Original Research Article

Nori Preference Level Based on the Condition of the Raw Material *Eucheuma cottonii* seaweed

ABSTRACT

Aims: To determine the level of preference of panelists for ~~n~~Nori based on the condition of raw materials of dry and semi-dried *Eucheuma cottonii* seaweed.
Study design: The research was conducted experimentally
Place and Duration of Study: Organoleptic tests were carried out in the Laboratory of Fisheries Product Processing Faculty of Fisheries and Marine Sciences, University of Padjadjaran. Physical tests and chemical tests conducted at the Laboratory of Research and Biological Resources and Biotechnology Research Institute at the Society (LPPM), IPB, between March 2019 and April 2019.
Methodology: The research was conducted experimentally consisted of 3 treatments with 20 semi-trained panelists as replication from Fisheries students of Fisheries and Marine Science Faculty, University of Padjadjaran who had experienced the organoleptic assessment. Hedonic tests ~~are~~ were to determine the level of panelists preference for the products which included appearance, aroma, texture, and flavor, the results were statistically analyzed using Friedman Test and Bayes Test. Physical tests (thickness and hardness) and chemical tests (water content and crude fiber content) were carried out on the most preferred treatment product and analyzed descriptively.
Results: The organoleptic test results of ~~n~~Nori from *Eucheuma cottonii* seaweed with dry raw material conditions has~~d~~s the highest average value on each characteristic compared to other treatments, appearance of 7.70, aroma of 7.00, texture of 7.50, and flavor of 7.90. The Bayes test results on the treatment of ~~n~~Nori from *Eucheuma cottonii* seaweed with dry raw materials conditions having the highest alternative which was 8.54 with the most influential taste criteria for the assessment ~~of nori from seaweed *Eucheuma cottonii*~~. The thickness of the ~~n~~Nori was 0.108 mm, the hardness was 1916.16 gf, water content of ~~n~~Nori was 17.23% and crude fiber content was 10.10%.
Conclusion: The treatment of ~~n~~Nori with raw materials of dry conditions ~~is~~ was the most preferred by panelists.

Formatted: Font: Italic

Keywords: [Nori, Eucheuma cottonii, Raw Materials, Dried, Semi-Dried]

1. INTRODUCTION

Seaweed is an important commodity for the Indonesian economy. This is because the seaweed commodity has economic value and the magnitude of the potential development of seaweed cultivation in Indonesia. Seaweed has the potential to be developed considering the nutritional value it contains. Seaweed can be used as food, pharmaceutical, cosmetic and textile industries [22].

Nori is one of the foods made from seaweed. Nori is dried seaweed, in the form of thin sheets with high nutritional value. Nori is not a foreign item in Indonesia because there are many processed Nori products with various brands sold in supermarkets. So far, ~~n~~Nori has only been produced in Japan, Korea and China [18]. The raw material of seaweed used to make imported ~~n~~Nori is *Porphyra* seaweed. *Porphyra* lives in subtropical climates so it does not exist in Indonesia [18]. So, it is necessary to look for other types of seaweed that are easily cultivated or found in Indonesia as raw materials for ~~n~~Nori.

Commercial economic seaweed in Indonesia are *Eucheuma*, *Gracilaria*, *Gelidium*, *Hypnea*, and *Sargassum* [16]. *Eucheuma cottonii* is a type of seaweed that is cultivated by the community. This type of seaweed is widely cultivated because the handling of seaweed post-harvest is relatively easy and simple. Also, the production technology is relatively cheap and easy. *Eucheuma cottonii* can be used as an industrial raw material and can be processed into food that can be consumed directly [27].

The potential of *Eucheuma cottonii* seaweed in Indonesia can be developed as a raw material for making ~~n~~Nori. The use of different types of seaweed can affect the resulting ~~n~~Nori characteristics such as different appearance, aroma, texture, and taste. There are two types of post-harvest seaweed products that are traditionally done, namely semi-dried seaweed and dried seaweed [2]. The raw material for seaweed *Eucheuma cottonii* semi-dry and dry processing can produce different ~~n~~Nori characteristics.

(a) (b)

Figure 1. (a) Dried *Eucheuma cottonii seaweed*, (b) Semi-Dried *Eucheuma cottonii seaweed*

Several studies have been carried out in making ~~n~~Nori ~~with~~ using *Eucheuma cottonii* seaweed generally using raw materials with dry conditions which have a moisture content of 13.39% -15.13% [2], while raw materials *Eucheuma cottonii* seaweed is also available in semi-dried conditions which have a moisture content of 32% [24]. Therefore, it is necessary to research on ~~n~~Nori produced from dried *Eucheuma cottonii* seaweed and semi-dried *Eucheuma cottonii* to find out the best ~~n~~Nori product that is ~~results~~preferred.

2. MATERIAL AND METHODS

2.1 Time and Place of Research

The research was conducted from March 2019 until April 2019. Organoleptic tests were carried out in the Laboratory of Fisheries Product Processing Faculty of Fisheries and Marine Sciences, University of Padjadjaran. Physical tests and chemical tests conducted at the Laboratory of Research and Biological Resources and Biotechnology Research Institute at the Society (LPPM), IPB, between March 2019 and April 2019.

2.2 Materials and Tools

The material used in this research was based on McHugh (2003) modification, as follows [15]: dried *Eucheuma cottonii* seaweed, semi-dried *Eucheuma cottonii* seaweed, rice water, clean water, salt, sugar, pepper, flavoring, fish sauce, olive oil and sesame oil. The tools used in this research ~~are~~ were analytic balance, basin, blender, measuring cup, plastic spatula, boiling pot, gas stove, baking sheet, oven.

2.3 Research Methods

The research was conducted experimentally consisted of 3 treatments with 20 semi-trained panelists as replication from Fisheries students of Fisheries and Marine Science Faculty, University of Padjadjaran who had experienced the organoleptic assessment. Hedonic tests ~~are~~ were to determine the level of panelists preference for the products include appearance, aroma, texture, and flavor, the results were statistically analyzed using Friedman Test and Bayes Test. Physical tests (thickness and hardness) and chemical tests (water content and crude fiber content) were carried out on the most preferred treatment product and analyzed descriptively.

2.4 The Treatment Based on Condition of the Raw Material of *Eucheuma cottonii* Seaweed

The treatment in this study ~~is~~was:
Treatment A: Dried *Eucheuma cottonii* seaweed 100%
Treatment B: Semi-dried *Eucheuma cottonii* seaweed 100%
Treatment C: Dried *Eucheuma cottonii* seaweed 50% ~~:~~plus semi-dried *Eucheuma cottonii* seaweed 50%

~~—~~Hedonic tests ~~are to~~ determined the level of panelists preference for the products which included appearance, aroma, texture, and flavor.

2.5 Procedure

The procedure for making ~~n~~Nori from *Eucheuma cottonii*, modified in Teddy 2009, as follows [25]: dried *Eucheuma cottonii* seaweed and semi-dried *Eucheuma cottonii* seaweed weighed 50 g, soaked with rice water for 24 hours as much as 1 L, seaweed rinsed with clean water, then soaked with clean water 1 ~~,~~5 L for 48 hours, water is replaced every 24 hours. The ingredients were prepared namely *Eucheuma cottonii* seaweed which had been soaked and seasoning ingredients namely 0.2 g salt, 1 g sugar, 0.2 pepper, 0.3 g flavoring, 1 mL fish sauce, 2 mL olive oil, and oil 2 mL sesame. Soaked *Eucheuma cottonii* is weighed as much as 100 g and added to 200 ml of water, then blended for 2 minutes. Blended seaweed is put into a boiling pan and seasoning is added ~~seasoning~~, then cooked for 5 minutes to produce a gel product. Cooked seaweed puree is measured 80 ml with a measuring cup and poured into a baking sheet measuring 17 × 23 cm and baked using an ~~O~~oven at 70ºC for 180 minutes.

Formatted: Font: Italic

Formatted: Font: Italic

2.6 Data Analysis

2.6.1 Hedonic Test

Hedonic tests ~~are~~ were used to determine the level of panelists preference for the products which included appearance, aroma, texture, and flavor, the results were statistically analyzed using Friedman Test and Bayes Test.

2.6.2 Physical Test

The physical test on the ~~n~~Nori ~~is~~ were the measurements of thickness and hardness. Physical tests ~~are~~ were carried out for the most preferred products.

2.6.2.1 Thickness (LPPM IPB)

Nori is measured using a micrometer tricle brand with several replications in mm. The measurement results are averaged so that the average thickness value of the ~~n~~Nori is obtained.

$$\text{Average value} = \frac{\text{number of values}}{(\text{lots of data}}$$

2.6.2.2 Hardness (LPPM IPB)

Nori is measured using the TA-XT2i Stable micro system. Measurements are made by giving a compressive force to the sample to produce a curve that shows the sample texture profile. Hardness is expressed from the maximum force (peak value) to pressure or first compression with units of gram force (gf) [4]. The style value obtained shows that the greater the value, the smaller the crispness of the texture. The data obtained is then visualized in graphical form using a program ~~from~~ in a computer [6].

2.6.3 Chemical Test

Chemical tests are carried out for the most preferred products. Chemical tests on the ~~n~~Nori are moisture content (AOAC 1980) and crude fiber content (AOAC 1980).

2.6.3.1 Moisture Content (AOAC 1980)

One gram of sample was weighed in a cup. Put it in the oven at a temperature of 105 ^{0} C, for 8 hours, then ~~weigh~~ work out the water content calculated by the formula:

$$\text{Moisture content} = \frac{\text{sample weight (fresh-dried)}}{\text{Fresh sample weight}} \times 100\%$$

2.6.3.2 Crude Fiber Content (AOAC 1980)

A total of 1 gram of sample was dissolved ~~with~~ in 100 ml of 1.25% H_2SO_4, heated to boiling and then continued with destruction for 30 minutes then filter with filter paper and with Buchner curong bundles. The filter residue is rinsed with 20-30 ml of boiling water and with 25 ml of water 3 times. The residue is reconstructed with 1.25% NaOH for 30 minutes. Then filter in the manner above and rinse successively with 25 ml of H_2SO_4 1.25% boil, 25 ml of water three times and 25 ml of alkohol residue and filter paper is transferred to the porcelain cup and dried in the oven at 130ºC for 2 hours, after the residue cools along with a porcelain cup weighed (A), then put in a furnace of 600ºC for 30 minutes, cooled and weighed again (B).

$$\text{Crude fiber weight} = W - W^0$$

Information:

W = residual weight before being burned in the kiln

= A- (weight of cup filter paper): A: residual weight + filter paper + cup

W^0 = weight of residue after being burned in the kiln

= B - (cup weight): B: residual weight + cup

$$\text{Crude fiber content} = \frac{\text{crude fiber weight}}{\text{sample weight}} x\ 100\%$$

3. RESULTS AND DISCUSSION

3.1 Hedonic Test

3.1.1 Appearance

Appearance is the first parameter seen in a product [23]. Observations of the appearance of ~~n~~Nori from *Eucheuma cottonii* seaweed are presented in Table 1.

Comment [U1]: ?

Formatted: Superscript

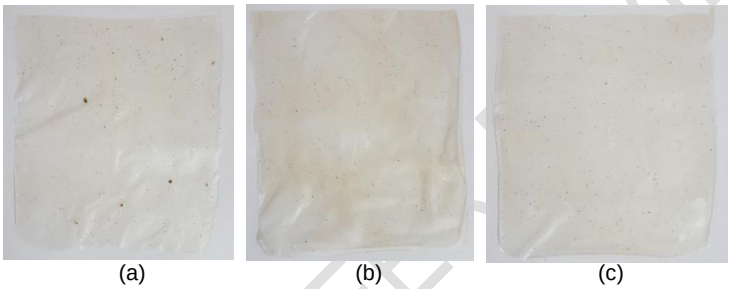
Formatted: Font: Italic

Table 1. Average Appearance of Nori Based on Differences in Condition of *Eucheuma cottonii* Seaweed Raw Materials

Condition of Nori Raw Material	Median	Average
Dried	9	7.70 b
Semi-dried	5	6.10 a
Dried 50% : Semi-dried 50%	7	7.20 ab

Description: The average number of treatments followed by the same letter shows that there is no significant difference according to the multiple comparison test of at 5%.

Statistical tests showed the appearance of nNori from seaweed *Eucheuma cottonii* dried raw material was significantly different from the appearance of nNori from *Eucheuma cottonii* seaweed from semi-dried raw materials. All treatments included in the neutral, preferred, and very preferred category with median values 5, 7, and 9. The appearance of Nnori from *Eucheuma cottonii* seaweed conditions of dry raw materials had the highest average value of 7.70 producing nNori with a white appearance rather than transparent. Nori from *Eucheuma cottonii* seaweed, the condition of semi-dried raw materials has a slightly brownish color appearance and is rather transparent. Nori from *Eucheuma cottonii* seaweed condition of dry raw material 50%: 50% semi-dry has a slightly brownish white color and is rather transparent.



(a) (b) (c)

Figure 2. Nori Results: (a) Nori *Eucheuma cottonii* condition of dry raw material, (b) Nori *Eucheuma cottonii* condition of semi-dry raw material, (c) Nori *Eucheuma cottonii* condition of 50% dry raw material: 50% semi dry.

Different nNori colors are caused by different conditions of the raw material of *Eucheuma cottonii* seaweed which has produces a different color of seaweed product. The condition of dried seaweed raw materials is white because in the process of drying seaweed there is a soaking process of calcium oxide (CaO) solution which serves to remove fishy odor, whiten and kill microbes [2], while the raw material for seaweed is not treated by immersion of calcium oxide (CaO) in the process of drying seaweed, so that there is still the original color of the *Eucheuma cottonii* seaweed which is slightly brownish in color. The color is slightly brownish in the nNori from semi-dry raw material because the seaweed *Eucheuma cottonii* has a slightly brownish red color derived from the pigment content of fikoeritin, the red pigment [26].

3.1.2 Aroma

The aroma assessment aims to determine the delicacy of the product based on the sense of smell. The observation of nori aroma from *Eucheuma cottonii* seaweed is presented in Table 2.

Table 2. Average Aroma of Nori Based on Differences Condition of *Eucheuma cottonii* Seaweed Raw Materials

Condition of Nori Raw Material	Median	Average
Dried	7	7,00 a
Semi-dried	7	6,80 a
Dried 50% : Semi-dried 50%	7	6,40 a

Description: The average number of treatments followed by the same letter shows that there is no significant difference according to the multiple comparison test ofat 5%.

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

Formatted: Font: Italic

The aroma is one of the factors that influence the panelists on a product. Based on the panelists 'assessment of the ~~n~~Nori aroma of *Eucheuma cottonii* seaweed, the panelists' average values ranged from 6.40 to 7.00. The results of the statistical tests show that all treatments did not provide significantly different results and included the preferred category of panelists. The resulting aroma of ~~n~~Nori smells of aroma and typical seaweed. The highest average value of ~~n~~Nori aroma was found in the ~~n~~Nori treatment with the condition of dry raw materials with a value of 7.00, with a slightly fishy aroma on the ~~n~~Nori and flavored spice. The less fishy aroma on dry raw material conditions is because the drying process of dried seaweed undergoes a process of immersing it in calcium oxide (CaO) solution which has the function of removing fishy odor, whitening and killing microbes [2]. The cause of the fishy odor is the amine content found in seaweed [28]. The lowest average value of the aroma of ~~n~~Nori was found in the treatment of ~~n~~Nori with the condition of 50% dry raw material: 50% semi-dry at 6.40. The aromas ~~of aromas~~ produced by the ~~panel~~ treatments ~~are~~ waas still acceptable to the panelists.

Formatted: Indent: Left: 0", Hanging: 0.5"

3.1.3 Texture

The texture is one of the quality attributes of food ingredients [12]. Texture assessment is done by feeling and folding the ~~n~~Nori. The observation of the ~~n~~Nori texture of *Eucheuma cottonii* seaweed is presented in Table 3.

Formatted: Font: Italic

Table 3. Average Nori Texture Based on Different Conditions of *Eucheuma cottonii* Seaweed Raw Materials

Condition of Nori Raw Material	Median	Average
Dried	7	7,50 a
Semi-dried	7	6,20 a
Dried 50% : Semi-dried 50%	7	6,80 a

Description: The average number of treatments followed by the same letter shows that there is no significant difference according to the multiple comparison test ~~of~~ at 5%.

Based on the panelists 'assessment of the texture of ~~n~~Nori from *Eucheuma cottonii* seaweed, the panelists' average values ranged from 6.20 to 7.50. The results of the statistical tests showed that all treatments did not give significantly different results from other treatments. Nori in the treatment of the condition of dry raw materials has the highest average value with a value of 7.50, the texture of the ~~n~~Nori produced is thick, flexible and somewhat crunchy. This is because the raw materials of *Eucheuma cottonii* seaweed dry conditions have lower moisture content than *Eucheuma cottonii* seaweed in semi-dry conditions. The moisture content of dried seaweed is 13.39% -15.13% [2] and the moisture content of semi-dried seaweed is 32% [24]. The moisture content of dried seaweed is lower because the process of drying seaweed is carried out for 3 days [2], while the drying of semi-dried seaweed is carried out for 2 days [24]. The preference for the texture produced in the ~~n~~Nori ~~is~~ was still acceptable to the panelists.

3.1.4 Flavor

The taste assessment is done using the ~~n~~Nori being cut into a small size of ± 2 cm and then given to the panelists for sampling and assessment. The results of observations of the ~~n~~Nori flavor from *Eucheuma cottonii* seaweed are presented in Table 4.

Table 4. Average Flavor of Nori Based on Differences Conditions of *Eucheuma cottonii* Seaweed Raw Material

Condition of Nori Raw Material	Median	Average
Dried	9	7,90 b
Semi-dried	7	6,60 ab
Dried 50% : Semi-dried 50%	5	6,10 a

Description: The average number of treatments followed by the same letter shows that there is no significant difference according to the multiple comparison test ~~of~~at 5%.

Based on the panelists' assessment of the ~~n~~Nori taste of *Eucheuma cottonii* seaweed it is known that all treatments can still be accepted by the panelists. The statistical test showed that the ~~n~~Nori taste of *Eucheuma cottonii* seaweed was significantly different from the ~~n~~Nori flavor of seaweed *Eucheuma cottonii* 50% dry matter: 50% semi-dry.

The nori taste of *Eucheuma cottoni*i seaweed, the condition of dry raw materials has the highest average value of 7.90 producing nori with savory flavors, after taste feels rather bitter, slightly feels typical of seaweed. Nori from *Eucheuma cottonii* seaweed, the condition of semi-dried raw materials has a savory taste, after taste feels chewy and somewhat bitter, very noticeably typical of seaweed. Nori from *Eucheuma cottonii* seaweed condition of 50% dry raw material: 50% semi-dry has a savory taste, rather bitter after taste, quite feels typical of seaweed. The taste formed in the ~~n~~Nori of *Eucheuma cottonii* seaweed can be derived from the amino acid contained in *Eucheuma cottonii* seaweed namely glutamic acid, glycine and alanine [14] other than because of the addition of spices. Commercial nori taste that is salted and smells of seaweed, the taste produced in ~~n~~Nori comes from three amino acids found in Porphyra seaweed namely alanine, glutamic acid, and glycine [25].

The condition of different raw materials can affect the taste because the *Eucheuma cottonii* seaweed conditions of dry raw materials during the drying process of seaweed undergo the immersion stage of calcium oxide (CaO) solution which serves to eliminate fishy odor on seaweed [2], so that the ~~n~~Nori is produced from dried seaweed raw materials have a little fishy seaweed. Whereas, in semi-dried seaweed, during the drying process there is no immersion with a solution of calcium oxide (CaO) so that the distinctive fishy smell of seaweed is still felt and the ~~n~~Nori taste produced is very fishy seaweed. Mixing the two conditions of the raw material produces a taste of -Nnori that is quite fishy seaweed product.

3.2 Bayes Decision Methods

Decision making on alternative weight values of the appearance criteria, aroma, texture, and ~~n~~Nori taste of *Eucheuma cottonii* seaweed were carried out by multiple comparison tests (Pairwise Comparison). The results of calculations on the weighted scores of the appearance criteria, aroma, texture, and ~~n~~Nori flavor of seaweed *Eucheuma cottonii* are presented in Table 5.

Table 5. Weight Value Criteria Nori

Criteria	Weighted criteria
Appearance	0,20
Aroma	0,12
Texture	0,11
Flavor	**0,58**

Based on the calculation of the weight of the appearance criteria, aroma, texture, and ~~n~~Nori taste of *Eucheuma cottonii* seaweed, it was found that the taste criteria had the highest value compared to other criteria. This shows that the taste criteria most influence the assessment of ~~n~~Nori from *Eucheuma cottonii* seaweed. Flavor is the most considered criteria because the good taste will be an important point in a product [1]. This is because food made with modern technology and high nutritional value is not a guarantee that consumers will like it in terms of taste [12]. The calculation results on the weight of criteria and in determining the best treatment taking into the appearance, aroma, texture, and Flavor of nori from *Eucheuma cottonii* seaweed are presented in Table 6.

Table 6. Nori Rate Decision Matrices ~~with~~by Bayes Method

The Condition of Nori Raw Materials	Criteria				Alternative Value	Priority Value
	Appearance	Aroma	Texture	Flavor		
Dried	9	7	7	9	**8,54**	**0,41**
Semi-dried	5	7	7	7	6,61	0,31

Dried 50% : Semi-dried 50%	7	7	7	5	5,85	0,28
Weight Criteria	0,2	0,12	0,11	**0,58**		

Based on the calculation by the Bayes method, the highest ~~n~~nori value of *Eucheuma cottonii* seaweed was obtained with the condition of dry raw material with a value of 8.54. Nori from *Eucheuma cottonii* seaweed with dry raw material conditions is the most preferred ~~n~~Nori by the panelists compared to other treatments, because it has a savory taste, after taste feels a bit bitter, slightly feels fishy typical of seaweed.

3.3 Physical Test

3.3.1 Thickness

Based on the results of thickness tests that ~~have been~~were carried out on ~~n~~Nori from *Eucheuma cottonii* seaweed with the condition of dry raw materials ~~having~~ had a thickness 0.108 mm. Nori thickness of *Eucheuma cottonii* seaweed with dry raw material conditions approaching the thickness of commercial ~~n~~Nori which has a thickness of 0.193 mm [19]. The carrageenan content in *Eucheuma cottonii* seaweed can form a gel so that it can maintain the shape of the ~~n~~Nori sheet so that it is not easily damaged and torn [7]. Thickness is affected by the area of the mold, the volume of solution, and the amount of total solids [16]. Nori thickness affects the crispness of the product and the drying time. The more amount of dough used can produce ~~nori~~ Nori which is thicker, heavier, and not crispy [20].

Formatted: Font: Italic

3.3.2 Hardness

Based on the tests carried out, the ~~n~~Nori from *Eucheuma cottonii* seaweed dry matter has a value of 1916.16 gf, this value is higher than the commercial value which has a value of 408 gf [20]. The unit of gram force (gf) comes from the hardness which is expressed from the maximum force (peak value) at the first pressure or compression [4]. The value of the force obtained shows that the greater the value, the smaller the level of crisp texture [6]. This shows that commercial nori is crisper than nori from *Eucheuma cottonii* dry raw material. The high value of nori from *Eucheuma cottonii* dry matter seaweed can be influenced by carrageenan content in *Eucheuma cottonii* seaweed which during heating forms a gel. [10] In research that stated that the tensile strength of ~~n~~Nori *H. ~~s~~Saidana* was influenced by carrageenan extracted during heating and the cooling process, the hydrogen atoms in the carrageenan molecule would ~~urge~~ help to form a twist, the interaction of this twist would form a gel, then forming aggregation of these cross points and form a three-dimensional structure. This results in the gel getting stronger and not easily broken.

3.4 Chemical Test

3.4.1 Moisture Content

Based on the results of the ~~n~~Nori test from *Eucheuma cottonii* seaweed with the condition of dry raw materials having a moisture content of 17.23%. Based on the standards [5], the quality requirements for dry products have a maximum moisture content of 10%. Nori moisture content from *Eucheuma cottonii* seaweed with dry raw material conditions is higher than commercial nori containing 2.15% moisture content [18]. The higher the water content, the lower the nori crispness and conversely the lower the moisture content, the higher the crispy ~~n~~Nori [11]. Nori sheets easily absorb water, so even though they are packaged, many ~~n~~Nori uses silica gel and other materials as moisture absorbers [10]. The higher water content in the ~~n~~Nori from *Eucheuma cottonii* seaweed can also be caused by the carrageenan content of the *Eucheuma cottonii* seaweed. [19] In research stated that the increase in water content due to water molecules binds to carrageenan molecules and the

drying process does not evaporate to the maximum. [8] The carrageenan content of *Eucheuma cottonii* seaweed dry conditions amounted to 61.52%.

3.4.2 Crude Fiber Content

The test results of crude fiber on ~~n~~Nori from *Eucheuma cottonii* seaweed with dry raw material conditions had~~ve~~ a value of 10.10%. Crude fiber content found in ~~n~~Nori was influenced by carrageenan ~~owned~~ cotained ~~by~~ in seaweed *Eucheuma cottonii*. [13] In research stated that fiber content which is relatively high in dodol was caused by the use of ingredients from dodol, namely seaweed *Eucheuma cottonii* as a producer of carrageenan having high fiber content. Levels of dietary fiber from *Eucheuma cottonii* seaweed reached 67.5% consisting of water-insoluble dietary fiber 39.47% and water-soluble dietary fiber 26.03% [9]. The total level of commercial ~~n~~Nori dietary fiber as much as 31.67% consisted of 8.37% dissolved feeding fiber and 23.3% non-dissolved dietary fiber [20]. Levels of crude fiber are lower than dietary fiber because strong acids (sulfuric acid) and strong bases (sodium hydroxide) have a greater ability to break (hydrolyze) food components compared to digestive enzymes [3].

4. CONCLUSION

Based on the results of the research conducted ~~by~~ on ~~n~~Nori products from *Eucheuma cottonii* seaweed, the panelists preferred the ~~n~~Nori with dried raw material condition of *Eucheuma cottonii* seaweed. Nori thickness of *Eucheuma cottonii* seaweed with dry raw material conditions of 0.108 mm and hardness of 1916.16 gf was the most preferred. Meanwhile, the moisture content ~~is~~ of 17.23% and the crude fiber content ~~is~~ of 10.22% was contained in this product.

REFERENCES

[1] Aiman, A., Handaka, A.A., dan Lili, W. 2017. Analisis Preferensi Konsumen dalam Pengambilan Keputusan Membeli Produk Olahan Perikanan di Kota Tasikmalaya (Studi Kasus di Pasar Tradisional Cikurubuk, Kec. Mangkubumi). *Jurnal Perikanan dan Ilmu Kelautan*. 8 (1): 8-18

[2] Alamsyah, R., Lestari, N., dan Hasrini, R. F. 2013. Kajian Mutu Bahan Baku Rumput Laut (*Eucheuma* sp.) dan Teknologi Pangan Olahannya. *Jurnal Dinamika Penelitian Industri*. 24 (1): 57-67.

[3] Ardiansyah. 2008. *Studi Pembuatan Serat Makanan dari Beberapa Limbah Tanaman Sayur*. Skripsi. Fakultas Pertanian, Universitas Sumatera Utara.

[4] Bourne, M. C. 2002. Food, Texture and Viscosity Concept and Measurement. London: Academic Press.

[5] Departemen Perindustrian Badan Penelitian dan Pengembangan Industri. 1992.

[6] Harahap, S. E., Purwanto, Y. A., Budijanto, S., Maharijaya, A. 2018. Karakteristik Kerenyahan dan Kekerasan Beberapa Genotipe Kentang (*Solanum tuberosum L.*) Hasil Pemuliaan. Artikel. 7 hlm.

[7] Iqbal, M., Wahyuni S., Syukri M. 2017. Pengaruh Konsentrasi k-Karagenan Terhadap Penilaian Organoleptik Produk *Vegetable Leather* dari Daun Kelor (*Moringa oleifera* L.). *Jurnal Sains dan Teknologi Pangan (JSTP)*. 2 (3): 641-647.

[8] Istini, S. A., Suhaimi, dan J Anggadiredja. 1986. Manfaat dan Pengolahan Rumput Laut. Jakarta: *Jurnal Penelitian*. BPPT.

[9] Kasim, A. 2004. Peluang dan Tantangan Pemanfaatan Gambir sebagai Bahan Baku Perekat pada Industri Kayu Lapis dan Papan Partikel. Seminar Nasional Tumbuhan Obat Indonesia XXVI. Padang 7-8 september 2004.

[10] Lalopua, V. M. 2018 Karakteristik Fisik Kimia Nori Rumput Laut Merah *Hypnea saidana* Menggunakan Metode Pembuatan Berbeda dengan Penjemuran Matahari. *Majalah BIAM*. 14 (01): 28-36.

[11] Lalopua, V. M. N. 2017. Pemanfaatan dan Karakteristik Nori Tiruan Menggunakan Bahan Baku Alga *Hypnea saidana* dan *Ulva conglubata* Dari Perairan Maluku. *Majalah Biam.* 13 (02): 33-40.

[12] Larasati, K., Patang, dan Lahming. 2017. Analisis Kandungan Kadar Serat dan Karakteristik Sosis Tempe dengan Fortifikasi Karagenan Serta Penggunaan Tepung Terigu Sebagai Bahan Pengikat. *Jurnal Pendidikan Teknologi Pertanian*. 3: 67-77.

[13] Lukito, M. S., Giyarto, dan Jayus. 2017. Sifat Fisik, Kimia, dan Organoleptik Dodol Hasil Variasi Rasio Tomat dan Tepung Rumput Laut. *Jurnal Agroteknologi*. 11 (01): 82-95.

[14] Matanjun, P., Mohamed, S., Mustapha, N. M., dn Muhammad, K. 2009. Nutrient Content of Tropical Edible Seaweeds, *Eucheuma cottonii*, *Caulepra lentillifera* and *Sargassum polycystum*. *J Appl Phycol*. 21: 75-80.

[15] McHugh DJ. 2003. A Guide to The Seaweed Industry. Roma (IT): FAO.

[16] Murdinah. 2011. Prospek Pengembangan Produk Berbasis Rumput Laut *Eucheuma spinosum* dari Nusa Penida, Bali. *Prosiding Forum Inovasi Teknologi Akuakultur*. 1139-1142.

[17] Park, J.W., Testin, P.J dan Vergano, H.J. 1996. Application of Laminated Edible Films to Potato Chip Packaging. *Journal of Food Science*. 61(4): 766-768.

[18] Putri, R. C. T dan Ningtyas, S. A. 2017. *Pembuatan Nori dari Rumput Laut Campuran Jenis Ulva lactuca linnaeus dan Glacilaria sp.* Skripsi. Fakultas Teknik, Universitas Sebelas Maret, Surakarta.

[19] Rezekiana, M. 2015. *Pengaruh Penambahan Karagenan pada Pembuatan Nori Fungsional Lidah Buaya (Aloe barbadensis)*. Skripsi. Fakultas Teknologi Pertanian, Universitas Brawijaya, Malang.

[20] Riyanto, B., Trilaksani, W., dan Susyiana, L. E. 2014. Nori Imitasi Lembaran dengan Konsep *Edible Film* Berbasis Protein Myofibrillar Ikan Nila. *JPHPI*. 17 (3): 263-280.

[21] Sajida. 2016. *Karakteristik Produk Inori dari Rumput Laut Campuran Ulva lactuca dan Eucheuma cottoni.* Skripsi. Fakultas Teknologi Pertanian, Institut Pertanian Bogor.

[22] Salim, Z. dan Ernawati. 2015. *Info Komoditi Rumput Laut*. Jakarta: Badan Pengkajian dan Pengembangan Kebijakan Perdagangan.

[23] Soekarto, S. T. 1985. Penilaian Organoleptik untuk Industri Pangan dan Hasil Pertanian. Jakarta, Bhratara Karya Aksara.

[24] Sulistiyowati, E. 2015. *Pengaruh Umur Panen dan Metode Penjemuran Terhadap Mutu Fisik Rumput Laut Euxheuma cottonii sp.* Tesis. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.

[25] Teddy. 2009. Pembuatan Nori Secara Tradisional dari Rumput Laut Jenis *Glacilaria* sp. *Skripsi*. Program Studi Teknologi Hasil Perikanan, Institut Pertanian Bogor. Bogor.

[26] Veronika, H. H., Mappiratu, dan Sumarni, N. K. 2017. Ekstraksi dan Karakterisasi Ekstrak Zat Warna Rumput Laut (*Eucheuma cottonii*). *Kovalen*. 3 (1): 7-16.

[27] Wijayanto, T., Hendri, M., dan Aryawati, R. 2011. Studi Pertumbuhan Rumput Laut *Eucheuma cottonii* dengan Berbagai Metode Penanaman yang Berbeda di Perairan Kalianda, Lampung Selatan. *Maspari Journal*. 3: 51-57.

[28] Xiren and Aminah 2014," Elimination of seaweed odour and its effect on antioxidant activity''. Department of Food science, School of Chemical Sciences and Food Technology, Faculty of Science and Technology, University Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.