The utilization of flour purple sweet potato in layered cake production to support local food diversification

Wildan Shalihy[1*], *Amarilia Harsanti* Dameswary[2], and *Nur Hasnah* AR[3]

[1]Department of Agriculture, Manokwari Agricultural Polytechnic, SPMA Reremi Street, Manokwari, West Papua, Indonesia
[2]National Research and Innovation Agency. Jl. Jogja – Wonosari Km 31.5, Kec Playen, Yogyakarta, Indonesia
[3]Department of Agricultural Technology, Faculty of Agriculture, Riau University, Pekanbaru Riau, Indonesia

Abstract. Potato sweet is contain a carbohydrate, including a plant that is easy to cultivate and has the potential to be developed as a local food. The West Papua Province is one of the producers, but traditionally, they have been consumed simply by boiling and frying. These consumption methods are less appealing to the younger generation. One effort to increase community interest in consuming purple sweet potatoes is by creating various processed food variants, one of sweet potato layered cake. This study aims to determine a good formulation for making purple sweet potato flour. The determination of the best formulation for making purple sweet potato layered cake is conducted using a non-factorial design with treatments involving the ratio of purple sweet potato flour and wheat flour. There are four treatments with different ratios: F1 (75%:25%), F2 (50%:50%), F3 (25%:75%), and F4 (0%:100%). Purple sweet potato flour can be used as a substitute ingredient in making food products, so that can be used as food diversification weast papua to increase added value of purple sweet potatoes. The results of the analysis showed that the best treatment for making purple sweet potatoes overall was in the F1 treatment (75%:25%). With 75% purple flour and 25% wheat flour.

1 Introduction

Sweet potato (Ipomea batatas L) is a food crop that is a source of carbohydrates that is easy to cultivate. The agro-climatic suitability of sweet potato with the tropical climate in Indonesia means that sweet potato plants can grow well [1]. Data from the West Papua Central Statistics Agency shows that sweet potato production in West Papua from 2017 to 2019 was 12,385 tons, 15,425 tons, and 12,113 tons or the average sweet potato production for the last three years was 13,307.7 tons a year [2]. The high production of sweet potatoes in West Papua gives sweet potatoes in West Papua the potential to be developed as a local

* Corresponding author: wildan.shalihy@gmail.com

food source. One of the efforts to develop local food is to diversify food using sweet potatoes as a substitute for processed products.

Sweet potatoes are used to make processed products such as ice cream, noodles, porridge, and cakes [3]. Sweet potatoes can be used as a substitute ingredient in cake products. Utilization as a substitute material is still minimal in Papua. For the people of West Papua, sweet potatoes are only consumed in traditional ways, such as boiled and fried. This way of consumption is less attractive to the younger generation and makes sweet potatoes less popular as a local food. So efforts need to be made to increase public interest in processing sweet potatoes. The creation of various variants of processed food will be a solution to the problem of importing wheat flour which is still being carried out [4]. Based on the description above, research is needed to find out the best formulation for making sweet potato layer cake

2 Material and method

2.1 Time and materials

Time and place was conducted for three months from February to April 2022 at the Agricultural Products Processing Technology Laboratory. Manokwari Agricultural Development Polytechnic

The tools and materials used in this research are as follows: 80 mesh sieve, blender, stove container, baking dish, mixer, and spatula.

The ingredients used were 17.5 kg of sweet potatoes, harvested from the Manokwari Polbangtan research garden, purple sweet potato flour, wheat flour, granulated sugar, salt, eggs, milk powder, margarine, and baking powder.

2.2 Sweet potato samples and flour processing

Making a layered cake is done by making purple sweet potato flour using the best treatment method from previous research. The process of making flour is done by peeling and cleaning the purple sweet potato and, after that slicing it using a chip slicer with a thickness of ± 1 mm. The sweet potato chips dried at 70ºC for 40 hours. The dried sweet potato chips are blended and sifted using an 80 mesh sieve to produce purple sweet potato flour which is ready to be used.

2.3 Layer cake preparation

In the research, the process of making layered cakes adopted a method for making dough and taro layered cakes that complies with PT with a formulation that has been determined and ensured that it uses good quality ingredients, Mix all the ingredients well until you get a homogeneous, soft and fluffy dough, Pour the mixture into a baking pan that has been lined with baking paper, Cook by getting heat from boiling water steam for 30- 45 minutes. Removing from the mold (Depanning), namely removing the purple sweet potato layered bolus cake from the mold. The layered cake that has been released from the mold is then cooled at room temperature for 10-15 minutes. color, taste, aroma, texture, and overall acceptability.

2.4 Analysis data

Determining the best formulation for making purple sweet potato layer cake was carried out using a non-factorial design by comparing the concentration of purple sweet potato flour and

wheat flour. There were 4 comparison treatments of purple sweet potato flour and wheat flour used, namely F1 (75%: 25%), F2 (50%: 50%), F3 (25%: 75%), F4 (0%: 100%). The variables observed were color, aroma, taste, texture and best treatment. The panelists used were untrained panelists and consisted of 30 people.

Data from research and observations were tested/analyzed using Microsoft Excel. If there is an influence of hedonic level between treatments ($0.01<p<0.05$ or $p<0.01$) then a further Duncan test is carried out at a confidence level of α 0.05.

3 Result and discussion

3.1 The organoleptic test of purple sweet potato layer cake

Organoleptic test was one way to describe the sensory characteristics of a food product, including color, shape, taste, and texture. Organoleptic test can be calculated by means of a hedonic test or score to certain characteristics of a product to determine the level of liking of the product [5]. The results of organoleptic tests on layer cakes substituted with sweet potato flour show at Table. 6 Conclusions on Organoleptic Test Results for the Best Treatment in Layer Cake Substitution for Purple Sweet Potato Flour.

3.2 Color

The color assessment was carried out after the purple sweet potato layer cake was cooked. This is because the purple sweet potato layer cake is accepted by consumers when it is cooked. The average value of organoleptic for the color obtained was from 2.90 to 4.34. The level of panelists' preference for the color of the purple sweet potato flour substitute layer cake is shown in Table 2. The results of the analysis of various purple sweet potato and wheat flour substitute layer cakes show that the calculated F value is greater than the F table. This shows that the comparison treatment of purple sweet potato flour and wheat flour had a real influence on the level of panelists' liking for the color of the purple sweet potato layer cake. The treatment with the lowest panelist preference level was F4 (0%:100%). The best treatment was F1 (75%:25%) with a concentration of 75% purple sweet potato flour and 25% wheat flour. Data on panelists' liking levels showed that panelists tended to like the color of purple sweet potato layer cake with a higher concentration of purple sweet potato flour. This is because the lower the concentration of purple sweet potato flour the resulting purple color becomes. The results of this research are research conducted by Krisnawati *et.*al. [6], that purple sweet potato puree on white bread influences the color of the crust of white bread so that there is a difference in the color of the crust of white bread with purple sweet potato substitutes of 30, 40, to 50%. Panelists preferred the purple sweet potato flour formulation the most in the jalangkote study with the highest average score of 4.15. This shows that the purple sweet potato flour material is more dominant so it is greatly influenced by the brighter purple color of the jalagkote [7], explains that the purple color of sweet potato is caused by the presence of anthocyanin pigments which are spread from the skin to the flesh of the tuber. The high anthocyanin content in purple sweet potatoes has high stability compared to anthocyanins from other sources.

Table 1. Organoleptic test results for color.

No	Treatment	Color
1	F1 (75 :25)	4,34a
2	F2 (50 :50)	4,34a

3	F3 (25 :75)	3,28b
4	F4 (0 :100)	2,96b

3.3 Aroma

Aroma. Aroma is the odor component emitted by a product that is identified by the sense of smell [8]. The organoleptic test results for the aroma of purple sweet potato layer cake ranged between 3.72 and 4.14. The average value of the color organoleptic test can be seen in Table 2.

Tabel 2. Organoleptic test results for aroma.

No	Treatment	Aroma
1	F1 (75 :25)	4.14b
2	F2 (50 :50)	3.72ab
3	F3 (25 :75)	3.45a
4	F4 (0 :100)	3.72ab

The results of analysis of variance in organoleptic tests on the aroma of purple sweet potato substitute layer cake show that the calculated F value is greater than F table. This shows that the comparison treatment of purple sweet potato flour and wheat flour has a real influence on the level of panelists' liking for the aroma of sweet potato layer cake. purple. The panelist's lowest level of preference was F3 (25%:75%). 25% purple sweet potato flour and 75% wheat flour. The highest panelists' favorite treatment was F1 (75%:25%). 75% purple sweet potato flour and 25% wheat flour. This shows that the greater the concentration of purple sweet potato, the more the panelists prefer it. The same thing was also reported by Krisnawati *et.al.,* [6] that the substitution of purple sweet potato puree for white bread had an influence on the aroma of white bread so that there was a difference in the aroma of white bread with purple sweet potato substitution of 30, 40, and 50%. There was an increase in the intensity of the typical sweet potato aroma in cookies along with an increase in the amount of purple sweet potato flour [9]. The difference in aroma level appeared when purple sweet potato was added to ice cream as much as 45%. This is because the panelists prefer the aroma of purple sweet potato [10]. The results of the analysis of variance showed that the treatment with the addition of 10 - 40 g purple sweet potato flour had a very significantly different effect ($P<0.01$) on layer cake.

3.4 Taste

Taste is an important sensory component because consumers tend to like food with a good taste [8]. The treatment with the highest level of taste preference was F1 (75%:25%). With a concentration of 75% purple sweet potato flour and 25% wheat flour. The lowest level of panelists' favorite treatment was F4 (0%:100%). With a concentration of 0% purple sweet potato flour and 100% wheat flour. The panelists' level of preference for color show at the table 3.

Tabel.35. The result of organoleptic by taste.

No	Treatment	Taste

1	F1 (75 :25)	4.28a
2	F2 (50 :50)	3.97a
3	F3 (25 :75)	3.79a
4	F4 (0 :100)	3.63a

Analysis of variance (Anova) of purple sweet potato layer cake with a mixture of purple sweet potato flour and wheat flour shows that the calculated F value is smaller than F table. This shows that the comparison treatment of purple sweet potato flour and wheat flour does not have a real influence on the panelists' level of preference for purple sweet potato layer cake flavor. This is because the taste of purple sweet potato layer cake is a combination of flavors from various supporting components such as eggs, butter, milk and others. Based on the results of taste semprong cakes mixed with purple sweet potato flour and wheat flour, it shows that the calculated F value is smaller than the table F value. This shows that mixing purple sweet potato flour and wheat flour has no effect on the taste of semprong cakes. The taste of semprong cake is the contribution of various constituent components, namely sugar, coconut milk and eggs. The number of these components does not change in the amount in the semprong cake formulation so that the resulting taste gives the impression of liking at the same level [11].

3.5 Texture

Texture is an important thing to measure the level of panelists' liking for purple sweet potato cake. The treatment with the highest level of taste preference was F1 (75%:25%). With a concentration of 75% purple sweet potato flour and 25% wheat flour. The lowest level of panelists' favorite treatment was F3 (25%:75%). With a concentration of 25% sweet potato flour ungu and 75% wheat flour. The level of preference for texture can be seen in Table 4.

Tabel. 4. The organoleptic result by texture.

No	Treatment	Texture
1	F1 (75 :25)	4.14b
2	F2 (50 :50)	3.72ab
3	F3 (25 :75)	3.45a
4	F4 (0 :100)	3.72ab

The results of the analysis of various types of purple sweet potato layer cake with a mixture of purple sweet potato flour and wheat flour show that the calculated F value is smaller than the F table. This shows that the comparison treatment of sweet potato flour and wheat flour does not have a real influence on the level of panelists' liking for the texture of the cake sweet potato layers. This is because the texture not only come from purple sweet potato flour and wheat flour but is also influenced by other supporting compositions. This is in accordance with what was reported by Montolalu *et al*., [11]. Based on the results of the fingerprint analysis of varieties of semprong cakes mixed with purple sweet potato flour and wheat flour, it shows that the calculated F value is smaller than the table F value. This shows that mixing purple sweet potato flour and wheat flour has no effect on the texture of semprong cakes. The texture produced by semprong cake by mixing purple sweet potato and wheat flour is a crunchy texture. Variations in the concentration of purple sweet potato flour did not

have a significant effect on the texture of the Yangko cake. The texture of the Yangko cake was caused by a combination of supporting ingredients in the form of sticky rice flour, purple sweet potato flour, water and granulated sugar. In the kneading process, the starch granules in purple sweet potatoes and sticky rice will absorb water and swell, causing the texture to become soft [12].

3.6 The best treatment

The level of panelists' liking for the overall acceptance of the purple sweet potato layer cake produced can be seen in table 2. Based on table 2 it can be concluded that the best treatment overall is in the F1 treatment (75%:25%). With 75% purple sweet potato flour and 25% wheat flour. This is because F1 (75%:25%) has the highest percentage of purple sweet potato flour compared to other formulations and this formulation can be used as a recommendation for making purple sweet potato layer cake**.**

Table 5. Conclusion of the organoleptic test results for the best treatment of purple sweet potato flour substitution layer cake.

Treatment	Color	Aroma	Taste	Texture
F1 (75%:25%)	4.34	4.13	4.27	4.13
F2 (50%:50%)	4.34	3.72	3.96	3.93
F3 (25%:75%)	3.27	3.44	3.79	3.89
F4 (0%:100%)	2.89	3.72	3.62	3.93

4 Conclusion

Purple sweet potato flour can be used as a substitute ingredient in making food products, so that it can be used as food diversification in Manokwari Papua to increase added value of purple sweet potatoes. The results of the analysis showed that the best treatment for making purple sweet potatoes overall was in the F1 treatment (75%:25%). With 75% purple flour and 25% wheat flour.

The author would like to express his thanks to The Ministry of Agriculture of the Republic of Indonesia for providing research funding through the Manokwari Agricultural Development Polytechnic's Budget User Form List (DIPA). Thanks are also given to the Director of the Manokwari Agricultural Development Polytechnic and the Research and Community Service unit for facilitating this research activity. Thanks are also given to fellow researchers who have worked hard so that this research could be completed on time.

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