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Physicochemical characteristics of crackers from composite flour (modified sukun, sweet powder purple, mocaf, and saga seeds)

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Abstract. Crackers are one type of processed food that is very popular with the community. Crackers are usually made from wheat flour and have a layered, dry, and usually salty structure. Among this type of pastry community is much in demand as a snack when relaxed. However, due to the increasing value of imported flour in Indonesia, these crackers can be made using composite flour such as breadfruit flour, purple sweet potato flour, mocaf, and saga seed flour which are found in Indonesia. This research consisted of 8 treatments with the best modified breadfruit flour ratio: purple sweet potato flour: mocaf: saga seed flour ie P1 = 10: 25: 65: 0, P2 = 15: 20: 60: 5, P3 = 20: 15: 55:10, P4 = 25: 10: 50: 15, P5 = 100% modified breadfruit flour, P6 = 100% Mocaf, P7 = Purple sweet potato flour, P8 = 100% flour. The results of the study had a significantly different effect ($P < 0.01$) on the value of specific volume, ash content, fat content, fiber content, and protein content. But no significant effect on the value of L *, a *, b *, oHue, carbohydrate content, color, aroma, texture, taste and general acceptance of crackers produced. And based on the De Garmo test with organoleptic parameters of color, aroma, taste, and texture, general acceptance, moisture content, fat, fiber, protein, and ash content, crackers with treatment P4 = P4 = 25: 10: 50: 15 are the best crackers.

1. Introduction

Crackers is a food product type of pastry that is usually made from flour which is very popular with the community and is very much consumed throughout the year [1]. This is because crackers have a salty, salty, crunchy structure. The manufacture of crackers made from wheat flour makes the import of wheat flour which has increased to increase Therefore the manufacture of crackers can be diversified using composite flour. Composite flour used for making crackers is a local food ingredient that is commonly found in Indonesia and has a high nutritional value . So that local food that is underutilized and has a low economic value becomes more beneficial and has a high economic value. In addition, the appointment of local food ingredients that are often found in Indonesia can make the diversity of food products increase [2].

2. Methodology

This research was conducted in August 2019 at the Laboratory of Food Chemical Analysis Laboratory and Laboratory of Food Technology Science and Technology Study Program Faculty of Agriculture, University of North Sumatra, Medan, Bakery Innovation, and Flour House. The raw materials used in this study are breadfruit obtained from Pasar Setia Budi, Medan, purple sweet potato obtained from



Pasaraya Pancing, Medan, saga seeds obtained from around the University of North Sumatra, and mocaf obtained from Bakery Innovations. Other ingredients are additives for making crackers in the form of, sugar, eggs, vegetable oil, margarine, and baking powder, vanilla, yeast obtained from the traditional market Djamin Ginting, Padang Bulan, Medan. The chemicals used to make flour are acetic acid, citric acid, sodium metabisulfite and NaHCO_3 . The chemicals used for the chemical analysis of flour and product analysis are trichloroacetic acetate, aquadest, sulfuric acid, potassium sulfate, copper sulfate, sodium hydroxide, methyl blue, methyl blue, methyl red, hydrochloric acid, ethanol, and hexane.

This research was made with four controls and four comparisons of a mixture of modified mocaf flour, purple sweet potato flour, breadfruit flour and saga seeds. The four controls and four comparative treatments, namely: P1 = 65 : 25 : 10 : 0; P2 = 60 : 20 : 15 : 5; P3 = 55 : 15 : 20 : 10; P4 = 50 : 10 : 25 : 15; P5 = 100% modified breadfruit flour (control 1); P6 = 100% purple sweet potato flour (control 2); P7 = 100% *mocaf* (control 3). Each treatment was made in 3 replications.

Analysis of water content was carried out using the oven method [3], ash content using dry ashing [4], crude fiber content was carried out using crude fiber method [5], fat content was done with boiling flask [6], sensory analysis in this study used hedonic rank test [7], specific volume was carried out by the displacement test method [8], and color (brightness) using chromameter minolta (CR type 200, Japan) [9], de-Garmo method to determine the best crackers [10].

3. Results and Discussion

3.1. Specific volume

The specific volume level of crackers ranges from 0.06% to 0.08%. The analysis of variance shows that the specific volume value of crackers products has a very significant effect ($P > 0.01$). This is because the amylose content in flour influences the development of crackers. This is reinforced by the statement [11] that the amylose content in the type of flour that is high mocaf can affect the texture of crackers and can affect the development of the texture. In addition, according to [12] that the amylose content of sweet potato flour provides the ability to form crystals with a larger size so that it affects the nature of the volume of development.

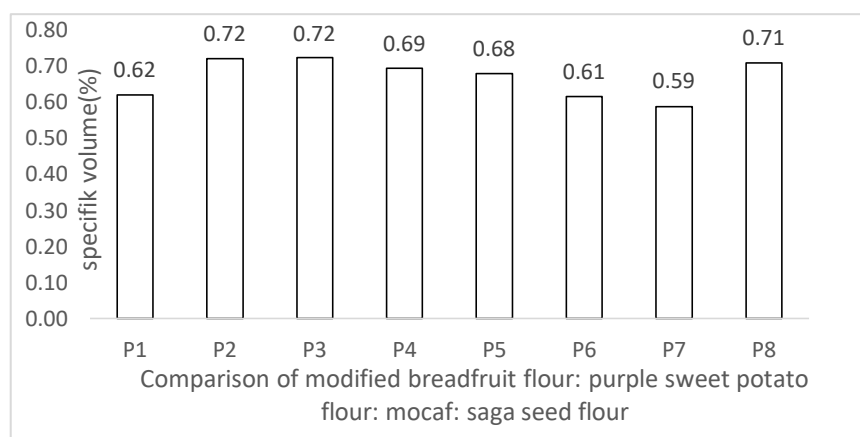


Figure 1. Comparison of modified breadfruit flour, purple sweet potato flour, mocaf flour, and saga seed flour to specific volume of crackers

3.2. Ash content

Crackers ash content ranged from 0.23% to 0.72%. The analysis of variance shows that the value of ash content in crackers products has a very significant effect ($P > 0.01$). This is due to the mineral content in each different material whereas in this study using four raw materials and flour. This is consistent with the statement [13] that wheat flour has an ash content of around 0.482% so that it can affect the ash value of the product.

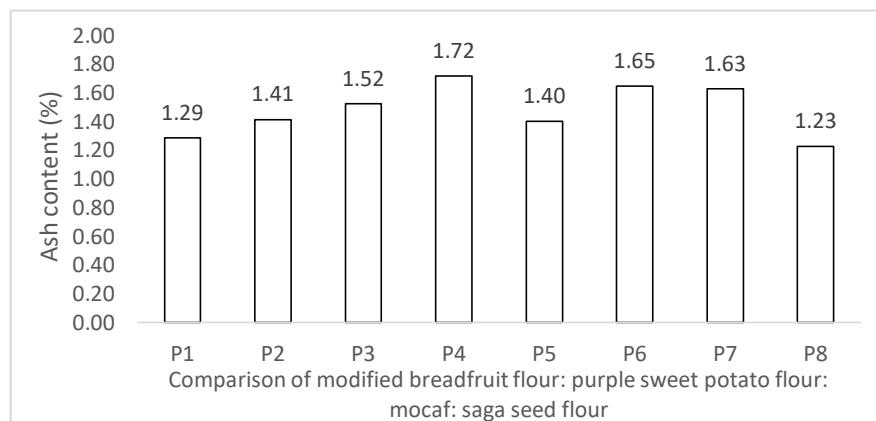


Figure 2. Comparison of modified breadfruit flour, purple sweet potato flour, mocaf flour, and saga seed flour to the value of crackers ash content

3.3. Fat content

Crackers' fat content ranged from 9.58% to 15.22%. The results of analysis of variance showed that the value of fat content in crackers products had a very significant effect ($P > 0.01$). This is due to the fatty acid content in each of the different ingredients whereas in this study using four raw materials and flour. It also can be influenced by the presence of enzymes found in one food ingredient [14]. This is consistent with the statement of saga [14] that the fat content of saga is influenced by the presence of the enzyme lipoxegenase which causes unpleasant odor in sagas.

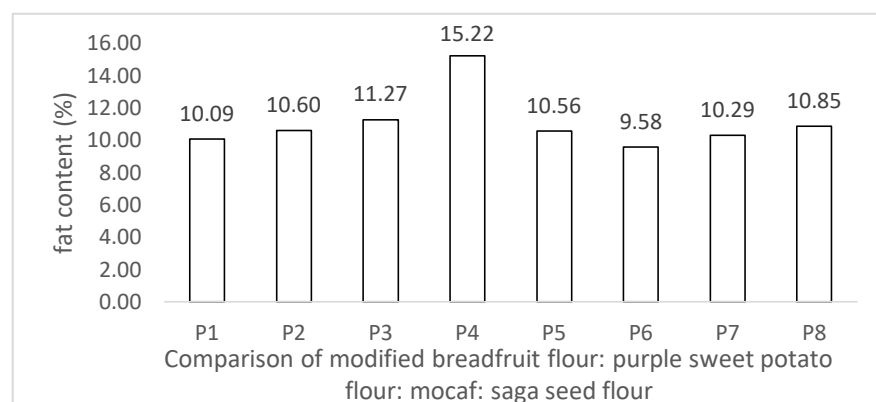


Figure 3. Comparison of modified breadfruit flour, purple sweet potato flour, mocaf flour, and saga seed flour to the value of fat crackers

3.4. Crude fiber content

Crude fiber levels of crackers ranged from 3.13% to 6.68%. The results of analysis of variance showed that the value of crude fiber content in crackers products had a very significant effect ($P > 0.01$). This is due to the crude fiber levels acid content in each of the different ingredients whereas in this study

using four raw materials and flour. This is consistent with the statement [15] that wheat flour is not a source of crude fiber and in making flour, crude fiber is a component that must be removed.

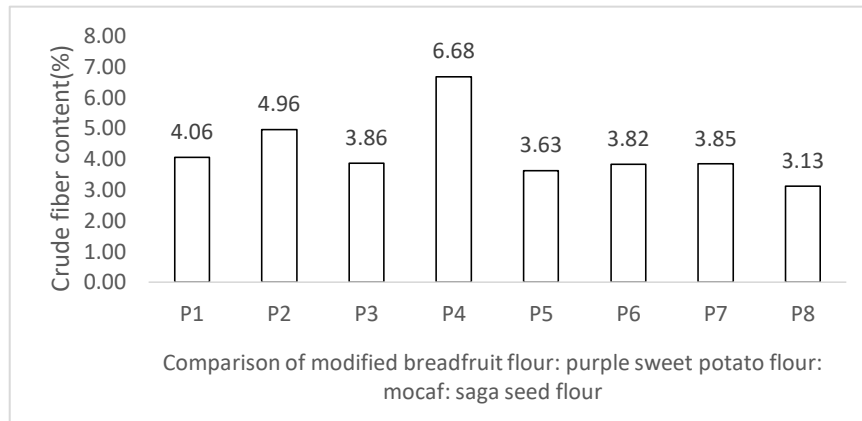


Figure 4. Comparison of modified breadfruit flour, purple sweet potato flour, mocaf flour, and saga seed flour to crude fiber content

3.5. Protein content

Crackers protein levels ranged from 1.65% to 12.64%. The results of analysis of variance showed that the value of protein content in crackers products had a very significant effect ($P > 0.01$). This is due to the protein content in each of the different ingredients whereas in this study using four raw materials and flour where flour has a high enough protein content. This is consistent with the statement [16] that the protein content of wheat flour is influenced by the gluten content of the flour.

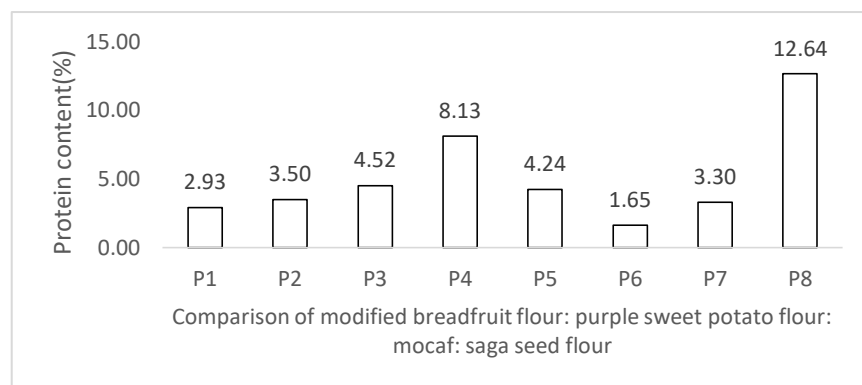


Figure 5. Comparison of modified breadfruit flour, purple sweet potato flour, mocaf flour, and saga seed flour to the value of protein crackers

3.6. Best formulations

The selection of the best treatment for crackers is determined through the results of de garmo on the parameters of sensory characteristics (color, aroma, taste, texture, and general acceptance), chemical characteristics (ash content, fiber content, water content of protein content). crackers namely crackers with treatment P4 = 25: 10: 50: 15 (best modified breadfruit flour: purple sweet potato: mocaf: saga seeds).

4. Conclusion

In this study the specific volume, ash content, fat content, protein content, crude fiber content showed very real results ($P > 0.01$). Besides crackers with treatment $P_4 = 25: 10: 50: 15$ (the best modified breadfruit flour: purple sweet potato: mocaf: saga seeds) is the best treatment crackers and can be accepted in the community.

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