The Substitution of Bran Flour on the Acceptability and Color Characteristics of *Eucheuma cottonii* Seaweed Cookies

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Abstract- Cookies are one of practical foods because they can be eaten at any time and with good packaging will have a relatively long shelf life. The substitution of rice bran flour in product *Eucheuma cottonii* seaweed cookies can increase the use value and economic value of rice bran flour. This study aim is to determine the level of acceptance of panelists and color characteristics of *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour. The concentration from substitution of rice bran flour used were 0% (A), 2.5% (B), 5% (C) and 7.5% (D). The research method used a completely randomized design of 4 treatments and 5 replications. Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test. The results of the study shows that the substitution of rice bran flour give significant effects on the level of acceptance and color of cookies. The substitution concentration 2.5% of rice bran flour has a higher score with a score 3.42, lightness 68.50, redness 8.36 and yellowness 29.39.

Keywords: cookies, *Eucheuma cottonii* seaweed, rice bran flour, substitution, organoleptic

I. INTRODUCTION

Cookies are one of practical foods because they can meet human nutritional needs. Cookies are one type of pastry made from basic ingredients of flour and other additives that form a formula, thus producing cookies with certain structural properties. *Eucheuma cottonii* Seaweed Cookies are one type of cookies that are added with seaweed as a raw material. Rice bran contains a lot of dietary fiber and phytosterol, which has a strong fiber content and fitosterol in reducing blood cholesterol. Rice bran has a nutrient content of 16.3% protein, 21.4% fat, 8.3% mineral, 49.4% carbohydrates and food fiber 25.3%.[1]

The first characteristic of the product that consumers will see before consume the product is appearance. Appearance of a product is an important characteristic, because apparitions support the quality or quality of the product. Appearance assessment can be influenced by color, texture and shape.[2] One of the parameter for the appearance of the product is color. The color contained in a product served as the first attraction for consumers to accept or reject the product. Rice bran has a high nutrient content, but has a brownish color. Therefore it is necessary to do research to find out the effect of substitution of rice bran flour on the color and level of acceptance of cookies.

II. MATERIAL AND METHOD

Material

The ingredients used are rice bran flour, seaweed flour *Eucheuma cottonii*, flour, margarine, egg yolk, sugar, skim milk and baking powder. While the tools used are digital scales, mixers, ovens, pans, molds and basins. The tool used for color testing is Chromameter CR-400.

Method

The method used in the research is the experimental method. The treatment used in the study is the difference in the concentration of rice bran flour substitution. The experimental design used is a simple complete randomized design (RBD) with 5 treatments and 4 replications. The substitution concentrations of rice bran flour used are 0% (A), 2.5% (B), 5% (C) and 7.5% (D). Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test.

Processing of cookies

The process of making cookies is by mixing butter, egg yolk, sugar, baking powder and milk powdes using a mixer for 5 minutes. Then add the flour, seaweed flour, rice bran flour and knead until the mixture is evenly mixed. The finished dough is formed according to taste on a butter-smeared pan. Then bake the dough by using an oven with a temperature of $150^{o}C$ for 15 minutes.

III. RESULT

The assessment of hedonic organoleptic tests was carried out by 100 panelists. The parameters assessed are appearance, aroma, taste and texture. The organoleptic test was used to determine the level of reception of panelists on seaweed cookies *Eucheuma cottonii* substitution of rice bran flour. The organoleptic test results on *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour can be seen in Table 1.

Table 1. Test of organoleptic *Eucheuma cottonii* seaweed cookies substitution of rice bran flour

Treatment	Appearance	Flavor	Taste	Texture	Overall
A (0%)	3,58	3,29	3,42	3,23	3,38
B (2,5%)	3,41	3,40	3,53	3,33	3,42
C (5%)	3,25	3,08	3,04	3,05	3,10
D (7,5%)	2,91	3,03	3,13	3,14	3,05

In the organoleptic test the highest value of sighting parameter was obtained treatment A (0%) and lowest treatment D (7.5%). The highest parameters of aroma and taste were obtained in treatment B (2.5%) and the lowest in treatment D (7.5%). The highest parameters of texture were obtained in treatment B (2.5%) and the lowest in treatment C (5%). Overall the panelists' acceptance of *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour was obtained in treatment C (2.5%) with a value of 3.42.

The results of the color test showed that there was a significant influence on seaweed cookies *Eucheuma cottonii* substitution of rice bran flour on the characteristics of Lightness (L), redness (a) and yellowness (b). This is indicated by the value of each characteristic which gives a value of $p < 0.05$. The color characteristics of *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour can be seen in Table 2, the Lightness (L) graph can be seen in Figure 1, the redness (a) graph can be seen in Figure 2 and the yellowness graph (b) can be seen in Figure 3.

Table 2. Characteristics of color *Eucheuma cottonii* seaweed cookies substitution of rice bran flour

Treatment	Color		
	L*	a*	b*
A (0%)	$68{,}24\pm0{,}07^{d}$	$7{,}84\pm0{,}10^{a}$	$28{,}56\pm0{,}25^{b}$
B (2,5%)	$68{,}50\pm0{,}14^{d}$	$8{,}36\pm0{,}04^{b}$	$29{,}39\pm0{,}07^{d}$
C (5%)	$66{,}76\pm0{,}16^{c}$	$8{,}80\pm0{,}06^{c}$	$30{,}00\pm0{,}06^{e}$
D (7,5%)	$63{,}86\pm0{,}12^{b}$	$10{,}36\pm0{,}03^{d}$	$28{,}94\pm0{,}06^{c}$

Based on the ANOVA results, it can be analyzed that the different treatment of rice bran flour gives a significant effect ($p < 0.05$) on the color characteristics of lightness, redness and yellowness. Then proceed to Tukey's further test. In lightness characteristics, the A treatment obtained a lightness value of (68.24 ± 0.07^{d}), B treatment obtained a lightness value of (68.50 ± 0.14^{d}), C treatment obtained lightness value of (66.76 ± 0.16^{c}) and D treatment obtained lightness value of (63.86 ± 0.12^{b}). The graph of lightness values can be seen in Figure 1.
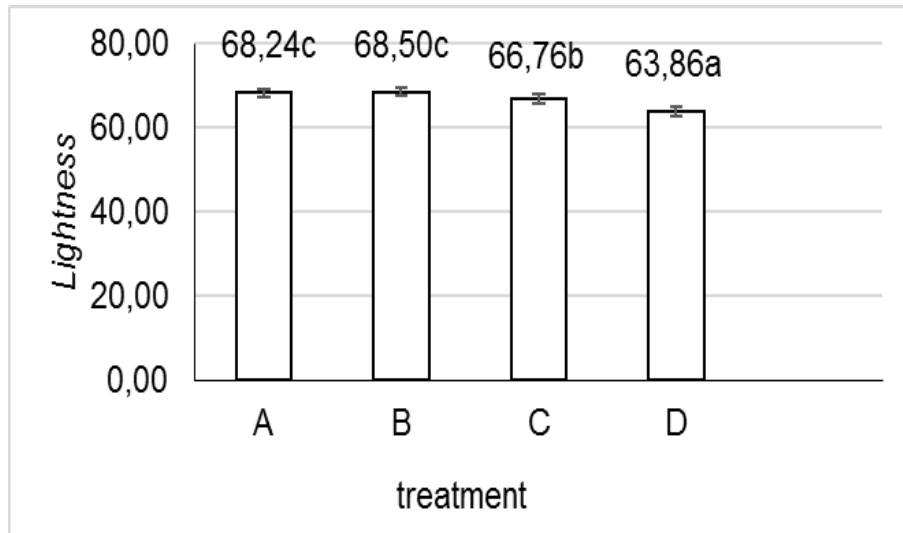
Figure 1. Graph of Lightness (L) *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour

In redness characteristics, the A treatment obtained a redness value of (7.84 ± 0.10^{a}), B treatment obtained a redness value of (8.36 ± 0.04^{b}), C treatment obtained redness value of (8.80 ± 0.06^{c}) and D treatment obtained redness value of (10.36 ± 0.03^{d}). Graph of redness value can be seen in Figure 2.
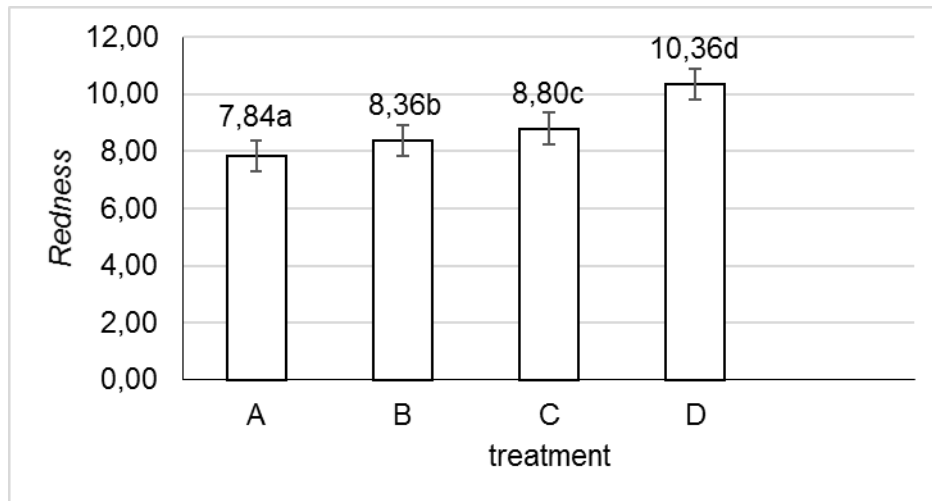

Figure 2. Graph of redness (a) *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour

In yellowness characteristics, A treatment obtained yellowness value of (28.56 ± 0.25^{b}), B treatment obtained yellowness value of (29.39 ± 0.07^{d}), C treatment obtained yellowness value of (30.00 ± 0.06^{e}) and D treatment obtained yellowness value of (28.94 ± 0.06^{c}). The graph of yellowness values can be seen in Figure 3.
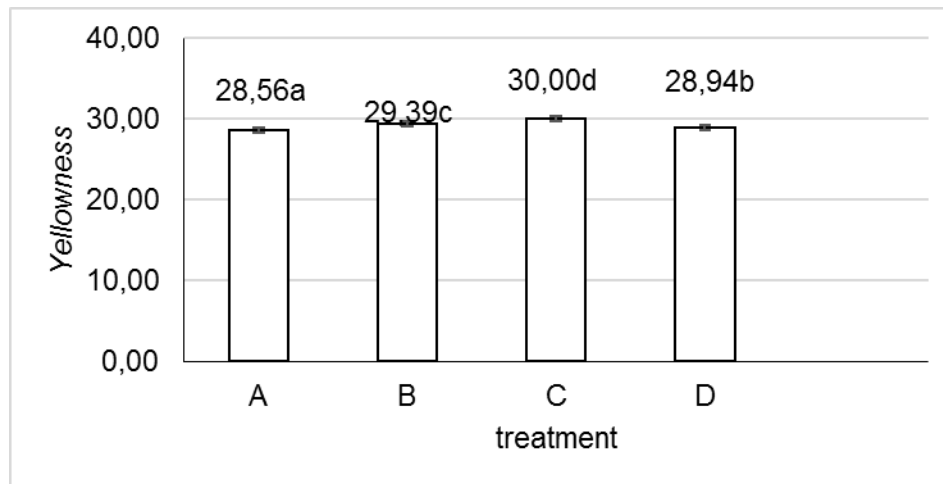
Figure 3. Yellowness graph (b*) *Eucheuma cottonii* seaweed cookies with substitution of rice bran

IV. DISCUSSION

The value of Lightness (L) shows that the higher the substitution concentration of rice bran meal, the L* value will be lower. The value of L* (Lightness) starts from the number 0 (black) to 100 (white). If the L value is higher, it indicates that the color of the product is getting brighter. The highest brightness value of cookie is in treatment B (2.5%) which is equal to 68.50 and the lowest value is found in treatment D (7.5%) which is equal to 63.86. Decreasing the value of L* on the product can be influenced by protein content. High protein content in a product can make the L* value decrease. Decrease in L* value because the higher the protein it will increase the Maillard reaction which will make the product darker.[3] Explained that the addition of rice bran flour will decrease the brightness of Cookies. This is caused by the color of the rice bran flour itself is brownish yellow. So more addition of rice bran will make the color more dull brown, besides that it can also be caused by browning or maillard reaction (non-enzymatic browning reaction).[4]

The value of redness (a) shows that *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour causes the color of color tends to be red. The value of the component a* (redness) represents the red-green color level with levels (+60 red and -60 green). The highest a* value was obtained in treatment D (7.5%) in 10.36 and the lowest value was obtained in treatment A (0%) in 7.48. The color redness in cookies are thought to be influenced by raw materials, which the higher the concentration of rice bran is given so the color of the cookies are red. It can also be caused by the roasting process that affected the color of cookies, then produces red color.[5]

The yellowness value (b) shows that *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour will cause the color of cookies that tend to be yellow. Components of value b* represent blue to yellow, are two chromatic components with a range of values -120 to +120. The higher the value of b* indicates that the yellow color in the cookie is getting yellow, and vice versa. The highest b* value was obtained in treatment C (5%) of 30.00 and the lowest value was obtained in treatment A (0%) of 28.56. The brighter the products are produced, the higher the value of the yellowish degree from the product, on the contrary if the brighter the products are produced, the lower the value of the redness of the product. The yellowish color of cookies are influenced by the addition of rice bran, the more addition of rice bran four will reduce the yellowish color of the product and vice versa.[2]

V. CONCLUSION

Eucheuma cottonii seaweed cookies with substitution of rice bran flour can give significant effect (p <0.05) on the color produced, namely lightness (L), redness (a) and yellowness (b). In addition, the differences in concentration of rice bran flour substitution also affects the level of acceptance of panelists. The concentration of the substitute of bran flour preferred by the panelists is in treatment C (2.5% substitution of rice bran flour).

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