

Effects of Added Katuk Leaf Powder and Cooking Oil on the Organoleptic Properties of Groundnut Biscuits

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Abstract—Breastfeeding mothers need the additional food to increase the nutritional adequacy as well as to help the productivity of breast milk. Due to the lack of snacks, the production of biscuits is developed. This research focuses on the relation between *katuk* leaf powder and cooking oil on the organoleptic properties of groundnut biscuits. This study aimed to know the best product of organoleptic test result (shape, smell, color, crumb, crispness, taste and consumers' preference levels) and the nutrients (carbohydrate, energy, protein, fat, vitamin A, fiber and sesquiterpene acid). This research used is experimental method, which done in the three stages; pre-experiment, preliminary and main research. It is followed by data collection in the two ways. First, organoleptic test was carried out with 30 panelists of Culinary Major and 100 breastfeeding panelists. Second, chemical tests conducted at *Balai Penelitian dan Konsultasi Industri (BPKI)*, East Java. The result shows that there is relation that effect on the color, but not to other organoleptic elements. The effect of color interaction from leaf chlorophyll content, added with the same *katuk* leaf powder and the higher cooking oil indicating the better colour. So, the addition of *katuk* leaf powder can affect the colour of biscuit.

Keywords—groundnut biscuit; *katuk* leaf powder; cooking oil

I. INTRODUCTION

Due to the lack of snacks, the production of groundnut biscuits is developed for breastfeeding mother. It can increase the nutritional adequacy as well as to help the productivity of breast milk. These additional nutrients are *katuk* leaf powder and cooking oil.

Some studies are conducted concerning on the use of *katuk* leaf. One of them is entitled "Performance and Egg Quality of Quail Offered Feed Containing Sterol from *Katuk* and Mulberry Leaf Meal" by Hermana [12]. They explain that the poultry produces eggs and meats with a good quality. It is also added by the nutrients of *katuk* and mulberry.

This research is good due to the adding of nutrients to the metabolism of poultry. However, there are some limitations on the adding of *katuk*'s nutrients. They are not only good for poultry, but also for breastfeeding mothers.

Another reason is for the development of groundnut biscuits. As the filler, groundnut has good contents of energy,

protein and fat to increase the need of nutritional for breastfeeding mothers. Nevertheless, the adequacy of those contents doesn't enough to fulfill their needs due to the lack of breast milk produced by pregnant women. To solve this problem, Javanese people often use *katuk* leaves as the consumption support for breastfeeding mothers. *Katuk* is usually consumed as the soup dish or even boiled. These dishes are too bored to be consumed, so that groundnut biscuits are created as snacks by adding of *katuk* leaves powder.

The benefit of *katuk*'s nutritional content, as lactogagum, has been proven to be transmitter secretion on the breast milk or ASI [10]. The nutritional contents of *katuk* leaf can help to expedite the breast milk containing carbohydrate 11.00 g, energy 59.00 cal, protein 4.80 g, fat 1.00 g, vitamin A 10,370.00 SI, fiber 204.00 mg. In addition, it also contains acid sesquiterpene of 0.18 g.

Groundnut contains much nutrients such as carbohydrates 23.60 g, energy 559.00 cal, protein 26.90 g, fat 44.20 g, and fiber 74.00 mg (Directorate of Nutrition MOH RI, 1981) that fulfill the needs of breastfeeding mothers. The basic ingredient of groundnut is cooking oil made from palm oil. It is used in the production of groundnut biscuits by adding *katuk* leaves powder. The addition and subtraction of the materials give the changing in physical characteristics that can be identified through the nature of organoleptic biscuit.

Groundnut biscuit, with the addition of *katuk* leaf powder and oil, has never been found in the market. As the food additives, *katuk* leaf powders in groundnuts are expected to produce as a good biscuit. It also can be accepted by the society, as one of the healthy snack. Based on the explanation above, it is necessary to conduct the research on "The Effect of Addition of Leaf Powder of *Katuk* (*Sauropusandrogunus* (L.) Merr.) and Oil to Organoleptic Properties of Groundnut Biscuits". Further, groundnut biscuits that added by *katuk* leaves powder and oil, will be tested organoleptically (form, aroma, colour, crumb, crisp and flavor). To determine the best result, it will be continued on the chemical test including carbohydrates, energy, fat, protein, vitamin A, fiber, and sesquiterpene acid.

II. METHOD

This research is experiment which is done in the three stages. First stage is pre-experiment 1. It is aimed to find the standard recipe of groundnut that will be developed in the next stage. The second stage is the preliminary study. To manipulate the adding of *katuk* powder, the three best results are chosen to be continued in the main study. In this case, the main research means the continuation of the preliminary. It is added with the manipulation of total of groundnuts that are used in groundnut biscuits.

The variables of the research consist of: 1) independent variable (the addition of *katuk* leaf powder and oil), 2) dependent variable (the organoleptic properties of groundnut biscuits including shape, aroma, colour, crumb, crisps, taste and favorite level) and 3) control variables (the type and quality of ingredients consisting of low protein flour, sugar, milled sugar, *katuk* leaf powder), that are made by blanching them. Then, over all is baked until dry, sprinkled with the powder and cooking oil. There are two techniques to process the groundnuts. First, it is processed by using roasted techniques, thrown and crushed. Second, it is used the technique of making groundnut biscuits.

The design of experiment research is a 3x2 double factorial, as shown in Table I.

TABLE I. EXPERIMENTAL DESIGN

Addition of Katuk Leaf Powder (A)	Cooking Oil (B)	
	B ₁	B ₂
A ₁	A ₁ B ₁	A ₁ B ₂
A ₂	A ₂ B ₁	A ₂ B ₂
A ₃	A ₃ B ₁	A ₃ B ₂

There are two influenced factors. In the factor A, the addition of *katuk* leaf include three levels; 5%, 10% and 15%. In the factor B, the addition of cooking includes two levels; 62.5% and 52.5% that are equal with the weight of wheat flour.

The data were collected in the two 2 ways; organoleptic test and chemical test. The organoleptic test is performed in 2 stages. First stage is to determine the best product and the second stage is see the best product on preferences level. The first stage organoleptic test was carried out the trained panelist of 15 lecturers and 15 semi-trained artists consisting of culinary students who already programmed in Bakery & Pastry courses. Furthermore, based on phase 1 test, the preferred level of test (stage 2), performed on 100 breastfeeding panelists with an age range of 25-40 years. Chemical tests were performed on the best product of organoleptic test results. It was conducted in *Balai Penelitian dan Konsultasi Industri (BPKI)* of East Java.

III. RESULTS AND DISCUSSION

A. Organoleptic Test

The organoleptic test is performed to determine the best product and to see the best product preferences level.

• Shape

The expected shape criteria of biscuits are the shape and sharpness of the angle that based on the mold with a thickness of ± 7 mm. The best results obtained are an average value of 3.43 biscuit and added with *katuk* leaf powder of 15% and oil 52.5%. The average value of groundnut biscuit is presented in Figure 1.

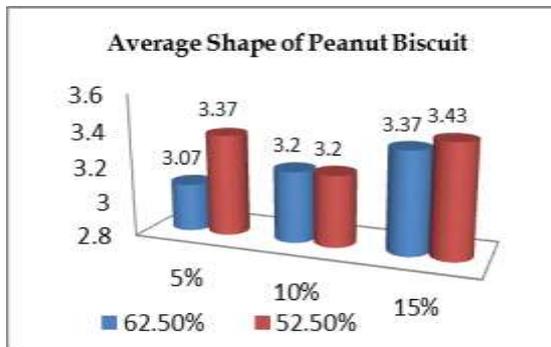


Fig. 1. Average Shape of Groundnut Biscuit Diagram

Furthermore, multiple anova tests were used to determine on the effect adding *katuk* leaves and cooking oil to groundnut biscuits. The results show that the addition of *katuk* leaf powder and oil do not affect the shape. It is indicated by the value of 0.585 with a significant level of 0.558 (above the real level of 0.05).

The shape of the biscuit is composed by the materials including wheat flour, groundnuts, oil and egg. An addition of *katuk* leaf powder of 5 to 15% and oil 52.5 to 62.5%, produce the dough that is not physically different. When it is crushed, the dough will have the compact form. It will not cause to the changing of the biscuits after the canning process. It is caused by the use of some eggs which has a weight of 32g ($\pm \frac{1}{2}$ grains). Indeed, it has no others developer ingredients. There is no water in the process of mixing, so that the shape of biscuits can't change as well.

• Aroma

The expected criteria of aroma are savory and flavorful nuts. The best results are obtained with an average value of 3.4 i.e. biscuit added with 5% *katuk* leaf powder and oil of 62.5%. The average value of groundnut biscuit aroma is presented in the diagram in Figure 2.

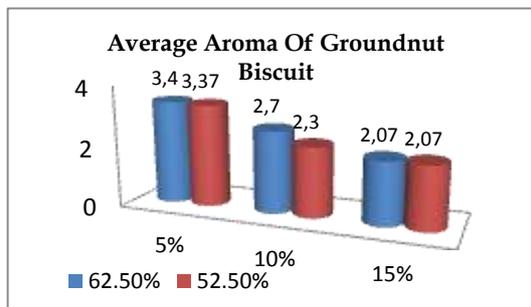


Fig. 2. Average Groundnut Biscuit Aroma Diagram

Based on the calculation using double anova, the effect of *katuk* leaves powder and oil don't give the influence to its aroma. This is indicated by the value of F arithmetic of 1.586 with a significant level of 0.208 (above the real level of 0.05).

The use of cooking oil and groundnuts cannot cover the whole aroma of *katuk* leaf. So, there is no effect regarding to the addition of *katuk* leaves and oil.

- Colour

The expected colours criteria are light green and slightly green speckled. The best results are obtained with an average value of 4.4, i.e. biscuit with 10% leaf mixed powder and 52.5% oil. The average value of groundnuts biscuit color that added by *katuk* leaf powder and oil is shown in Figure 3.

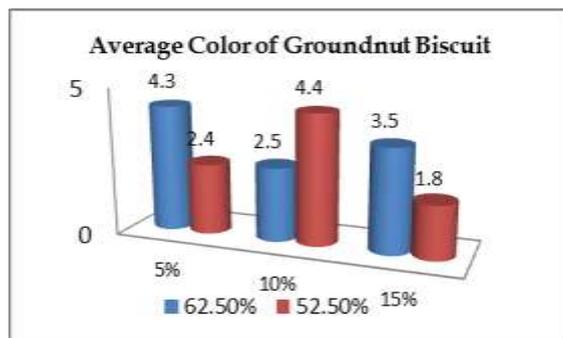


Fig. 3 Average Chart of Groundnut Biscuit Aroma

The result of double anova test shows the influence on color. This is indicated by the value of F arithmetic of 8,811 with a significant level of 0.000 (below the real level of 0.05). Duncan test is purposed to see the effect of *katuk* leaf powder and oil on the color of groundnuts biscuit.

Based on the results of Duncan's test, it can be seen that the use of *katuk* leaf powder with the addition of 5%, 10% and 15% showed the different color of groundnut biscuit. In table 2, a higher *katuk* leaves treatment have a low average value. The highest value is obtained from the third part of 5%, which is added by *katuk* leave and a value of 3.6000.

The higher the total of *katuk* leaf powder, the lower the average value of the panelist on the valuation of biscuits' color. Plenty of *katuk* leaves will be added the green color that containing the contents of chlorophyll. Besides, the total of *katuk* leaf is equally same with the total of oil showing the better color. It can be influenced by its colour of *katuk* leaves that is the productive of green *katuk* leaves. So, the higher the total of *katuki* leaves will affect to the result of biscuits. The addition of green leaf powder of 15% shows the real colour. It is concentrated, so that an average value obtained is one including dark green and green speckled.

The addition of *katuk* leaf powder and cooking oil consisting of 5%, 62.5% and 5%, 52.5% show that there is the different on colour of groundnut biscuits by the increasing of 10%. It is different as if added with 10%, 52.5%, 15%, 52.5% and 15%, 62.5%. Based on Table 3, it shows the higher treatment columns of *katuk* leaf and the lower oil average

rating. The highest value is in the third subset of 5% *katuk* leaf powder, added with a value of 3.6000

It can be concluded that the best result from the six treatments achieve the high score of 3.633. It is conducted by adding 5% of *katuk* leaf powder and 62.5% cooking oil. Those things are significantly affected to the colour of biscuits.

- Crumbs

The expected crumb criteria are easily broken and crumbled when it is flattened with good grains. The best results are obtained with an average rating of 3.47 i.e. biscuit with 5% *katuk* leaf powder and oil of 62,5%. The average value of groundnut biscuit crumbs added with *katuk* leaf and oil powder is presented in the Figure 4.

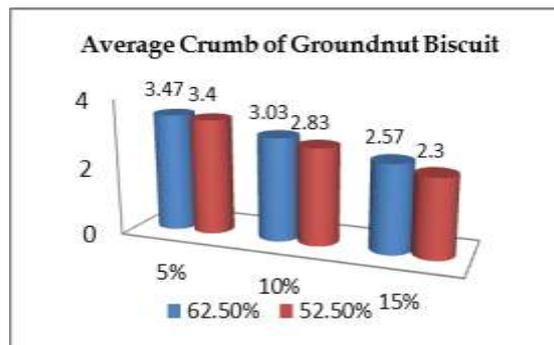


Fig. 4 Average Chart of Groundnut Biscuit Crumb

Results from multiple anova tests shows that there is no effect on crumbs. This is indicated that the value of F arithmetic of 0.196 with a significant level of 0.823 (above the real level of 0.05).

As seen in figure 4, the higher the total of *katuk* leaf powder, the lower the average value of the panelists on the valuation of biscuit crumbs. This is influenced by the composition of ingredients in biscuit. The addition of much dry ingredients and liquid will result slurry dough. Whereas the addition of enough dry ingredients and also liquid will result a dense mixture. However, the addition of *katuk* leaf powder and oil has no effect due to its addition of 5-15% of the weight of wheat flour. In other words, a little addition will not effect on the crumbs of groundnut biscuits.

- Crispness

The expected criteria of crispness are crunchy and easily crumbled when it is chewed. The best results are obtained with an average value of 3.57 i.e. biscuit with 5% *katuk* leaf powder and oil 62.5% and 52.5%. The average value of crispy groundnut biscuit, added by of *katuk* leaf powder and oil is shown in the Figure 5.

Results from multiple anova tests shows that there is no effect on crispness. This is indicated that the value of F arithmetic of 0.637 with a significant level of 0.530 (below the real level of 0.05).

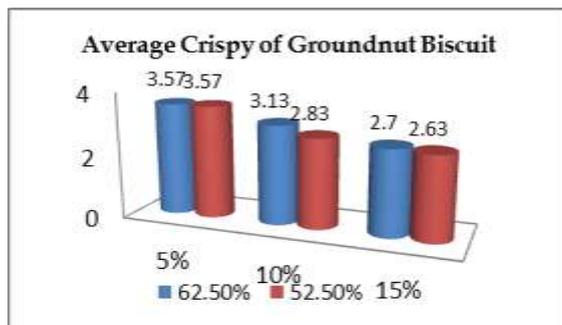


Fig. 5. Average Crispy Groundnut Biscuit

In Figure 5, the higher the total of *katuk* leaf powder, the lower the average value of the panelist on the evaluation of crisp biscuits. This is influenced by the composition of ingredients on biscuit. The addition of *katuk* leaf powder and oil on crumbs as well as on crispness also has the same factor. It is because the addition of *katuk* leaf powder is only 5-15% of the weight of wheat flour. In other words, a little addition will not effect on the crispness of groundnut biscuits.

• Flavor

The expected taste criterion is very tasty. The best results are obtained with an average value of 3.03 that is biscuit with 5% *katuk* leaf powder and 52.5% oil. The average value of groundnut biscuit flavors, added with *katuk* leaf powder and oil is shown in Figure 6.

Results from multiple anova tests showed that there is no effect on taste. This is indicated by the value of F arithmetic of 0.292 with a significant level of 0.747 (above the real level of 0.05). The higher the total of *katuk* leaf powder, the lower the average value of the panelist to the taste of the biscuits. The addition of *katuk* leaf powder is about 5-15% of the weight of wheat flour. In other words, a little addition will not affect the taste of biscuits.

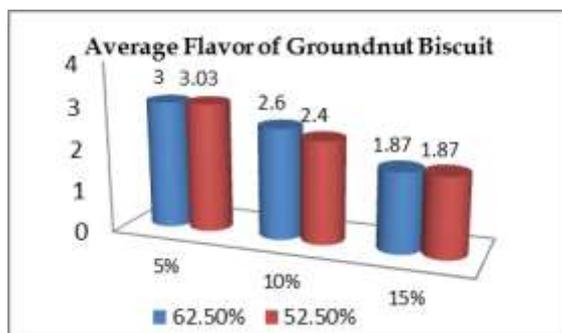


Fig.6. Flavor Aroma of Groundnut Biscuit

• Preference level of Groundnut Biscuit

The result of the favorite test obtained are presented in the percentages including 1) criterion 4 (like) of 61%, criterion 3 (quite like) of 25%, criterion 2 (less like) of 14%, and criterion 1 (do not like) of percentage 0%. The result of test of respondent's level in the percentage form can be seen in Table II.

TABLE II. RESPONDENTS PREFERENCE LEVEL

Preference Level	Frequency	Percentage
4 (like)	61	61%
3 (Quite like)	25	25%
2 (do not like it much)	14	14%
1 (do not like)	0	0
Total	100	100%

B. Chemical Test

Nutritional content of groundnut biscuit is presented in Table III.

TABLE III. COMPARISON OF NUTRITIONAL CONTENT OF BISCUIT

No	Nutrient	Groundnut Biscuit	Groundnut Biscuit Added with <i>Katuk</i> Leaf Powder and Cooking Oil
1	Karbohidrat (%)	68.12	66.34
2	Energi (kal)	426.80	466.50
3	Protein (%)	6.88	7.86
4	Fat (%)	14.12	14.56
5	Vitamin A (mg)	57.80	98.60
6	seskuiterna acid (%)	-	0.18
7	Fiber (%)	2.48	4.82

Chemical tests are performed in the best product samples, added with 5% *katuk* leaf powder (20 g) and oil of 62.5% (250 g). Nutritional content tested include carbohydrates, energy, protein, fat, vitamin A, sesuruterna acid, and fiber. Chemical tests are conducted at Balai Penelitian dan Konsultasi Industri (BPKI), Surabaya. It is carried out 100 grams for each biscuit.

IV. CONCLUSION.

The addition of *katuk* leaf powder and oil affect the color, however, it does not effect on the shape, aroma, crumb, crispness, and taste. The best groundnut biscuit product is added with 5% *katuk* leaf powder and oil of 62.5%. It is obtained based on the nutrient content of 66.34% carbohydrate, 466.5% energy, 7.86% protein, 14.56% fat, 98.60 mg vitamin A, 0.18% sesuranerna acid and 4.82% fiber.

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