipomea Batatas L) in the Village of Kimi, Nabire District

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Abstract. Purple sweet potato is one type of tuber. Organoleptic test is a test of a food ingredient based on the level of preference. Shelf life is a time span on a product. Objective: To determine the level of consumer preference and shelf life of pia cake skin with the addition of purple sweet potato (Ipomea Batatas L). Methods: Quantitative research with a completely randomized experimental design (CRD). Panelists in this study were 30 untrained panelists, 15 moderately trained panelists. Results: It is known that the results of research conducted on pia cake skin added purple sweet potato (Ipomea Batatas L) have an effect on the taste p-value 0.01 (<0.05), there is an effect on the aroma p-value 0.02 (<0.05), there is an effect on the color p-value 0.00 (<0.05), there is an effect on the texture p-value 0.00 (<0.05), for the shelf life of pia cake skin in treatments X, Y, V and Z at cold temperature and room temperature there is a relationship p-value <0.05. Conclusion: Based on the results of the study, it can be concluded that there are differences in the variables of taste, aroma, color, texture and shelf life of pia cake skin with the addition of purple sweet potato (Ipomea Batatas L) in Kimi Village, which obtained p-value <0.05. Suggestion: There is a need for skills, knowledge related to purple sweet potatoes to increase creativity and the economy of the community.

Keywords : Purple Sweet Potato, Organoleptic, Shelf Life

1. INTRODUCTION

Sweet potato (Ipomea Batatas L) is a type of food that is classified as a source of carbohydrates. Sweet potato or in English Sweet Potato is a type of cultivated plant, in this case what is utilized is the roots that form tubers that contain quite high levels of nutrition in the form of carbohydrates. Sweet potatoes have antioxidant content that can cause a fairly thick purple color in the flesh of the sweet potato so that it attracts a lot of people's attention (Dani, N, A., Ekawatiningsih, P, 2021).

Food and Agriculture Organization Of the United Nations(2020) said that the largest sweet potato producing country in 2019 was China with a production of around 114,622,946,961 tons in 2019. In Indonesia, sweet potato production in 2021 was around 1,424,147 tons, which is a decrease from the previous year of 1,604,181 tons (Rahmawati, I et al, 2023). Sweet potato production data in Nabire Regency in 2022 was around 2,351 tons (Nabire Regency Food Security Service, 2023). Meanwhile, sweet potato production in Teluk Kimi was around 275.50 tons (BPS Nabire Regency, 2016).

The consumption of tubers in the Indonesian population was relatively low in 2020, reaching only 42.9% of the recommended amount of 108 grams/cap/day, the highest consumption of tubers was in Papua Province, which was around 349.3 grams/cap/day, and

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the lowest consumption was in East Nusa Tenggara, which was only 22 grams/cap/day. The energy contribution from the recommended type of tuber food is 126 kcal/cap/day or around 6% of the total energy requirement of 2100 kcal, while the energy contribution from tubers in the Indonesian population is still relatively low because it only reaches 2.8% of the total energy requirement (Karimah, N, I et al, 2023).

Sweet potatoes are generally processed by steaming, frying or making snacks such as chips. One type of sweet potato is purple sweet potato. Purple sweet potatoes are a local food that is easily damaged, so purple sweet potatoes need to be processed or combined with other products with the aim of making the food shelf life longer (Izza, N, K et al, 2019).

One of the uses of purple sweet potatoes to produce new products is the addition of other processed products such as bakpia. Bakpia originally came from China with the name Tou Luk Pia which means green bean bakpia and began to be produced in Indonesia, more precisely in Yogyakarta Pathuk Village in 1948. Generally there are 2 types of bakpia, namely wet bakpia and dry bakpia, for the shelf life of dry bakpia can last longer than wet bakpia because of the water content in it. Based on the storage of bakpia cakes, the shelf life of dry bakpia can last longer, which can be up to 1 month, while for wet bakpia the longest is only about 2 weeks from the start of production (Borobudur Authority Agency, 2022).

The selection of purple sweet potatoes for addition to pia cakes is intended because purple sweet potatoes contain higher anthocyanins, which are around 110.51 mg, which is one source of antioxidants (Mentari, S, I, 2015). The daily requirement for anthocyanins is not yet known, but the function of antioxidants is as a preventative against free radicals.

Based on research conducted by Lamusu, D (2018) related to organoleptic tests of purple sweet potato jalangkote (Ipomea Batatas L) as an effort to diversify food, it was found that purple sweet potato jalangkote products had a very significant effect on the color, aroma, and texture of jalangkote. The results of the taste that was preferred by the panelists were in treatment J3, namely 80% purple sweet potato flour + 20% wheat flour, then the panelists preferred the level of aroma in jalangkote in treatments J0 and J2, while in terms of texture the panelists preferred treatment J0, namely 50% purple sweet potato flour + 50% wheat flour.

Based on research conducted by Pulungan, M, H et al (2016) where research related to the shelf life of apple pie stored for 30 days which was checked seven times with an interval of five days at a temperature of 25oC, 35oC and 45oC, it was found that products stored at a temperature of 45oC could not be stored for more than 30 days for consumption. This is because on that day the apple pie was considered damaged or rejected by the panelists.

2. METHODS

This type of research is quantitative research with experimental methods. Experimental methods are research methods used to find the effect of certain treatments on others under controlled conditions (Sugiyono, 2011). The experimental design used in this study was a Completely Randomized Experimental Design (CRD) with 4 (four) treatments and 3 (three) repetitions, namely by adding purple sweet potatoes as follows:

Table 1. Completely Randomized Trial (CRD) Plan

Treatment	Purple Sweet Potato (grams)	Wheat Flour (grams)	Cooking Oil (ml)	Water (ml)	Eggs (btr)
X	0	350	200	100	1
Y	150	350	200	100	1
V	300	350	200	100	1
Z	450	350	200	100	1

In addition, this study also wants to know how the shelf life of purple sweet potato pia cake skin is using the Direct Method, namely the presence of microbial growth characterized by physical and sensory changes, with a predetermined time period (Asiah, N et al, 2018). In this study, the product will be stored at cold temperatures and room temperature. The cold temperature in question is around 1.7-3.3oC, and for room temperature it is around 20-27.1oC. In this study, the shelf life to be studied is for 30 days and is checked every 5 days both from cold temperatures and room temperature with categories of color, aroma, texture and taste.

3. RESULTS

In this study, two types of panelists were used, namely 30 untrained panelists for organoleptic testing, while 15 somewhat trained panelists were used.The following is a description of untrained panelists based on gender, which can be seen in table 2 below:

Table 2. Organoleptic Test Panelists Based on Gender

Gender	f	%
Man	15	50%
Woman	15	50%
Total	**30**	**100%**

Source: Primary Data, 2024

In this study, the criteria for untrained panelists were also determined by age. The description of untrained panelists based on the age of the panelists according to Permenkes No. 25 of 2016 can be seen in table 3 below:

Table 3. Organoleptic Test Panelists Based on Age

Age	f	%
19-25	16	53%
26-30	6	20%
31-44	8	27%
Total	**30**	**100%**

Source: Primary Data, 2024

The following are the shelf life criteria based on gender which can be seen in table 4 below:

Table 4. Shelf Life Panelists Based on Gender

Gender	f	%
Man	3	20%
Woman	12	80%
Total	**15**	**100%**

Source: Primary Data, 2024

The following are the shelf life criteria based on the age of the panelists, which can be seen in table 5 below:

Table 5. Shelf Life Panelists Based on Age

Age	f	%
20	1	7%
21	3	20%
22	8	53%
23	3	20%
Total	**15**	**100%**

Source: Primary Data, 2024

This study used the Anova test. The results of the test of taste, aroma, color and texture that have been added to purple sweet potatoes can be seen in the following table:

Table 6. Bivariate Analysis of Organoleptic Tests

Variables	*P Value*
Flavor	0.01
Aroma	0.02
Color	0.00
Texture	0.00

Source: Primary Data, 2024

Based on table 6 above, it is found that the hypothesis in this study for pia cake skin is that there is a difference in the variables of taste, aroma, color and texture that have been added with purple sweet potatoes because the p-value is <0.05. Based on the four organoleptic test variables, the significant difference is in the color and texture variables with a p-value of 0.00.

Table 7. Bivariate Analysis of Shelf Life of Treatment X

Variables	Temperature	*P value*
Flavor	Cold	0.00
	Room	0.04
Aroma	Cold	0.00
	Room	0.01
Color	Cold	0.00
	Room	0.00
Texture	Cold	0.00
	Room	0.00

Source: Primary Data, 2024

Based on table 7 on the shelf life of treatment X which has gone through a storage process for 30 days at cold temperatures and room temperatures, it was found that for the shelf life of pia cake skin treatment X there was a significant difference in the variables of taste, aroma, color and texture that had been added with purple sweet potatoes because the p-value was <0.05.

Table 8.Bivariate Analysis of Shelf Life of Treatment Y

Variables	Temperature	*P value*
Flavor	Cold	0.00
	Room	0.00
Aroma	Cold	0.00
	Room	0.00
Color	Cold	0.00
	Room	0.00
Texture	Cold	0.00
	Room	0.00

Source: Primary Data, 2024

Based on table 8 on the shelf life of treatment Y which has gone through a storage process for 30 days at cold temperatures and room temperatures, it was found that the hypothesis in this study for the shelf life of pia cake skin with treatment Y is that there is a significant difference in the variables of taste, aroma, color and texture that have been added with purple sweet potatoes because the p-value is <0.05.

Table 9 Bivariate Analysis of Shelf Life of Treatment V

Variables	Temperature	P value
Flavor	Cold	0.00
	Room	0.00
Aroma	Cold	0.00
	Room	0.00
Color	Cold	0.00
	Room	0.00
Texture	Cold	0.00
	Room	0.00

Source: Primary Data, 2024

Based on table 9 on the shelf life of treatment V which has gone through a storage process for 30 days at cold temperatures and room temperature, it was found that the hypothesis in this study for the shelf life of pia cake skin treatment V there is a significant difference in the variables of taste, aroma, color and texture that have been added with purple sweet potatoes because the p-value is <0.05.

Table 10. Bivariate Analysis of Shelf Life of Treatment Z

Variables	Temperature	*P value*
Flavor	Cold	0.00
	Room	0.00
Aroma	Cold	0.00
	Room	0.00
Color	Cold	0.00
	Room	0.00
Texture	Cold	0.00
	Room	0.00

Source: Primary Data, 2024

Based on table 10 on the shelf life of treatment Z which has gone through a storage process for 30 days at cold temperatures and room temperatures, it was found that the hypothesis in this study for the shelf life of pia cake skin treatment Z there is a significant difference in the variables of taste, aroma, color and texture that have been added with purple sweet potatoes because the p-value is <0.05.

4. DISCUSSION

Differences in the Taste of Pia Cake Skin with the Addition of Purple Sweet Potato (Ipomea Batatas L)

Taste or commonly known as flavor is one way to distinguish the taste of food, flavor is a collaboration of five kinds of human senses, namely from taste, smell, sight and touch. While for the definition of taste itself, it is the result of the work of labeling the taste located on the tongue, throat, cheeks, roof of the mouth, which are part of a flavor (Hadi, S, N, 2016).

Taste is one of the determining factors of the product that has been made by researchers, if consumers do not like the taste of the product then the product will not be accepted by consumers. The purpose of the organoleptic test on the pia cake skin that has been added with purple sweet potatoes is to determine whether there is a difference in taste after adding purple sweet potatoes. The taste of a product is the result of a chemical stimulus that can later be received by the sense of taste or tongue (sangur, 2020, Mushaddiq, A, U et al, 2023).

In this study, there were 4 treatments assessed from their taste, namely treatments X, Y, V and Z. The panelists' preference level for the taste variable for the pia cake skin with the addition of purple sweet potato (ipomea batatas L) had a significant difference, the taste variable had a value ranging from 4.43 (like) to 5 (very much like). The highest score was obtained in treatment X, namely with the addition of 0 grams of purple sweet potato or no purple sweet potato was added, and the lowest score was obtained in treatment Z or with the addition of 450 grams of purple sweet potato.

In this study, panelists preferred treatment X in terms of taste because panelists were accustomed to the taste of treatment X or not with the addition of purple sweet potatoes, but panelists said that when compared to treatments Y, V and Z which were added with purple sweet potatoes, panelists preferred the taste of treatment Y because it still had the original taste of the pia cake skin. While in treatment Z, panelists were less interested because when consumed, the savory taste of the pia cake skin was less pronounced or felt. This is different from the opinion of Al-faida, N et al (2024) who conducted a study on ice cream added with purple sweet potatoes that the more purple sweet potatoes, the more the taste of the ice cream was preferred.

Differences in the Aroma of Pia Cake Skin When Purple Sweet Potato (Ipomea Batatas L) is Added

The aroma of food is one of the things that has a strong enough attraction and can stimulate the sense of smell so that it can arouse appetite, the aroma of each food is different, depending on how the food is cooked (Hermanto, R, 2020). Aroma is the smell of a food, the smell is a response to volatile compounds from food then entering the nasal cavity and later will be felt in the olfactory system. Compounds in aroma are volatile which easily reach the olfactory system at the top of the nose, and require concentration in order to interact with other olfactory receptors (Tarwendah, I, P, 2017).

The aroma of a product can be assessed from its smell. The food industry believes that aroma is very important to be tested because it can produce an assessment of production results that will add the role of aroma to the product because it can determine consumer

acceptance (Winarno, 2002 (Khalisa et al, 2021)). Aroma compounds are one of the important roles in the production of flavorings that will be used in the food industry, which are used to enhance taste, in addition to increasing the appeal of food products (Antara and Wartini, 2014 (Tarwendah, I, P, 2017)).

Aroma is one of the components in organoleptic testing. Based on table 2, the panelists' level of preference for the aroma variable for the pia cake skin added with purple sweet potato (ipomea batatas L) has a difference, the taste variable has a value ranging from 4.63 (like) to 5 (very much like). In this study, the highest score or the most preferred by the panelists was treatment Z with the addition of 450 grams of purple sweet potato, while the lowest was in treatment X or no addition of purple sweet potato. The addition of purple sweet potato greatly affects the aroma of a product. This is in line with the opinion stated by Lanusu, A, D et al (2017) the more purple sweet potato added, the stronger the aroma will be. This study is also in line with research conducted by Al-faida, N et al (2024) namely the more purple sweet potato added to ice cream, the stronger the aroma produced.

Differences in Pia Cake Skin Color Due to the Addition of Purple Sweet Potato (Ipomea Batatas L)

Color is the first thing that is assessed in a product, because color will also determine whether a product is accepted or not. In general, determining the quality of food depends on the color produced, the color that matches the color that should provide its own assessment to the panelists (Negara J, K et al, 2016). In a food ingredient, even though it is considered to have a good taste but has an unattractive color or has a color that deviates from what it should be, it will not be consumed (Khalisa et al, 2021).

Based on table 2 the panelists' preference level for the color variable of the pia cake skin added with purple sweet potato (ipomea batatas L) has a difference. In this study, the most chosen or most preferred treatment was treatment Y with the addition of 150 g of purple sweet potato, while the least preferred treatment in the color variable was treatment X (0 g).

The real difference between treatment X and other treatments cannot be separated from the content of the purple sweet potato color itself. Panelists prefer treatment Y because panelists like the purple color produced when compared to treatments V and Z. This is in line with research conducted by Duniaji, N, A et al (2018) the color produced on the skin of purple sweet potato pia cakes can be influenced by the pigment content in the food itself, the pigment in question is the bluish red and the purple color produced in purple sweet potato anthocyanins. Based on research conducted by Al-faida, N et al, (2024) regarding the color of ice cream added with purple sweet potatoes, it is said that the level of preference for the color

of ice cream is due to purple sweet potatoes containing anthocyanin pigments which can give a purple color to ice cream.

Differences in Pia Cake Skin Texture Due to the Addition of Purple Sweet Potato (Ipomea Batatas L)

Texture in food is a result of the tactile sense response to the form of physical stimulation when there is contact between the inside of the oral cavity and food (Tarwendah, I, P, 2017). Texture is a characteristic of a food ingredient that is caused by a combination of several physical properties that will cause the size, amount, elements and shape of the formation of the material that will be felt by the sense of taste and touch, which includes sight and sense of taste (Midayanto and Yuwono, 2014 (Tarwendah, I, P, 2017).

Based on table 2, it shows that, when assessed from its texture, the most chosen or most preferred by the panelists is treatment Y with the addition of 150 grams of purple sweet potato, while the least chosen by the panelists is treatment Z with the addition of 450 grams of purple sweet potato. The panelists said that the texture of treatment Z was harder when compared to other treatments. The more sweet potato content in the pia cake skin, the more the texture of the pia cake skin will be affected or harder. This is in line with research conducted by Duniaji, A, S et al, (2018) that the texture of the purple sweet potato pia cake skin can be influenced by the water content and the nature of the food ingredients used.

Based on the explanation above, it can be concluded that, from the treatments X, Y, V and Z which can be seen from the variables of taste, aroma, color and texture, the treatment most preferred by the panelists was treatment Y with the addition of 150 grams of purple sweet potato. This is because in treatment Y the addition of purple sweet potato is considered very appropriate, neither excessive nor lacking. The more purple sweet potato is added and the moist and dense food ingredients, the more it will affect the results of the product.

Difference in Shelf Life of Pia Cake Skin with the Addition of Purple Sweet Potato (Ipomea Batatas L)

Shelf life can be defined as the time span of a product from the production process to consumption. The shelf life testing process describes how long the product will remain at the same quality during the storage process. Shelf life is calculated when the product is produced. During the storage process, a product must remain in the condition at the beginning of production, namely the nutritional content must be the same, the smell, taste, texture, appearance must be maintained, and the function of the product (Asiah, n et al, 2018).

There are several factors that can affect shelf life, one of which is microbial growth. Fungi and mold are one of the causes of food damage. The time needed for these microbes to damage and poison the product can be influenced by the number and type of microbes that are actually present in the food and contamination occurs during the processing process, as well as the temperature and storage time as well as the character of the food used are factors that affect the rate of microorganism growth (Asiah, N et al, 2018).

In treatment X cold temperature or room temperature, if you want to consume it with the same taste as when it was first made, then it can be consumed until the 20th day. After the 20th day the pia cake skin can still be consumed, it's just that the taste is no longer the same as when it was first produced. For treatment Y cold temperature if you want to get the same results as when it was first made, then it can be consumed until the 20th day, while at room temperature it is until the 15th day. At cold temperature after the 20th day it can still be consumed, only the variables of taste, aroma, color and texture are no longer the same as when it was first produced. While for room temperature after the 15th day it can still be consumed until the 25th day only, this is because the product has experienced physical damage.

While in Treatment V cold temperature if you want to consume and want to get the same results as when it was first produced, it can be obtained up to day 15, after day 15 it can still be consumed, only the results are no longer the same as when it was first produced. While at room temperature, for the same results as when it was first produced, namely up to day 10 and after day 10 it can still be consumed up to day 25 only because after day 25 there has been physical damage to the product. In treatment Z cold temperature or room temperature, if you want to get the same results as when the production process was first started, it can be obtained up to day 10. At cold temperature after day 10 it can still be consumed, only the results are not the same as when it was first produced, while for room temperature after day 10 it can only be consumed up to day 25 because after that day the product has experienced physical damage.

Based on the research that has been conducted on the skin of the pia cake added with purple sweet potato to 4 treatments X (0 g), Y (150 g), V (300 g) and Z (450 g) at cold temperatures or room temperature stored for 30 days, if the skin of the pia cake added with purple sweet potato or in treatments Y, V and Z at room temperature cannot be stored for more than 25 days for consumption, while in treatment X at room temperature it can last up to the 30th day or can be accepted by the panelists until the 30th day. The skin of the pia cake on the 25^{th} day at room temperature was no longer accepted by the panelists because the skin

of the pia cake had undergone a physical damage process or mold had appeared and had emitted an unpleasant odor. While at cold temperatures the skin of the pia cake can still be consumed or can still be accepted by the panelists until the 30th day. The higher the temperature, the faster the process of damage to the product. This is in line with research conducted by Pulungan, M, H et al in (2016) on the shelf life of apple pie, the results of the research stated that it is recommended not to store apple pie at too high a temperature because high temperatures can accelerate product damage and can reduce the shelf life.

Storing the skin of the pia cake with added purple sweet potatoes, if you want to maintain its shelf life, it can be stored at a lower temperature or in a cold temperature. Meanwhile, if the skin of the pia cake with added purple sweet potatoes wants to be stored at room temperature, it should not be stored for a long time because the more purple sweet potatoes are added, the faster the product will deteriorate so that the shelf life of the product cannot last long. In addition, the skin of the pia cake with added purple sweet potatoes produces a skin that is more moist or wet, this moist skin can accelerate the appearance of microbes or fungi on the skin of the pia cake. The Borobudur Authority Agency (2022) said that wet pia cakes (wet pia) can only last about 2 weeks from the initial production process.

5. CONCLUSION

Based on research on pia cake skin added with purple sweet potato (Ipomea Batatas L) in Kimi Village, the results showed that there were significant differences in organoleptic tests and the shelf life of pia cake skin.

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