

PROXIMATE ANALYSIS OF SEAWEED MEAL (*Eucheuma cottonii*) LIVING IN THE WATERS OF SOUTH BUTON

Firdan Elandari ¹, Sarni ^{2*}, Ratih Nurwanti³

Baubau Polytechnic, Baubau, Indonesia

ARTICLE INFORMATION

Received: 23 February 2026

Revised : 17 March 2026

Accepted: 27 April 2026

DOI:

KEYWORDS

Eucheuma cottonii, seaweed, proxy analysis, flour, South Buton.

CORRESPONDING AUTHOR

Name : Sarni

Address : Baubau

E-mail: Sarni. 230579@gmail.com

ABSTRACT

Background: *Eucheuma cottonii* is a type of red seaweed that is widely cultivated in various coastal areas of Indonesia, including in the waters of South Buton. This seaweed is widely known because it contains compounds of high economic value, especially carrageenan, which are widely used in the food and pharmaceutical industries. In addition, *Eucheuma cottonii* also has the potential to be used as a functional food. **Objective:** This study was conducted to determine the composition of basic nutrients (proxy analysis) of *Eucheuma cottonii* flour that has gone through the drying and refining process. The analyzed parameters included moisture content, ash, protein, fat, crude fiber, and carbohydrates. **Methods:** standard laboratory analysis methods commonly used in nutrition studies. **Results:** research shows that *Eucheuma cottonii* flour has a fairly high moisture and ash content. Its crude fiber and carbohydrate content are also abundant, making it a good source of fiber for digestive health. Meanwhile, the protein content, although not too large, still supports its potential as a nutritious alternative food. Based on these findings, *Eucheuma cottonii* flour from the waters of South Buton is considered to have good development prospects as a raw material in the healthy food industry and functional food products that are environmentally friendly and have high added value.

INTRODUCTION

Indonesia is known as a maritime country with abundant marine resource potential, including various types of microalgae that live in its waters. One type of microalgae that has potential but is still underutilized is green algae, in particular *Eciuma kitonic*. These microalgae thrive in tropical waters such as the South Buton region, which has a marine ecosystem rich in biodiversity. This potential provides a great opportunity to develop marine-based products as an alternative food ingredient (Triawan *et al.*, 2020). Green algae such as *Eciuma kitonic* contributes to environmental sustainability due to its environmentally friendly nature. These microalgae are able to grow quickly, utilizing nutrients from the aquatic environment without requiring high energy inputs like terrestrial plants. This makes it a more sustainable option compared to traditional food sources. In addition, microalgae also have the ability to absorb carbon dioxide from the atmosphere, having a positive impact on climate change mitigation (Asriyana *et al.*, 2023). Green algae belong to the group of algae that utilize sunlight for food synthesis through the process of photosynthesis. They contain chlorophyll pigments that give algae their green color, as well as carotenoids that act as protective pigments and antioxidants. Green algae can grow in a variety of aquatic environments, both freshwater and seawater, and some species can live in extreme conditions, such as in very salty or very cold waters (Emelda *et al.*, 2020).

According to Sutomo (2006) seaweeds type *Eucheuma cottonii* In general, it has been widely used on an industrial scale, including for raw materials for medicines, cosmetic raw materials, health food raw materials, and raw materials for processed food products. According to Astawan, et.al., (2004) chemically seaweed consists of ash, proteins and carbohydrates of dietary fiber and iodine. Seaweed also contains vitamins, such as vitamins A, B1, B2, B6, B12, C, D, E and K; beta-carotene; and minerals. The excess of seaweed is as a foodstuff, does not cause obesity, as medicine, increases immunity, and is good for skin health (Handayani, 2014). In addition, green algae also contains omega-3 fatty acids that are beneficial for heart and brain health. Therefore, green algae flour can be used as an alternative source of vegetable protein in the daily diet, especially for vegetarians or vegans (Yoga *et al.*, 2020). One way to utilize green algae in the food industry is to process it into flour. Green algae flour, especially of the type *Eciuma kitonic*, can be used as a base ingredient in a variety of food products, such as raw flour, noodles, bread, or even health supplements. Green algae flour can be mixed with other food

ingredients to increase the nutritional value of the product. The use of green algae flour in noodle making, for example, can increase the protein and fiber content in the final product, thus making it more nutritious and healthy (Asriyana *et al.*, 2023).

In the context of food security, the use of green algae as food has great potential, especially in coastal areas that have easy access to aquatic resources. Green algae can also grow without the need for chemical fertilizers and pesticides, which means that the resulting product is more natural and free of harmful chemicals (Sahar *et al.*, 2023). In addition to flour, green algae can also be used in the manufacture of health supplements or functional food products that contain bioactive compounds. (Asriyana *et al.*, 2023). Flour produced from green algae *Eciuma kitonic* has great potential as a nutritious alternative food ingredient. The relatively simple processing process, from washing, drying, to grinding, makes it possible to produce flour rich in nutrients, especially protein and fiber. This green algae flour can be used in a variety of food products, such as noodles, bread, or raw flour, which can increase the nutritional content of these products (Asriyana *et al.*, 2023). Previous research has shown that green algae-based flour has high potential as an alternative food. For example, research by (Pramana, 2021) reveals that microalgae flour can be used as a source of plant-based protein in the formulation of food products. The protein content in green algae generally reaches 20-30%, higher than most vegetables. In addition, this flour is also rich in vitamins, such as vitamin B12 which is rarely found in other plant-based food sources. Similar research has also identified the presence of lipid content that is beneficial for cardiovascular health.

As a first step, proximate analysis is an effective approach to evaluating key ingredients *Eciuma kitonic*. This method not only provides an overview of the water, ash, protein, fat, and carbohydrate content, but also helps to understand their functional potential in the formulation of food products. With valid data, flour development *Eciuma kitonic* As a food raw material will be easier to do, both on a small scale and in industry (Laughter *et al.*, 2024).

Therefore, we are interested in analyzing the proximate of the seaweed flour type *Eucheuma cottonii* that lives in the waters of South Buton. This research not only aims to provide data related to nutritional content, but also encourage innovation in local food processing. In the context of the national food security program, the community's diversification of nutritional food from *Eucheuma cottonii* flour can be more confident to use it as a safe food ingredient with high nutritional value. In addition, this research is also expected to contribute to the development of the local economy in the South Buton area. If the processing and utilization of *Eucheuma cottonii* is successfully developed, this can be marine-based and can be a solution to reduce dependence on imported food sources. By understanding the composition creates new business opportunities for coastal communities. With a research-based approach, the use of these microalgae can be carried out efficiently and sustainably, providing long-term benefits for both the community and the environment.

METHOD

Research Design

This study uses an analytical descriptive research design, which aims to analyze the proximate composition of seaweed meal *Eciuma kitonic* who live in the waters of South Buton. This design was chosen because it can describe in detail the proximate content of seaweed, including the content of moisture, protein, carbohydrates, and ash. The analysis process will be carried out using the standard method of food chemistry analysis which includes drying, and combustion (Yunita *et al.*, 2022).

This research will be carried out in May-June 2025. Samples of *Eucheuma cottonii* seaweed were taken from Palabusa village, Lea-lea District, Baubau City, South Buton Regency, Southeast Sulawesi. The process of making flour and flour proximate analysis was carried out by 2 laboratories, namely the Baubau Polytechnic campus laboratory and the Binahusada Kendari Polytechnic campus laboratory. The production of *Eucheuma cottonii* seaweed flour is carried out at the Baubau Polytechnic Campus Laboratory. For the proximate analysis of *Eucheuma cottonii* seaweed flour was carried out at the Binahusada Kendari Polytechnic Campus Laboratory.

Tools and Materials

The tools used in this study include tools used for making flour and proximate analysis of seaweed flour. The tools used for making flour include knives, basins, blenders, analytical scales, and sieves. Meanwhile, the tools used for the proximate analysis of seaweed flour include analytical balances, test cups, exchange rate cups, ovens, spatulas, desiccant, and clamping pliers, porcelain cups, and erlenmeyer. The materials used in this study are betel lime, aquadest, NaOH, water and seaweed flour.

Seaweed sampling

Seaweed Sampling The main material used in this study is green seaweed obtained from the waters of South Buton as needed in a simple random manner. This method is a sample that is taken in such a way that each research unit of a population has an equal opportunity to be selected as a sample.

Manufacture of *Eucheuma cottonii* Seaweed Flour

Seaweed washing is carried out using running water, this washing functions to remove impurities such as sand, gravel, mud and other seaweed or algae. After washing, the seaweed is dried until the water content is reduced. Reduce the size of seaweed by using knives/scissors. Soaking or bleaching is carried out to continue the cleaning process that is still inherent and reduce fishy odors, by adding 20% betel lime to oxidize some of the pigment so that it is whitish and soft, the soaking time is 12 hours. Drying is done by drying first in the sun until the sea hair becomes stiff, then dried using an oven with a temperature of 50-60°C to get a faster drying process for 5 hours. The grinding process is carried out to smooth the seaweed, grinding is done using a blender. Styling is a level to separate coarse and fine details. To obtain fine flour use an 80 mesh sieve. Styling is carried out 2 times to ensure uniformity in the size of the flour grains (Safitri, 2020).

Proximate Analysis Procedure

Moisture content

Samples of seaweed that have become flour are weighed as much as 1-2 grams. After that it is cooled in a slider and weighed.

Moisture content is calculated by Formula: $\text{Moisture content (\%)} = (A-B) / C \times 100\%$

Information:

A = Cup + dry sample (g)

B = Empty cups (g)

C = Example weight (g)

Ash Rate

The seaweed sample that has become flour is then weighed as much as 2 grams of sample is weighed in a porcelain cup that has been dried and the weight is known, then it is boiled using a Bunsen heater so that it does not emit any more smoke.

Ash content (%) = $(A-M) / L \times 100 \%$

Information:

A = cup + dry sample (g)

M = empty cups (g)

L = sample weight (g)

Protein Levels

The sample of seaweed that has become flour is then weighed as much as 0.1 grams. The end of the condenser is rinsed with aqueducts (contained in an erlenmeyer). The solution in Erlenmeyer is titrated with NaOH 0.02 N until a change in color from green to purple is obtained. After that, a blank is assigned.

Crude protein content (%) = $(a-b) \times N \times 0.014 \times 6.25 / W \times 100 \%$ Description :

A = ml NaOH for blank titration

B = ml NaOH for titration of examples

N = Normality of NaOH

W = example weight (g)

Carbohydrate Levels

Carbohydrate analysis is carried out by difference, which is the result of a reduction of 100% with moisture content, ash content, protein content so that carbohydrate content depends on the reduction factor. Carbohydrate content is calculated using the formula

Carbohydrates (%) = $100\% - (\text{ash} + \text{water} + \text{fat} + \text{protein})$

Information:

A = Moisture content

B = Ash content

C = Protein content

Crude fiber content

The seaweed sample that has become flour is then weighed as much as 2 grams of water-free sample is put into a 500 ml Erlenmeyer and added 100 ml of H₂SO₄ 0.325 N. The mixture is hydrolyzed in an autoclave for 15 minutes at a temperature of 105°C and cooled and 50 ml of NaOH 1.25 N is added, then hydrolyzed again in an autoclave for 15 minutes. The fiber content is determined by the formula :

$$\text{Crude fiber content (\%)} = (X - A) / N \times 100\%$$

Information:

X = weight of fiber residue in filter paper (g)

A = dry filter paper weight (g)

N = Weight of Starting Material (g)

Data Analysis

The data obtained were tabulated and analyzed descriptively to describe the proximal composition of each green seaweed species. The data obtained from the proximate analysis will be analyzed descriptively to describe the composition of *Eucheuma cottonii* green algae flour. The results of the analysis of moisture content, ash content, protein content, fiber content and carbohydrate content will be calculated in percent weight for each sample analyzed.

RESULTS & DISCUSSION

The yield obtained from *Eucheuma cottonii* seaweed is 500 grams.

Yield calculation

$$\text{Yield (\%)} = \frac{\text{weight of flour extract}}{\text{Early simplification weight}} \times 100\% = 20\%$$



Figure 1. Making Green Seaweed Flour (*Eucheuma cottonii*) A fresh seaweed, B dried seaweed and C seaweed flour

Table 1. The results of the seaweed flour manufacturing process

Sample	Sample weight
Fresh seaweed	10,000 grams
Dried seaweed	5000 grams
Seaweed flour	500 grams

Source: Primary data, 2025

The process of making *Eucheuma cottonii* seaweed flour begins with sampling, washing, drying, soaking with betel lime, cutting, blending and then sifting with a size of 80 mesh so as to produce smooth white *Eucheuma cottonii* seaweed flour .

Eucheuma cottonii seaweed is taken as much as 10 Kilo Grams (10,000 grams) in fresh conditions. After the drying process is carried out in the sun, there is a heavy shrinkage due to a reduction in the natural moisture content of the seaweed. The final weight after drying becomes 250 grams. The drying process not only serves to reduce moisture content but also helps reduce the fishy smell typical of seaweed. After the drying stage, the dried seaweed is ground into a fine flour with a white wrna of 500 grams with a sieve size of 80 mesh.

Based on the results of the research that has been carried out, it can be concluded that: Making seaweed flour *Eucheuma cottonii* weighs 500 grams with a soaking value of 20%. For the results of the proximal test, the moisture content was 3.2787%, the ash content was 15.5340%, the crude fiber content was 5.4692%, the protein content was 0.5253% and the carbohydrate content was 74.6435%. According

to Dean's previous research 2023, the ash content produced in the study was 31.572%, the moisture content was 11.57%, the protein content was 3.848. Crude fiber content was 1.612%. And the carbohydrate content was 64.016. Based on the above results in the prosikmat test the moisture content obtained was 3.2787%, different from the moisture content obtained in the previous study, which was 11.57%. The ash content was 15.5340% while in the previous study the result was 31.572%. The protein content of 0.5253% is different from the protein content obtained in the previous study, which was 3.848. The crude fiber content was 5.4692% in the previous study, which was 1.612%. And the carbohydrate content of 74.6435% is different from the carbohydrate content obtained in the previous study, which was 64.016.

Proxy analysis.

Table 2. Results of proximate analysis of green seaweed flour *Eucheuma cottonii*

Sample	Test parameters	Yield Rate (%)
Seaweed <i>Eucheuma cottonii</i>	Moisture content	3,2787
	Ash content	15,5340
	Protein content	0,5253
	Carbohydrate content	75,1687
	Fiber content	5,4692

Source: Primary data, 2025

Moisture Rate

The low moisture content indicates that the drying process has been effective. This value is important because low moisture content can extend the shelf life of the product, reduce the risk of microorganism growth, and maintain the stability of flour quality. The moisture content yield of (3.2787%) is relatively low for marine-based products, and is in accordance with dry food quality requirements, where the ideal moisture content is below 10%. This shows that the drying method through sun drying is excellent.

Ash Rate

The high ash content reflects the high mineral content in the seaweed. These results show that *Eucheuma cottonii* flour from South Buton has the potential to be a source of important minerals such as calcium, magnesium, potassium, phosphorus, and iodine. The content of this mineral is very beneficial for supporting the body's metabolism and bone health. In comparison, the ash content in seaweed meal generally ranges from 10–30%, so this yield (15.5340%) is quite good and confirms its potential functional value in the healthy food industry.

Protein Levels

The protein content in the results of this study was relatively low at 0.5253. This may be due to several factors, such as the heating process during drying which has the potential to reduce protein levels, or the type of *Eucheuma cottonii* which does contain a limited amount of protein compared to other types of microalgae such as *Spirulina* or *Ulva lactuca*. However, there is still protein content that can provide benefits as an additional source of plant-based protein. For further development, it is necessary to review other processing methods that can maintain or increase protein levels.

Crude Fiber Rate

The crude fiber content in *Eucheuma cottonii* is quite significant (5.4692%) indicating that this flour can play a role in smoothing the digestive system and maintaining intestinal health. Fiber can also lower blood cholesterol levels and control blood sugar levels. This value adds to the potential of seaweed as a functional food ingredient that is not only filling, but also supports overall health

Carbohydrate Levels

The carbohydrate content is the largest component in the composition of *Eucheuma cottonii* flour (74.6435%). These results show that the seaweed has high potential as an energy source in the formulation of food products. This high carbohydrate content also supports its use as a basic ingredient for making noodles, bread, or healthy snacks. The carbohydrates in seaweed are also often complex, such as polysaccharides that are not only a source of energy but also provide benefits for digestion, including carrageenan.

COVER

Based on the results of the research that has been carried out, it can be concluded that making *Eucheuma cottonii* seaweed flour weighs 500 grams with a soaking value of 20%. For the results of the

proximate test, the moisture content was 3.2787%, the ash content was 15.5340%, the crude fiber content was 5.4692%, the protein content was 0.5253% and the carbohydrate content was 74.6435%.

This research has limitations in the availability of the number of materials and tools to be used, which has an impact on the delay in completing the research and affects the smooth process of data collection, analysis of results, and the achievement of research objectives optimally.

THANKS

The author would like to express his sincere gratitude for the facilities and assistance that have been provided to us during our research. Your help and focus have been invaluable to the writer and have simplified the process. In addition, the author would like to thank the Supervisor for his very valuable advice and guidance. The dedicated support of all of you has contributed greatly to the smooth running of this research.

BIBLIOGRAPHY

- Asriyana, Jumiati, & Ardiyati, D. P. I. (2023). Identifikasi Jenis - Jenis Makroalga Yang Terdapat Di Zona Intertidal Pantai Tanjung Buaya Desa Lasori Kecamatan Mawasangka Timur. *Jurnal Penelitian Biologi Dan Kependidikan*, 2(1), 50–64.
- Costa, J. F., Merdekawati, W., & Otu, F. R. (2018). Analisis Proksimat, Aktivitas Antioksidan, Dan Komposisi Pigmen *Ulva Lactuca L.* Dari Perairan Pantai Kukup. *Jurnal Teknologi Pangan Dan Gizi (Journal Of Food Technology And Nutrition)*, 17(1), 1-17.
- Emelda, E., Septiawan, A., ... D. P.-J. I. F., & 2020, Undefined. (N.D.). Formulasi Dan Uji Sifat Fisik Sediaan Gel Ekstrak Etanolik Ganggang Hijau (*Ulva Lactuca Linn.*). *E-Jurnal.Stikes-Isfi.Ac.Id.* Retrieved December 10, 2024, From <https://E-Jurnal.Stikes-Isfi.Ac.Id/Index.Php/Jifi/Article/View/645>
- Giovani, S., Aidina, R., Komalasari, E., & Puteri, N. E. (2023). Formulasi Dan Karakteristik Organoleptik Tepung Komposit Rumput Laut Merah, Tulang Ikan Tuna Sirip Kuning, Dan Tempe Koro Pedang. *Jurnal Teknologi Pangan*, 17(2).
- Handayani, R., & Aminah, S. (2014). Variasi Substitusi Rumput Laut Terhadap Kadar Serat Dan Mutu Organoleptik Cake Rumput Laut (*Eucheuma Cottonii*). *Jurnal Pangan Dan Gizi*, 2(03).
- Jumsurizal, J., Ilhamdy, A. F., Anggi, A., & Astika, A. (2021). Karakteristik Kimia Rumput Laut Hijau (*Caulerpa Racemosa* & *Caulerpa Taxifolia*) Dari Laut Natuna, Kepulauan Riau, Indonesia. *Jurnal Akuatika Indonesia*, 6(1), 19-24.
- Purwasih, R., Sobari, E., & Nurhasanah, Q. A. (2021). Pengaruh Penambahan Tepung Rumput Laut (*Eucheuma Cottonii*) Sebagai Bahan Penstabil Terhadap Karakteristik Fisik Dan Hasil Uji Sensori Es Krim. *Agrointek: Jurnal Teknologi Industri Pertanian*, 15(4), 1054-1061
- Sahar, A., Jumiati, J., Dan, L. A.-P. P. B., & 2023, Undefined. (N.D.). Identifikasi Jenis-Jenis Makroalga Di Zona Intertidal Pantai Lagilang Kecamatan Siompu Barat Kabupaten Buton Selatan: Makroalga. *Jurnal-Umbuton.Ac.Id.* Retrieved December 10, 2024, From Umbuton.Ac.Id/Index.Php/Penalogik/Article/View/4734
- Safitri, F., A., Syukri S.,M. (2020), Pengaruh Penambahan Tepung Rumput Laut (*Eucheuma Cottonii*) Terhadap Organoleptik Dan Fisikokimia Selai Jagung Manis (*Zea Mays L. Saccharata*). *Jurnal Sains Dan Teknologi Pangan* Vol. 5, No.1, P. 2687-2700, Th 2020
- Subrata, I., & Sumaryani, N. P. (2021). Identifikasi Jenis Rumput Laut Yang Terdapat Pada Ekosistem Alami Perairan Nusa Penida. *Emasains*, 10(1), 141-154.
- Kinanti, A., Nasution, A., Islam, B. W.-... Dan A., & 2024, Undefined. (N.D.). Identifikasi Produk Bahan Makanan Yang Berbahan Dasar Alga: Mikroalga Atau Makroalga Pada Pasar Tradisional Dan Modern Yang Ada Di Kota Medan A. *Journal.Laaroiba.Com.* Retrieved December 10, 2024, From <https://Journal.Laaroiba.Com/Index.Php/Mk/Article/View/4309>
- Nasution, J., & Susilo, F. (2022). *Buku Ajar Pengantar Taksonomi Tumbuhan Rendah*.<https://Books.Google.Com/Books?Hl=Id&Lr=&Id=Vizmeaaqbaj&Oi=Fnd&Pg=Pr1&>

Dq=Ganggang+Hijau+Dan+Jenis-Jenisnya&Ots=Krtmi-Fjtb&Sig=Wodpmv5vylaeufat7djbfa-D_E

- Pramana, C. (2021). *Meat Analog: Potensi, Tantangan, Dan Penerimaan Konsumen*. [Http://Repository.Unika.Ac.Id/27475/](http://Repository.Unika.Ac.Id/27475/)
- Sahar, A., Jumiati, J., Dan, L. A.-P. P. B., & 2023, Undefined. (N.D.). Identifikasi Jenis-Jenis Makroalga Di Zona Intertidal Pantai Lagilang Kecamatan Siompu Barat Kabupaten Buton Selatan: Makroalga. *Jurnal-Umbuton.Ac.Id*. Retrieved December 10, 2024, From [Http://Jurnal-Umbuton.Ac.Id/Index.Php/Penalogik/Article/View/4734](http://Jurnal-Umbuton.Ac.Id/Index.Php/Penalogik/Article/View/4734)
- Suriyanti, S., Arfah, A., Community, N. W.-C. J. Of, & 2022, Undefined. (N.D.). Alternatif Pemberdayaan Masyarakat Melalui Pemanfaatan Rumput Laut (Nori) Sebagai Produk Olahan Makanan Padat Gizi Kimbab Pada Kelompok Mitra Desa Tana. *Ojs.Stieamkop.Ac.Id*. Retrieved December 10, 2024, From [Https://Ojs.Stieamkop.Ac.Id/Index.Php/Celeb/Article/View/185](https://Ojs.Stieamkop.Ac.Id/Index.Php/Celeb/Article/View/185)
- Triawan, A., Dan, A. A.-J. J. I. K., & 2020, Undefined. (N.D.). Struktur Komunitas Fitoplankton Di Perairan Muara Dan Laut Desa Kramat Kecamatan Bangkalan Kabupaten Bangkalan. *Journal.Trunojoyo.Ac.Id*. Retrieved December 10, 2024, From [Https://Journal.Trunojoyo.Ac.Id/Juvenil/Article/View/6867](https://Journal.Trunojoyo.Ac.Id/Juvenil/Article/View/6867)
- Yoga, W., Pangan, H. K.-M., & 2022, Undefined. (N.D.). Potensi Alga Hijau (*Caulerpa Racemosa*) Sebagai Sumber Antioksidan Alami. *Journal.Universitasbumigora.Ac.Id*. Retrieved December 10, 2024, From [Https://Journal.Universitasbumigora.Ac.Id/Index.Php/Jtmp/Article/View/2172](https://Journal.Universitasbumigora.Ac.Id/Index.Php/Jtmp/Article/View/2172)
- Yunita, L., Rahmiati, B., Pangan, W. N.-... : J., Gizi, Undefined, & 2022, Undefined. (N.D.). Analisis Kandungan Proksimat Dan Serat Pangan Tepung Daun Kelor Dari Kabupaten Kupang Sebagai Pangan Fungsional. *Academia.Edu*. Retrieved December 10, 2024, From [Https://Www.Academia.Edu/Download/103277293/1115](https://Www.Academia.Edu/Download/103277293/1115).