Data Article

The Level of Nori's Relief Made From Raw Seaweed Mixed *Gelidium Sp* And *Eucheuma cottonii*

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ABSTRACT

Aims: This research aims to obtain the most preferred nori made from the mixture of Gelidium sp and Eucheuma cottonii seaweed.
Study design: Research was conducted
Place and Duration of Study: The Laboratory of Fisheries Product Processing at the Faculty of Fisheries and Marine Sciences, Padjadjaran University and the Laboratory of Biotechnology and Biotechnology Research LPPM Bogor Agricultural Institute from February to March 2019.
Methodology: The method used in this research was an experimental method with 5 mixed treatments of Gelidium sp and Eucheuma cottonii with 20 semi-trained panelists were repeated. The treatment was a mixture of Gelidium sp and Eucheuma cottonii 90%: 10%, 80%: 20%, 70%: 30%, 60%: 40% and 50%: 50%. The observed variables consisted of hedonic tests namely appearance, aroma, texture, taste. Chemical tests are water content and crude fiber.
Results: The results showed that the mixture of nori made from seaweed Gelidium sp and Eucheuma cottonii 70%: 30% was preferred over other treatments, with a moisture content of 15.35% and the crude fiber content of 5.36%. The median value of hedonic nori test of Gelidium sp and Eucheuma cottonii on appearance and texture 9 is very preferred, the value of aroma and taste 7 is preferred.
Conclusion the mixture of nori made from seaweed Gelidium sp and Eucheuma cottonii 70%: 30% is most preferred by panelists.

Keywords: [Mixture, Eucheuma cottonii, Gelidium sp, Seaweed]

1. INTRODUCTION

Seaweed is a marine plant that is classified as multicellular algae (algae) thallophyta division. Unlike perfect plants in general, seaweed has no roots, stems ,and leaves. Seaweed lives on the ocean floor that can be penetrated by sunlight so that a variety of colors are then used to classify seaweed. In general, edible seaweed is a type of blue algae (Cyanophyceae), green algae (Chlorophyceae), red algae (Rhodophyceae) and brown algae (Phaeophyceae) [5].

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Considering the availability of abundant types of seaweed and still very limited management, the research of Gelidium sp. Nori products. conducted to meet food products from local seaweed species. Gelidium sp. currently available in Indonesia is only used as a producer so that what is important in the food and non-food industries. Utilization of Gelidium sp. apparently not only used as industrial raw materials but also can be developed into food products such as nori.

In general, Gelidium sp. containing 14 - 20 grams of water, 0.4 grams of fat from 16.1 to 12.5 grams of protein, 10.5 to 13.5 grams of fiber and 3.5 to 8.5 grams of mineral in 100 grams [21]. Gelidium sp. including one type of seaweed that produces agar. Gelatin content in Gelidium sp. ranges from 12-48% [11] The quality of agar depends on the strength of the raw material which can be influenced by several factors such as: intrinsic factor (type of seaweed), environmental factors (temperature and salinity during seaweed growth), harvesting factor (temperature, mixing with other types of seagrasses), post-harvest (seaweed storage conditions obtained.

Eucheuma cottonii is one type of red seaweed (Rhodophyceae) which is widely cultivated by the people of Indonesia. This type of red algae has been renamed Eucheuma alvarezii [6]. However, because the carrageenan produced is the carrageenan kappa fraction, this species is taxonomically changed to Kappaphycus alvarezii, the name of the region "cottonii" is generally better known in the world of national to international trade [4].

Carrageenan, which is a hydrocolloid compound which is a long chain polysaccharide compound extracted from seaweed species of caraginophytes, such as Eucheuma sp., Chondrus sp., Hypnea sp., And Gigartina sp. Carrageenan can be divided into three types namely iotakaraginan, kappa-carrageenan, and lambda-carrageenan. All three differ like of the gel and its reaction to protein. Kappa-carrageenan forms a strong gel (rigid), whereas iotakaraginan forms a gel that is smooth (flaccid) and easily formed. Also, each carrageenan is produced by different types of seaweed. The solubility of carrageenan in water is influenced by several factors, including temperature, the presence of other organic compounds, salt that dissolves in water, and the type of carrageenan itself [10].

2. MATERIAL AND METHODS

2.1 Time and Place of Research

The research was conducted from February 2019 until March 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 February 2019 and March 2019.

2.2 Materials and Tools

The equipment and materials used to make nori in this research are as follows: Blender Basin. Baking sheet. Filter. Electric scales. Plastic Spatula Oven. Beaker glass Small bowl. Label sticker. Seaweed (Gelidium sp.) Seaweed (Eucheuma cottonii) Rice water Clean water Salt pepper Sugar Flavoring Sesame oil. Olive oil. Fish sauce.

2.3 Research methods

The results of the hedonic test were statistically analyzed using the Friedman Test and the Bayes Method. This formulation is divided into five parts, namely:

a. Gelidium sp. : Eucheuma cottoni 90%: 10%
b. Gelidium sp. : Eucheuma cottoni 80%: 20%
c. Gelidium sp. : Eucheuma cottoni 70%: 30%
d. Gelidium sp. : Eucheuma cottoni 60%: 40%
e. Gelidium sp. : Eucheuma cottoni 50%: 50%

2.4 Procedure

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Research procedures according to [20] that have been modified. This research procedure begins with the preparation of tools and materials, preparation of nori, treatment and observation. The following are the stages. Preparation of dried seaweed material Gelidium sp. and Eucheuma cottonii, weighed as much as 50 grams and cleaned of dirt attached. The second stage, namely preparation for making nori, starts from soaking in rice water with the aim to soften the dried seaweed network. Rice water used is 1000 mL, soaking is done for 1 x 24 hours. Then the next day, soaked in clean water for 2 x 24 hours, every 1 x 24 hours clean water must be replaced immediately. Clean water used as much as 1500 mL. Seaweed that has been cleaned, then weighed according to treatment and added as much as 200 ml of clean water, then crushed seaweed using a blender for 2 minutes. The puree is put into a baking dish and seasoned with salt such as 0.2 g, 1 gram sugar, 0.3 g flavoring, pepper 0.2 g, olive oil 2 mL, sesame oil 2 mL and fish sauce 2 mL. Puree is cooked using low heat for 10 minutes. Puree was measured using a measuring cup as much as 80 mL and poured on a baking sheet. The pan used has a size of 17 x 23 cm (outer size) and 15 x 20 cm (inner size). The puree in a baking pan was flattened using a plastic spatula. The puree thickness is calculated approximately 1 mm. Put in the oven with a setting of 70^{o}C for 3 hours. The final stage in this research is observation, testing is done that is the hedonic level test

2.5 Observation Parameters

The parameters for observing the level of preference include color, aroma, texture and taste. Tested on 20 semi-trained panelists. Panelists can respond with varying degrees of liking. The scale used in organoleptic (hedonic) tests ranges from 1-9, namely: 1 (very dislike), 3 (dislike), 5 (neutral), 7 (like), 9 (very like). The acceptance limit for panelists' preference level is ≥ 5, i.e. if the test product has a value equal to 5 or more than 5 then the test product is liked by the panelists and if the product being tested receives a value of ≤5 then the product is declared not accepted by the panelists [18].

2.6 Data Analysis

Analysis for organoleptic testing uses a two-way analysis of the Friedman test variance with the Chi-square test. If the price of Hc <x2α (K-1), then accept H0 and reject H1, and if the price of Hc> x2α (K-1), then H0 is rejected and H1 is accepted. If H1 is accepted, then the treatment gives a real difference and the test is continued to find out the median values that are not the same and to find out the differences between treatments with multiple comparison tests [12].

The test method used to determine the selected product is the Bayes method. The Bayes Method is one technique that can be used to analyze in the best decision-making of many alternatives to producing gains that take into account various criteria [12]. The results obtained are then discussed descriptively.

2.6.1 Hedonic Test

Hedonic test is a test that aims to determine the level of consumer preferences for a product. There were 20 panelists in the hedonic test. Tests on the level of preference include appearance, aroma, taste and texture. Consumer favorite values, namely: 9 (really like); 7 (likes); 5 (neutral / ordinary); 3 (don't like it); and 1 (very dislike) [18].

2.6.2 Chemical Test

Chemical tests are carried out for the most preferred products. Chemical tests on nori include the following:

2.6.2.1 Moisture Content (AOAC 1995)

A total of 1 gram of sample was weighed in a saucer. Put it in the oven at 105 ^{0} C, for 8 hours, then weigh the water content calculated using the formula:

2.6.2.2 Crude Fiber Levels (AOAC 1995)

A total of 1 gram of sample was dissolved with 100 ml of H2SO4 1.25%, heated to boiling and then continued with destruction for 30 minutes then filtered with filter paper and with the Buchner curving deadlock. 3 times . The residue was redistributed with 1.25% NaOH for 30

minutes. Then filter with the above method and rinse successively with 25 ml of boiling 1.25% H2SO4, 25 ml of water three times and 25 ml of residual alcohol and filter paper transferred to a porcelain cup and dried in a 130ºC oven for 2 hours after cold residue along with the porcelain cup are weighed (A), then put in a 600ºC furnace for 30 minutes, cooled and re-weighed (B).

Information:
W = weight of residue before burning in the furnace
= A- (weight of cup filter paper): A: residual weight + filter paper + cup
W0 = residual weight after burning in the furnace
= B - (cup weight): B: residual weight + cup

3. Results and Discussion

3.1 Hedonic Test

3.1.1 Appearance

Organoleptic tests include appearance, aroma, texture and taste. Preference test is conducted to determine the level of panelists on the products produced. Visibility is the first parameter that is pleasant to see from a product. Observation of nori appearance from seaweed Gelidium sp and Eucheuma cottonii presented in table 1.

Table 1. Average Nori Appearance Based on Seaweed mix Gelidium sp and Eucheuma cottonii

Condition Mix *Gelidium sp.*(%) dan *Eucheuma cottonii* (%)	Median	Average
90 : 10	3	3,5 a
80 : 20	5	5,7 b
70 : 30	9	8,2 c
60 : 40	5	5,3 b
50 : 50	6	5,9 b

Note: The treatment that has a real level with the same letter shows no significant difference according to the F test at 95% confidence level

The highest average value of panelists' preference level for the appearance of nori from a mixture of Gelidium sp. and Eucheuma cottonii, in Gelidium sp. and Eucheuma cottonii 70%: 30% with a dark brownish brown appearance and a flatter surface or not many holes, while the lowest average in the treatment of nori mixture Gelidium sp. and Eucheuma cotttonii 90%: 10% with dark green appearance and uneven surface with many holes. Nori treatment of Gelidium sp. and Eucheuma cotttonii 80%: 20% with a green appearance and uneven surface and many holes on the nori sheets. Nori treatment of Gelidium sp. and Eucheuma cotttonii 60%: 40% with a rather light green appearance and uneven surface and many holes on the nori sheets. Nori treatment of Gelidium sp. and Eucheuma cotttonii 50%: 50% with light green appearance and a flat surface on nori sheets.

3.1.2 Aroma

Aroma is one of the factors that influence panelists on a product. Aroma assessment aims to determine the deliciousness of the product based on the sense of smell. The results of observations of nori aroma from Eucheuma cottonii seaweed are presented in Table 2.

Table 2. Average Aroma of Nori Based on a mixture of Seaweed Gelidium sp and Eucheuma cottoni

Condition Mix *Gelidium* sp. (%) dan *Eucheuma cottonii* (%)	Median	Average
90 : 10	5	5,4 a

80 : 20	5	5,7 a
70 : 30	7	6,1 a
60 : 40	6	6,0 a
50 : 50	5	5,6 a

Note: The treatment that has a real level with the same letter shows no significant difference according to the F test at 95% confidence level

Panelist assessment of the average nori aroma of Gelidium sp. and Eucheuma cottonii with differences in addition have an average range of 5.4 to 6.1 the average value of the highest aroma that is at the addition of 70%: 30% with a distinctive aroma of seaweed with a flavoring aroma, while the lowest value is the treatment 90%: 10% with less fragrant aroma but still specific seaweed odor. The aroma of seasoning in the manufacturing process is slightly more dominant than the typical aroma of seaweed. The test results obtained from the Friedman statistical test showed that the 90%: 10% treatment to 50%: 50% treatment were not significantly different. It is suspected that in each treatment the scent that is less smelled from the processing.

According to [15], seasonings are all additives that improve the flavor of the product and can affect the aroma. However, according to [14] that the aroma that can be felt by the sense of smell depends on the ingredients and ingredients added to the food. The aroma that can be generated by volatile components, but the volatile component can be lost during the processing process, especially heat

3.1.3 Texture

Texture is one of the parameters of consumer preference for food products. Evaluation of this parameter aims to determine the level of panelist acceptance of the level of elasticity or flexibility of a product that can be assessed by the sense of touch, namely from the stimulation of touch. Hedonic test results on the average nori texture of Gelidium sp. and Eucheuma cottonii are presented in table 3.

Table 3. Average Nori Surface Texture Based on Treatment of Seaweed Mix Gelidium sp. And Eucheuma cottonii

Condition Mix *Gelidium* sp. (%) dan *Eucheuma cottonii* (%)	Median	Average
90 : 10	3	4,0 a
80 : 20	7	6,7 bc
70 : 30	9	8,3 c
60 : 40	6	5,8 b
50 : 50	6	6,1 b

Note: The treatment that has a real level with the same letter shows no significant difference according to the F test at 95% confidence level

Panelist assessment of the nori texture of Gelidium sp. and Eucheuma cottonii averaged between 4.0 and 8.3, meaning that the texture of some treatments on nori mixture Gelidium sp. and Eucheuma cottonii can still be accepted by people who are judges. The average value of nori texture of Gelidium sp. and Eucheuma cottonii with the addiction treatment of 60%: 40% and 50%: 50% were not significantly different from the treatment of 80%: 20%, while the treatment of Gelidium sp. and Eucheuma cottonii 70%: 30% received relatively higher values and significantly different from Gelidium sp. and Eucheuma cottonii 60%: 40% and 50%: 50% but not significantly different from the treatment of 80%: 20%. The highest average value of mixed nori textures of 70%: 30% has a value of 8.3 with a median of 9 which has a flexible and elastic texture. Whereas nori mixture Gelidium sp. and Eucheuma cottonii with 90%: 10% treatment had the lowest median value of 3 and an average of 4.0.

This means that the treatment of 90%: 10% is significantly different from the treatment of 80%: 20%, 70%: 30%, 60%: 40%, and 50%: 50%.

According to [7] the largest component of food is water 55-85%, so that the component can affect the structure and texture of the processed foodstuff. Euchuema cottonii ripening which aims to remove carrageenan from the cell wall until the extraction process is modified to form a film-like texture.

3.1.4 Taste

Taste is also an important factor in the organoleptic assessment of a product. Consumer acceptance of food products on these characteristics is usually used as a determining factor. Taste assessment aims to determine the panelist's assessment of a product using the taste buds.

According to [18] the acceptance of each panelist to a type of product is generally strongly influenced by the characteristics of taste, although the other parameters are good, if it has a disliked taste then the product will be rejected. The average hedonic test on the nori flavor of Gelidium sp. and Eucheuma cottonii are presented in table 4.

Table 4. Average Nori Surface Sense Based on Treatment Gelidium sp. And Eucheuma cottonii

Condition Mix *Gelidium* sp. (%) dan *Eucheuma cottonii* (%)	Median	Average
90 : 10	5	5,0 a
80 : 20	7	6,4 bc
70 : 30	7	7,2 c
60 : 40	6	6,0 ab
50 : 50	7	6,0 ab

Note: The treatment that has a real level with the same letter shows no significant difference according to the F test at 95% confidence level

Based on panelists' assessments of nori flavors ranging from 5.0 to 7.2 it means that the product is neutral or ordinary and preferred. The lowest average value occurs in the treatment of adding 90%: 10% and the average is preferred in the treatment of 80%: 20%, 70%: 30%, 60%: 40% and 50%: 50%. Nori treatment of Gelidium sp. and Eucheuma cottonii 90%: 10% were not significantly different from the treatment 60%: 40% and 50%: 50% and the treatment was not significantly different from the 80%: 20% treatment. However, this treatment was not significantly different from 70%: 30% treatment. The 70%: 30% treatment was significantly different from the 90%: 10% treatment 80%: 20%, 50%: 50% and the 70%: 30% treatment got the highest average of 7.2.

In general, Gelidium sp. has a protein content of 16.1 - 12.5 gr [21], Eucheuma cottonii has a protein content of 2.69% [23] that can cause the formation of a good taste in the mixture's nori. during the heating process, the protein will be denatured into free amino acids and one amino acid, glutamic acid so that it can cause a delicious taste [22].

Most seaweeds contain quite a lot of aspartic acid and glutamic acid in the total composition of amino acids [8]. Types of seaweed tested in vitro from soluble base proteins and water including green seaweed (Chlorophyta), red (Rhodophyta) and brown (Phaeophyta)

3.2 Bayes Method

The data of the pair comparison test results on the criteria of appearance, aroma, texture and taste of the mixture of Gelidium sp. and Eucheuma cottonii from 20 panelists. Completion of the results of the pairwise comparison was done by manipulating the

weighting matrix of the appearance, aroma, texture, and flavor characteristics of Gelidium sp. and Eucheuma cottonii.

Table 5. Weight Criteria for Nori Gelidium sp. And Eucheuma cottonii

Criteria	Weight criteria
Appearance	0,228
Aroma	0,097
Texture	0,140
Flavor	**0,534**

Based on the table above, the calculation of criteria weights ranging from appearance to taste from nori mixture Gelidium sp. and Eucheuma cottonii produce the value that taste is the most important criterion for determining the final decision of a panelist in Nori Gelidium sp. and Eucheuma cottonii with a baseline weight criteria value of 0.534, while panelists assessed the appearance and texture with criteria weights of 0.228 and 0.140 followed by aroma criteria weight values of 0.097. This shows that other assessments are good but if the taste of the mixture is Gelidium sp. and Eucheuma cottonii is not favored by panelists, the product will be rejected by panelists.

Bayes method is one of the methods used to analyze in making the best decision of many alternatives or treatments by considering criteria. The calculation results in determining the best treatment by considering the criteria for appearance, aroma, texture and taste of the mixture of Gelidium sp. and Eucheuma cottonii are presented in table 6.

Table 6. Calculation of the Bayes Method

The Conditions	Criteria				Alternative Value	Priority Value
	Appearance	Aroma	Texture	Flavor		
A	3	5	3	5	**4.26**	**5**
B	5	5	7	7	**6.35**	**3**
C	9	7	9	7	**7.74**	**1**
D	5	6	6	6	**5.77**	**4**
E	6	5	6	7	**6.44**	**2**
Weight Criteria	0.228	0.097	0.140	0.534		

The calculation table using Bayes method shows that the mixture of Gelidium sp. and Eucheuma cottonii 70%: 30% obtained the highest alternative value of 7.74 followed by Gelidium sp. and Eucheuma cottonii 50%: 50% have an alternative value of 6.44, followed by Gelidium sp. and Eucheuma cottonii 80%: 20% have an alternative value of 6.35, followed by Gelidium sp. and Eucheuma cottonii 60%: 40% have an alternative value of 5.77, and the lowest value of 4.26 by Gelidium sp. and Eucheuma cottonii 90%: 10%. based on the observed preference test parameters, differences in the mixture of nori Gelidium sp. and Eucheuma cottonii with a ratio of 70%: 30% is the best treatment and is preferred by panelists.

3.3 Chemical Testing

3.3.1 Moisture Content

Moisture test was carried out on Nori Gelidium sp. by mixing Eucheuma cottonii 70%: 30%. The results of the analysis of the water content obtained in the mixture of Gelidium sp. and Eucheuma cottonii which is 15.35%. Drying nori using oven results in some free water coming out and evaporating, resulting in a decrease in water content. The low moisture

content of nori products influences the texture of crispness or suppleness in nori. When compared to general commercial nori products (4.47%), the water content of the mixture of Gelidium sp. and Eucheuma cottonii obtained different results. This shows that the type of seaweed affects the water content of nori products. Different seaweed affects the amount of water content that is bound to fiber.

3.3.2 Crude Fiber Levels

The level of crude fiber test was only carried out on the research of nori mixture Gelidium sp. and Eucheuma cottonii selected or the best results in organoleptic (hedonic) tests. The results of crude fiber analysis are worth 5.36% while the fiber content in Pophyra sp. Nori is 7.5%. The difference in fiber content between nori mixture Gelidium sp. and Eucheuma cotttonii with nori Porphyra sp. caused by the fiber content in the product raw material. Even this agrees with research [16] that the mixture of Eucheuma cottonii and Ulva lactuca contains different ingredients from commercial nori in general.

3.4 Overall Observation Results

The overall results of observations on the difference in comparison between nori mixture of seaweed types Gelidium sp. and Eucheuma cottonii are presented in table 7 below.

Table 7. Overall Observations

Observations	90% :10%	80%:20%	70%:30%	60%:40%	50%:50%
Hedonic					
Apprearance	3	5	9	5	6
Aroma	5	5	7	6	5
Texsture	3	7	9	6	6
Flavor	5	7	7	6	7
Moisture Content	-	-	15,35%	-	-
Crude Fiber Content	-	-	5,36%	-	-
Alternative Value	4,26	6.35	7,74	5.77	5.44

The hedonic test results showed that the treatment of making nori mixture Gelidium sp. and Eucheuma cottonii 70%: 30% with a different mixture of each addition of Gelidium sp. and Eucheuma cottonii is the most preferred panelist and has the highest value. But in the treatment of mixture Nori Gelidium sp. and Eucheuma cottonii 90%: 10% appearance and texture of this treatment were rejected by the panelists, but the aroma and taste are still neutral.

Chemical test results stated 70%: 30% treatment on nori mixture Gelidium sp. and Eucheuma cottonii has a moisture content of 15.35% and crude fiber content of 5.36%. This is because by drying using an oven at a temperature of 70 0C able to evaporate enough water and not damage the levels of crude fiber contained in nori.

Based on all the late parameters observed, especially when seen from the hedonic test the results of the whole treatment with different treatments. Nori mixture Gelidium sp. and Eucheuma cottonii 70%: 30% is the most preferred nori of various other treatments.

4. Conclusions

Based on research results the treatment of adding a mixture of Gelidium sp. and Eucheuma cottonii 70%: 30%, preferably panelists. Nori mixture Gelidium sp. and Eucheuma cottonii 70%: 30% has a value of appearance value of 9 which is most preferred with dark brownish brownish characteristic, a flatter surface or not many holes, scent worth 7 means that it is liked by the distinctive smell of seaweed with flavoring, texture value 9 with flexible and elastic characteristics and taste worth 7 means it is preferred to have a bitter after-taste and flavoring.

Referensi :

[1] Andarwulan, N., Kusnandar, F., Herawati, D. 2011. *Analisis Pangan*. Dian Rakyat. Jakarta.

[2] AOAC. 1995. Official Methods of Analysis the Association of Official analytical And Chemis. 16 th editor. virginia. AOAC Inc Arlington.

[3] Aslan*, L. M. 1991. Budidaya Rumput Laut*. Kanisius. Yogyakarta.

[4] Atmadja, W.S., A. Kadi, Sulistijo, dan Radiamanias. 1996. *Pengenalan Jenis-Jenis Rumput Laut Laut di Indonesia*. Puslitbang Oseanografi. LIPI. Jakarta.

[5] Atmadja, W.S. 2012. *Pengendalian Helopeltis secara Terpadu pada Tanaman Perkebunan*. Balai Penelitian Tanaman Rempah dan Obat. Bogor. 25 hlm.

[6] Doty, M.S. 1985. *Taxonomy of Economic Seaweeds: Eucheuma alvarezii sp.nov (Gigartinales, Rhodophyta) from Malaysia*. California Sea Grant College Program. 37 – 45.

[7] Edwards, M. 1995. *Change in Cell Structure. In Physico-Chemical Aspects of Food Processing. New York*. edited by S.T. Beckett. Blackie Academic and Professional.

[8] Fleurence, J. 1999. Seaweed Protein: Biochemistry, Nutritional Aspects and Potential Uses. *Review of Trends in Food Chemistry,* 10 : 25-28

[9] Handayani, T. 2006. Protein Pada Rumput Laut. *Jurnal Oseana.*ISSN 0216-1877 Volume XXXI, No 4, tahun 2006 : 23-30

[10] Istini, S., Jana T., Anggadiretdja., Achmad Zatnika., Heri Purwoto. 2006*. Rumput Laut Pembudidayaa, Pengolahan dan Pemasaran komoditas perikanan potensial*. Penebar Swadaya. Depok.

[11] Kadi, A dan Atmadja W.S. 1988. *Rumput Laut (Algae). Jenis-jenis Reproduksi Budidaya dan Paca Panen*. Pusat Penelitian dan Pengembangan Oseanografi-LIPI. Jakarta.

[12] Marimin*,* M.Sc., Prof., Dr., Ir. *2004. Teknik dan Aplikasi Pengambil Keputusan Kriteria Majemuk*. PT.Gramedia Widiasarana Indonesia. Jakarta.

[13] McHugh, Dennys J. 2003. *A Guide to the Seaweed Industry*. FAO FISHER. Canberra.

[14] Rahmawati, A. 2016. Pengaruh Perbandingan Penambahan Daun Katuk dan Lama Pengeringan Terhadap karakteristik Fruit Nori Pisang.*Skripsi*. Universitas Pasundan. Bandung.

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

[16] Sajida. 2016. Karakteristik Produk Nori Dari Rumput Laut Campuran *Ulva lactuca* dan *Eucheuma cottoni. Skripsi*. Departemen Ilmu dan Teknologi Pangan. Fakultas Teknologi Pertanian. Institut Pertanian Bogor. Bogor.

[17] Soegiarto A., W.S. Atmadja, Sulistijo dan H. Mubarak, 1978. *Rumput Laut (Algae); Manfaat, Potensi dan Usaha Budidayanya*. Lembaga Oseanologi Nasional LIPI. Jakarta. 61 hal.

[18] Soekarto, S.T. 1985. *Penilaian Organoleptik (untuk Industri Pangan dan Hasil Pertanian)*. Penerbit Bharata Karya Aksara, Jakarta.

[19] Santoso, D. 2007. Pemanfaatan Rumput Laut Gelidium sp Dalam Pembuatan Permen Jelly. *Skripsi*. Program Studi Teknologi Hasil Perikanan. Fakultas Perikanan dan Ilmu Kelautan. Institut Pertanian Bogor. Bogor.

[20] Teddy M,S. 2009. Pembuatan Nori Secara Tradisional Dari Rumput Laut Jenis *Glacilaria sp*. *Skripsi.* Program Studi Teknologi Hasil Perairan. Fakultas Perikanan dan Ilmu Kelautan. Institut Pertanian Bogor. Bogor.

[21] Trono, G.C dan Reine, W.F. 2002. *Plant Resources of South-East Asia.Prosea Foundation*. Bogor.

[22] Winarno F.G. 1997. *Kimia Pangan dan Gizi*. Gramedia Pustaka Utama. Jakarta.

[23] Yani, H. I. 2006. Karakteristik Fisik Kimia Permen Jelly dari Rumput Laut Eucheuma spinosum dan Eucheuma cottonii. *Skripsi.* Program Studi Teknologi Hasil Perikanan, Institut Pertanian Bogor, Bogor.