

The Substitution of *Eucheuma cottonii* Seaweed Flour to the Acceptability and Color Characteristics of Biscuit

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Abstract- Biscuits are snacks that are known to be saved because they have a good and varied taste. Processing *Eucheuma cottonii* seaweed into flour as a raw material for making biscuits can be done to increase the use value and economic value of seaweed. The purpose of this study was to study the panelist acceptance and color characteristics of biscuits by substituting seaweed flour *Eucheuma cottonii*. The concentrations used were 0% (PM1), 5% (PM2), 10% (PM3) and 15% (PM4). 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 showed that what was meant by *Eucheuma cottonii* seaweed flour had an effect on the color of the biscuits. The 5% concentration of *Eucheuma cottonii* seaweed flour has a higher score with a score 3.47, lightness 72,74, redness 7,80 and yellowness 28,79.

Keywords: biscuit, *Eucheuma cottonii* seaweed, organoleptic, substitution

I. INTRODUCTION

Biscuits are a favorite food made by baking dough that comes from wheat flour, fat, eggs, sugar with or without the addition of other permissible additives.¹ Seaweed is an algae that is small, easily recognizable, has economic value and has been cultivated and utilized. *Eucheuma cottonii* seaweed is a seaweed which belongs to the red algae group (*Rhodophyceae*) and is most commonly found in the market.² The technology of *Eucheuma cottonii* seaweed cultivation that is easily applied to the community makes *Eucheuma cottonii* seaweed rapidly develop. Utilization of seaweed can be maximized by developing processed seaweed products to increase the use value and economic value of seaweed. One effort to develop seaweed is to process it into flour as a biscuit-making ingredient.

Product appearance is an important parameter on a product. The appearance of a product will affect consumer acceptance of the product. Appearance of a product in general can be determined by color. Colors can give the impression of liking before consumers consume these foods.³ Interesting colors on a product will cause a sense of liking before consumers consume these foods. Although the food produced is delicious, but if the resulting color deviates and is not attractive, it will cause someone to lose their appetite when they consume it. The color produced on the product must be able to represent the flavor added and can please consumers.

II. MATERIAL AND METHOD

Material

The main ingredients are used *Eucheuma cottonii* seaweed flour, flour, butter, egg yolk, sugar, milk powder, baking powder, cornstarch. The tools used are digital scales, mixers, ovens, pans, molds, bowls and spoons. The tool used to test the color of biscuits is Chromameter CR-400.

Method

The method used in this research is the experimental method. The treatment used in this study was the variation of the concentration of seaweed flour *Eucheuma cottonii*. The experimental design used in this study was a completely randomized design with 4 treatments and 5 replications. The substitution concentration of *Eucheuma cottonii* seaweed used was 0% (PM1), 5% (PM2), 10% (PM3) and 15% (PM4). Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test.

Processing of *Eucheuma cottonii* flour

The process of making *Eucheuma cottonii* seaweed flour is by washing and soaking seaweed for 3 days so that the smell and color of seaweed is lost. Furthermore, cutting seaweed becomes smaller and drying under the sun. Then dried seaweed is milled and sieved to get good seaweed flour.

Processing of biscuit

The process of making biscuits is by mixing butter and egg yolk using a mixer for 5 minutes. Next add sugar, baking powder, cornstarch, milk powder and stir again using the mixer for 3 minutes. Then add the flour, seaweed flour and knead until the mixture is evenly mixed. The finished dough is formed according to taste on a butter-smear pan. Then bake the dough using an oven with a temperature of 150°C for 15 minutes.

III. RESULT

Hedonic organoleptic tests was conducted by panelists of 100 persons. The components of hedonic organoleptic are appearance, flavour, taste and texture. The organoleptic test was used to determine the acceptability and preference of panelists for biscuits by substituting *Eucheuma cottonii* seaweed flour. Organoleptic test results on biscuits with substitution of *Eucheuma cottonii* seaweed flour can be seen in Table 1.

Table 1: Test of organoleptic biscuits substituted with *Eucheuma cottonii* seaweed flour

Treatment	Appearance	Flavour	Taste	Texture	Total
PM1	3,48	3,22	3,35	3,49	3,39
PM2	3,36	3,36	3,61	3,56	3,47
PM3	3,22	2,97	3,13	3,30	3,16
PM4	3,30	3,07	3,03	3,35	3,19

The result of organoleptic parameters the highest value of appearance was obtained in the treatment PM2 and the lowest in PM3. The highest parameters of flavour, taste and texture were obtained in PM2 treatment and the lowest was in PM3 treatment. Overall the panelists' acceptance of biscuits with the substitution of *Eucheuma cottonii* seaweed flour was obtained in the PM2 treatment with a value of 3.47.

The results of the color test showed that there was a significant effect on biscuits with substitution of *Eucheuma cottonii* seaweed 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 biscuits with substitution of *Eucheuma cottonii* seaweed flour can be seen in Table 2.

Table 2: Characteristics of color of biscuits with substitution of seaweed flour *Eucheuma cottonii*

Treatment	Color		
	L*	a*	b*
PM1	72,74 ± 0,06 ^d	5,34 ± 0,03 ^a	28,79 ± 0,15 ^c
PM2	71,73 ± 0,17 ^c	6,57 ± 0,10 ^{ab}	28,35 ± 0,18 ^b
PM3	69,47 ± 0,07 ^b	7,55 ± 0,04 ^{bc}	28,69 ± 0,12 ^c
PM4	65,75 ± 0,04 ^a	7,80 ± 0,07 ^d	26,84 ± 0,04 ^a

Based on the ANOVA results, it can be analyzed that the different treatment of *Eucheuma cottonii* seaweed 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 PM1 treatment obtained a lightness value of (72.74 ± 0.06^d) , PM2 treatment obtained a lightness value of (71.73 ± 0.17^c) , PM3 treatment obtained lightness value of (69.47 ± 0.07^b) and PM4 treatment obtained lightness value of (65.75 ± 0.04^a) . The graph of lightness values can be seen in Figure 1.

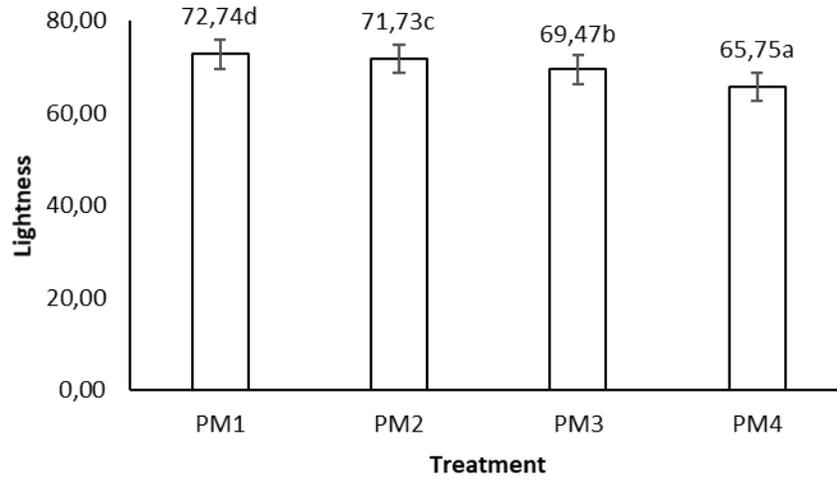


Figure 1: Graph of lightness of biscuits with substitution of *Eucheuma cottonii* seaweed flour

In redness characteristics, the PM1 treatment obtained a redness value of (5.34 ± 0.03^a) , PM2 treatment obtained a lightness value of (6.57 ± 0.10^{ab}) , PM3 treatment obtained lightness value of (7.55 ± 0.04^{bc}) and PM4 treatment obtained lightness value of (7.80 ± 0.07^d) . Graph of redness value can be seen in Figure 2.

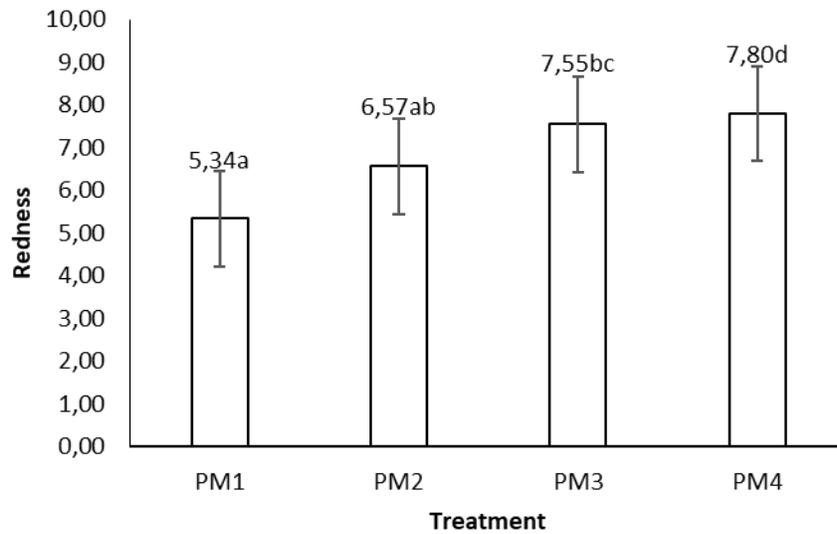


Figure 2: Graph of redness of biscuits with substitution of *Eucheuma cottonii* seaweed flour

In yellowness characteristics, PM1 treatment obtained yellowness value of (28.79 ± 0.15^c) , PM2 treatment obtained lightness value of (28.35 ± 0.18^b) , PM3 treatment obtained lightness value of (28.69 ± 0.12^c) and PM4 treatment obtained lightness value of (26.84 ± 0.04^a) . The graph of lightness values can be seen in Figure 3.

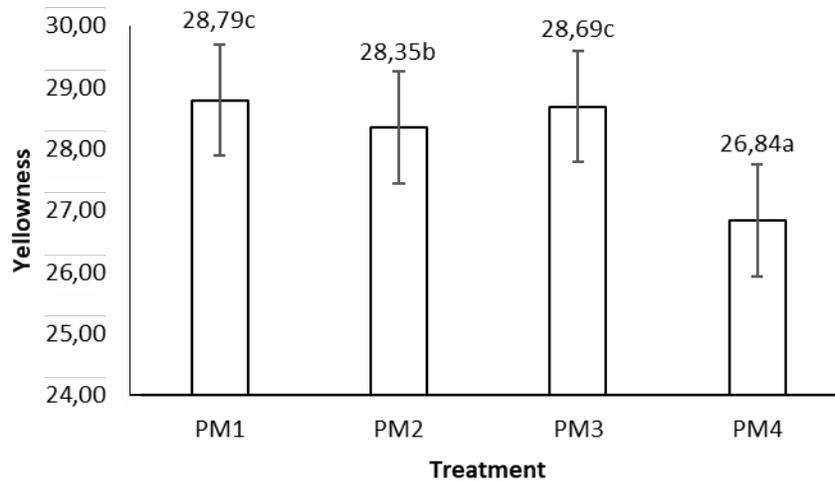


Figure 3: Graph of yellowness of biscuits with substitution of *Eucheuma cottonii* seaweed flour

IV. DISCUSSION

The value of lightness (L) shows that the higher the substitution concentration of *Eucheuma cottonii* seaweed flour the lower the L* value. The brightness level of biscuits ranged from 0-100. The highest brightness value of biscuits was found in the PM1 treatment which was 72,74 and the lowest value was found in the PM4 treatment which was 65,75. The lightness value of a product can be influenced by the roasting process affecting the color of the biscuits. The longer the roasting time, the more color produced on the biscuit will be brown due to the browning reaction (Maillard reaction). Maillard reaction is a reaction that occurs between amino groups and reducing sugars present in the raw material. The existence of this reaction will form a melanoidin compound so that the biscuit will be brown.⁴ 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.⁵

The value of redness (a) shows that the biscuits with the substitution of *Eucheuma cottonii* seaweed flour give a color that tends to red. Redness value is indicated by a positive value which means red and a negative value which means green. The highest a* value was obtained in the PM4 treatment of 7,80 and the lowest value was found in the PM1 treatment of 5,34. The redness value produced on biscuits can be affected due to the roasting process due to the reaction of the Maillard reaction. The values a* and L* values generated on biscuits are inversely proportional. The higher the value of L*, the value of a* will be lower.⁶

The yellowness value (b) shows that the biscuits with the substitution of *Eucheuma cottonii* seaweed flour tend to be yellow. The value of b* is indicated by a positive value which means yellow and a negative value which means blue. The highest b* value was obtained in the PM1 treatment of 28,79 and the lowest value was found in the PM4 treatment of 26,84. The yellowness value will be inversely proportional to the value of redness. If the yellowness value is high, then the value of redness will be low. The yellowness value of the product can be influenced by the ingredients present in the manufacturing process such as egg yolk. Egg yolk has a carotenoid pigment that can produce yellow and after the oven process will turn golden yellow or brownish yellow. In addition, the presence of developer materials such as baking powder can make the value of b* in the product relatively high.⁷

V. CONCLUSION

Biscuits substituted with *Eucheuma cottonii* seaweed flour can have a significant effect ($p < 0.05$) on the color produced, there are lightness, redness and yellowness. Besides that the difference in the substitution concentration of *Eucheuma cottonii* seaweed flour also had an influence on the level of preference of panelists. The substitution concentration of *Eucheuma cottonii* seaweed flour which was favored by panelists was PM3 (5% substitution of *Eucheuma cottonii* seaweed flour).

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