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The Sensory Hedonic Quality and Physical Characteristics Effect of *Kappahycus Alvarezii* Seaweed and Catfish Bone on Traditional Food Ilabulo Catfish (*Pangasius* sp.)

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ABSTRACT

Kappahycus alvarezii seaweed as an important commodity in Gorontalo Province add elasticity and nutrient to traditional ilabulo food whose raw material is catfish (*Pangasius* sp.). The research aimed to obtain characteristics of the sensory hedonic quality and physical gel strength due to fortification of *K. alvarezii* seaweed and catfish bone. The research method: added *K. alvarezii* 5% (A), 10% (B) and 15% (C) and 10% (A), 15% (B) and 20% (C) of catfish bone. Organoleptic test used hedonic quality scale based on SNI 01-2346-2006 parameters of appearance, color texture, flavor and taste. Physical analysis used TA-XT2i texture analyzer. The data analysis of hedonic quality sensory used non-parametric statistics *Kruskal Wallis* and if significantly affected continued with *Duncan* test and physical analyzed used descriptive. The Results of hedonic quality was obtained that ilabulo of selected catfish formula is formulation C fortification of *K.alvarezii* 15% seaweed and 20% fish bone flour, exposure of whole criteria, neat, flat surface, average thickness (7,33), texture of chewy, compact, solid (6.87) and a rather clear brown criteria of color (7.07). However, the flavor criteria (7.4) and the taste with the fish flavoring criteria (7.47) were founded in the B fortification of *K. alvarezii* 10% and 15% catfish bone. The results showed that the physical texture of ilabulo catfish fortification with seaweed *K.alvarezii* and catfish bone is average 2149.3/gf and without fortification is an average of 1927 / gf.

Keywords : fortification, catfish bone, ilabulo catfish, , *Kappahycus alvarezii*, physic,

Introduction

Kappahycusalvarezii is an important seaweed commodity in Gorontalo Province which has been widely applied to food products. One food product that can be fortified *K. alvarezii* seaweed is the traditional food ilabulo made from raw material catfish. Fortification of seaweed *K. alvarezii* in addition to as a nutritional addition of fiber also serves to make the product ilabulo catfish become more supple that is in the process of gelatination when cooking ilabulo. Astawan *et al* (2004) suggested that *K alvarezii* seaweed contain fikokoloid one of them is carrageenan equal to 20,97% which can be added to food which function assist forming gel.

Traditional food of catfish ilabulo besides fortification of *K. alvarezii* seaweed and catfish bone also contain the main ingredient of sago flour which contributed to gel formation. This research was conducted to find out the of hedonic quality of *K. alvarezii* seaweed and catfish bone and physical strength that is fortification gel strength and without fortification of *K. alvarezii* seaweed and catfish bone on traditional food of ilabulo catfish.

Material and Methods

Materials and Tools

The materials used in this research were *K.alvarezii* seaweed meat and catfish bone, sago flour, corn flour, seasoning and coconut milk.

The tool used was scoorsheet of hedonic quality test of SNI 01-2346-2006 and gel strength of TA-XT2i texture analyzer.

Methods Preparation of Catfish (*Pangasius sp.*)

Catfish preparations include weeding, stomach contents, and fillet preparation. Fried catfish meat based on Lanier method (1992) about the making of fish fillet that is fillet fish washed using cold water temperature between 5-10 °C as much as 3 times with water ratio: meat = 3: 1 and crushed.

Making Catfish Bone Flour (*Pangasiussp.*)

The preparation of catfish bone was based on (El Fauziah (2003) & Mulia (2004) modified. Candine bone was cleaned and boiled at 100°C for 30 minutes, washed and steamed for 4 hours, autoclaved 121°C 1 hour, manual pressing, reduced size 5-10 cm, dried with 105°C 90 minutes oven, mashed and sieved 100 mesh.

Kappaphycusalvarezii Seaweed Porridge Based on Harmainet al (2016)

Kappaphycusalvarezii seaweed porridge was based on Harmainet al (2016) method. *K. alvarezii* seaweed was cleaned and washed using fresh water as much as 3 (three) times, then soaked for 2 days and made two water changes. Furthermore, it was washed again with fresh water and the size of 3 - 5 cm was reduced and blended to produce *K.alvarezii* seaweed porridge.

Making Ilabulo Catfish (*Pangasiussp.*) Fortification *Kappaphycus alvarezii* Seaweed and Catfish Bone

The formation stage of catfish ilabulo refers to the formula of Harmain & Yusuf (2012) by modifying the addition of *K. alvarezii* seaweed and catfish bone as a treatment.

The ilabulo formation of catfish fortified *K. alvarezii* seaweed and catfish bone can be seen in Table 1.

Table 1. Formulation of ilabulo for 100 grams of catfish raw meat

Material Treatment	Composition (%)		
	A	B	C
<i>K. alvarezii</i> seaweed	5	10	15
Catfish bone flour	10	15	20
Sago flour (gr)	50	50	50
Corn flour (gr)	5	5	5
Garlic (gr)	10	10	10
Onion (gr)	30	30	30
Pepper (gr)	1,5	1,5	1,5
Chilli (gr)	1,5	1,5	1,5
Salt (gr)	1,5	1,5	1,5
Sugar (gr)	1,5	1,5	1,5
Coconut Milk (ml)	100	100	100
Onion Leaf (gr)	15	15	15
Cooking Oil (ml)	30	30	30

Based on the formulation, the process of making ilabulo is made. The scheme of ilabulo catfish making fortification of *K. alvarezii* seaweed and catfish bone flour is presented in Figure 1.

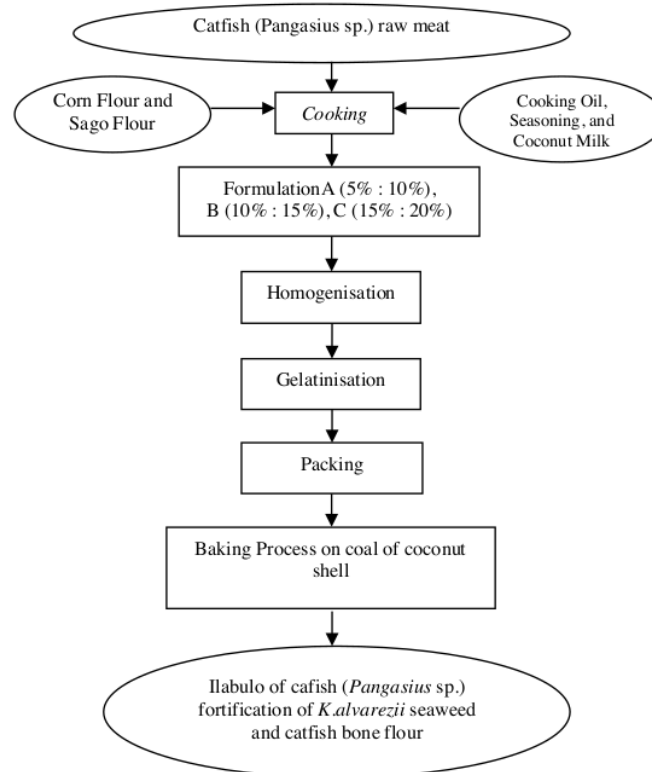


Figure 1. Scheme of ilabulo catfish fortification of *K. alvarezii* seaweed and catfish bone flour

Hedonic Quality Testing (SNI 01-2346-2006) To Obtain Selected Formulations

Ilabulo catfish fortified *K. alvarezii* seaweed and catfish bone meal was then done hedonic quality test based on non parametric statistic Kruskal Wallis. If it is significantly different then proceed with Duncan test. Analysis of organoleptic testing data using SPSS 16.

Analysis of Gel Strength of Ilabulo Fish Patin (Pangasius sp.) Fortification of K. alvarezii Seaweed and Selected Patin Fish Chip Flour (Chen, et.al. 2013) (Apriyantono et al, 1989)

Analysis of gel strength using TA XTplus type texture analyzer (Chen, et.al.2013). The gel strength value was calculated by using the formula:

$$\text{Gel strength (g cm)} = \text{gel force (gf)} \times \text{distance (cm)} \text{ (Apriyantono et al, 1989).}$$

Result and Discussion

Research Results of Hedonic Quality Ilabulo Catfish (Pangasiussp.) Fortification Seaweed Kappaphycusalvarezii and Catfish Bone Flour

Appearance

The result of the research of hedonic quality of exposure criterion can be seen in Figure 2.

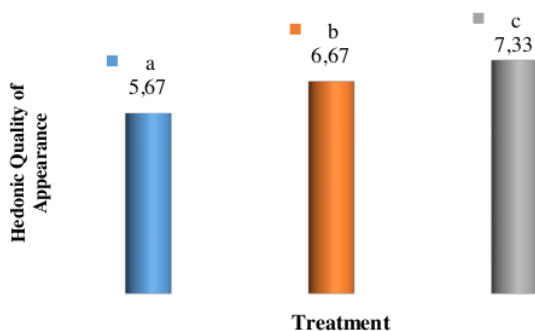


Figure 2. Histogram test results of hedonic quality of appearance

The histogram of figure 2 showed that the hedonic quality value of ilabulo catfish fortification of *K. alvarezii* seaweed and the highest catfish bone was C (15:20) formulated on the whole, neat, flat surface, average thickness of 7, 33 and the hedonic quality value of the lowest visibility of ilabulo catfish fortification *K. alvarezii* seaweed and catfish bone flour was A formulation (5:10) is in the intact criteria, less tidy, uneven surface, the thickness is not flat with a value of 5.47.

The *Kruskal-Wallis* test showed that the removal of catfish fortified *K. alvarezii* and catfish bone showed that the three formulations showed significant results ($p < 0,05$). Based on the results of further tests *Duncan* obtained that the formulation of A (5:10) was significantly different from formulation B (10:15) and C (15:20), formulation B (10:15) was significantly different from formulation A (5:10) and C formulations (15:20) as well as C formulations (15:20) were significantly different from formulations A (5:10) and formulation B (10:15).

Texture

The result of the texture hedonic quality value is shown in Figure 3.

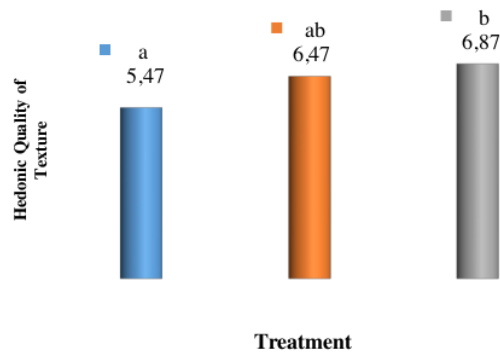


Figure 3. Result of test of hedonic quality test of texture

Histogram in Fig. 3 showed that the value of organoleptic hedonic quality of ilabulo catfish texture fortification of *K. alvarezii* seaweed and the highest catfish bone was B (15:20) formulated on the elastic, compact, solid criteria of 6.87 and the value Organoleptic hedonic quality texture lowest texture ilabulo catfish fortification *K. alvarezii* seaweed and catfish bone flour is cracker was the formulation A (5:10) is in the criteria of chewyness, less compact, less dense with a value of 5.47.

Kruskal-Wallis test showed that the ilabulo catfish texture of fortified *K. alvarezii* seaweed and catfish bone showed that the three formulations showed significant effect ($p < 0,05$). Based on the results of further tests it was found that the formulation of A (5:10) was significantly different from the formulation of B (10:15) and C (15:20), formulation B (10:15) was very different from formulation A (5:10) and C formulations (15:20) as well as C formulations (15:20) were significantly different from formulations A (5:10) and formulation B (10:15).

Seaweed *K. alvarezii* fortified on seaweed affects the formation of the patabol of catfish texture in addition to sago flour in each of these formulations. In addition, the gelatinization process during the heating process also affects the texture of catfish ilabulo. This is caused because *K. alvarezii* seaweed contains carrageenan that serves as a formator of elasticity. Sago starch containing amylopectin starch together with the carrageenan properties of *K. alvarezii* seaweed contribute to the texture of ilabulo to be elastic, compact and solid.

Figure 3 showed that panelists prefer formulation B (10:15) which is significantly different because the addition of *K. alvarezii* seaweed and catfish bone meal that is not too little and not too much to form a texture is not too dense and compact. But the addition of seaweed and bone meal of little catfish produce the texture of the catfish ilabulo was not too compact and rather mushy. Corn flour with the same composition in each of these formulations is less likely to cause the texture to be less compact, so with fortification *K. alvarezii* grass helped in forming

elasticity ilabulo catfish besides sago flour. Gelatinization process during heating process is crucial in texture formation.

Color

The result of the hedonic quality colourvalue is shown in Figure. 4

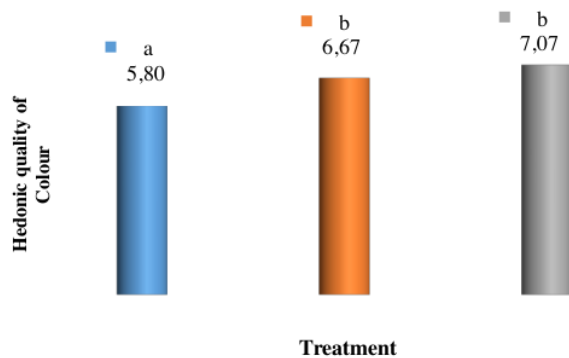


Figure 4. Results of color hedonic quality analysis

Histogram in Figure 4, showed that value of hedonic quality colour ilabulo catfish fortification *K. alvarezii* highest seaweed was C formulation (15:20) is in criteria like value 7.07 that is brown rather clear and the lowest colourvalue was formulation A (5:10) ie yellowish brown is in the criteria like the value of 5.80.

Based on *Kruskal-Wallis* test that the colour of ilabulo catfish fortification *K. alvarezii* pada seaweed all three formulations showed no significant effect ($p > 0,05$) on formulation B (10:15) and C (15:20) but formulation A (5:10) had a marked effect on the formulations of B (10:15) and C (15:20). This was due to the addition of the amount of composition *K. alvarezii* seaweed also affect the colour of catfish ilabulo.

Ilabulo catfish formulations B and C were not significantly different due to the addition of *K. alvarezii* seaweed to cover the colour of yellow cornflour. Colors on ilabulo catfish were also due to the addition of brown sago flour also affect the formation of color. In addition, the processing at the time of heating and baking also contribute to the formation of the colour of *Maillard* reaction. The *Maillard* reaction is an enzymatic browning that occurs between the reducing agents and the amino acids that produce a brownish color on the foodstuff when subjected to heating.

Aspects of colour formation of catfish ilabulo at the time of roasting is very important because it can affect the reception of panelists, because if too long in baking cause ilabulo color becomes somewhat blackish other than that the use of white sago flour compared with sago flour is slightly reddish brown needs to be considered. According Winarno (2008), colour is the result of the eye senses that can be considered in the assessment of a product.

Flavour

The result of the hedonic quality flavour analysis is shown in Figure 5.

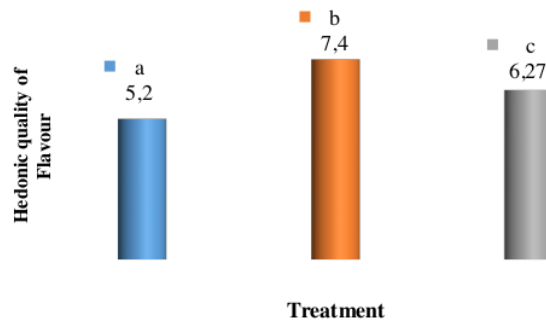


Figure 5. Results of hedonic quality flavour test

The result of organoleptic test of hedonic quality of taste was obtained that the selected formulation was formulation B (10:15) with the highest value of 7.4 criteria like the hedonic quality of fish smell.

Based on *Kruskal-Wallis* test, the aroma of catfish ilabulo which fortified by *K. alvarezii* seaweed and catfish bone meal of the three formulations had significant effect ($p > 0,05$).

These results indicated that the fortification of *K. alvarezii* seaweed and Catfish bone meal formulation A (5:10) B (10:15) C (15:20) in ilabulo catfish is said to affect the peculiar aroma of catfish ilabulo. The aroma of the catfish ilabulo is also the formation of volatile compounds through the process of processing. It is known that the aroma is one important factor that helps determine the acceptance or the fondness of a food product.

Taste

The result of hedonic quality test of taste criteria of ilabulo catfish fortification *K. alvarezii* seaweed and catfish bone meal can be seen in Figure 6.

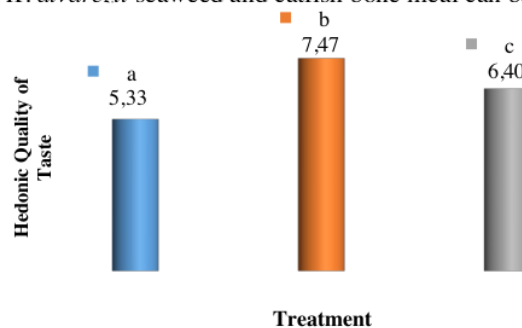


Figure 6. Results of the taste hedonic quality test

Based on Figure 6 showed that the hedonic quality of taste obtained the highest value in the formulation B (10:15) that was 7.47 with the criteria feels fish,

savory. The lowest value was on the formulation A (5:10) 6.40 with the criteria of less tasty fish less savory.

The results of *Kruskalwallis* analysis showed that the three formulations had significant effect. The results of *Duncan's* advanced test analysis showed that the formulation of A (5:10) was different from the formulation B (10:15) and C (15:20), the different formulation B (10:15) Real with formulations A (5:10) and C (15:20) and formulation B (10:15) was different from formulation A (5:10) and C 15:20).

The three different formulations were significantly different due to differences in the composition of seaweed and bone meal of different catfish so that the panelists give the organoleptic value of hedonic quality in accordance with the addition of the composition according to the formulation. The more composition of *K. alvarezii* seaweed and bone meal added, the product will produce different flavors despite the addition of spices with the same formulation. In addition, due to the processing included in the case of fumigation that contributes to different flavors that cause the product ilabulo catfish have a distinctive flavor. This is as proposed by Lewless and Heymann in Ariyani (2012) that the taste of a food comes from the constituents themselves who have undergone the processing.

The flavor on ilabulo catfish fortification *K. alvarezii* seaweed and catfish bone meal is an important factor in the acceptance of a food. Although the parameters such as texture, appearance, color and aroma with a good judgment on a product but if the taste is not preferred or not accepted then the product will be rejected.

Strength Gel

Data from analysis of gel strength of ilabulo catfish fortified *K. alvarezii* seaweed and selected catfish bone form (C) (15:20) and without treatment (control) are shown in Table 3.

Table 3. Data analysis of gel strength of ilabulo catfish fortification *K. alvarezii* seaweed and catfish bone.

Repeat	Selected Formulation of Product (C) (Gram fource/gf)	ProductWithoutTreatment (Control) (Gram fource/gf)
1	1933.9	1943.7
2	2063.4	1721.5
3	2450.6	2115.8
Average	2149.3	1927

The results of gelilabulopatellarity analysis of catfish fortification of *K. alvarezii* seaweed and selected catfish bone (C) (15:20) and without treatment (control) can be seen in Figures 7a and 7b.

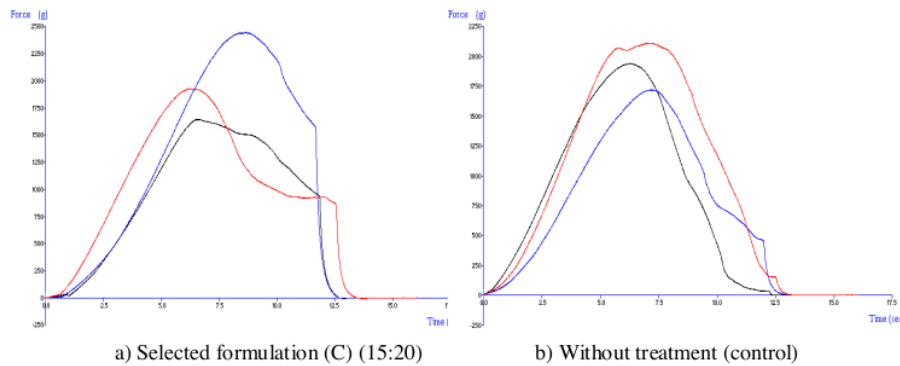


Figure 7. Analysis of gel strength of the catfish ilabulo fortification of *K. alvarezii* seaweed and selected catfish bone formula (C) (15:20) (a) and without treatment (control) (b).

6

Conclusion

Based on the result of the research, it is concluded that ilabulo catfish (*Pangasius* sp.) selected formulation fortified seaweed *K. alvarezii* 15% and catfish bone flour 20% hedonic quality criteria appearance intact, tidy, flat surface, uneven thickness, chewy texture, compact, Solid, clear brown color, smell fish, taste fish feels, tasty. Based on the physical ilabulo catfish fortification of seaweed *Kappaphycus alvarezii* and catfish bone flour obtained gel strength is 2149.3/gf higher without fortification ie 1927/gf.

Acknowledgments

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10
