Analysis proximate of sargassum seaweed sp

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Abstract. Sargassum sp. seaweed becomes one of the interesting food preparations for the community and can be a potential local food-based product because this type of brown seaweed can be processed into food, pharmaceutical, cosmetic, and textile products. Seaweed Sargassum sp. has economic value and protection for marine life. Sargassum sp can be beneficial in the health field because it contains protein, minerals, alginates, active compounds of steroids, alkaloids, and phenols that function as antibacterial, antifungal, and antiviral properties. Sargassum sp., was the largest class of brown algae (Phaeophyta) in tropical seas. The purpose of this study was to determine the nutritional composition of Sargassum sp. which includes protein content, fat content, ash content, and water content. The method used is a proximate analysis method based on SNI 01-2354.4-2006, SNI 2891 01 1992, SNI 01-2354.1-2006, and SNI 2354.2: 2015. The results obtained were Sargassum sp protein levels of 3.048% higher than E. cottonii. Fat content in Sargassum sp of 0.617% of dry weight is lower than E. cottonii. The ash content of Sargassum sp was 7.112% higher than that of E. cottonii in proportion to the mineral content of the two seaweeds. The water content of Sargassum sp was 67.281% lower than E. cottonii, both of which were higher than the specified water content standard of <32%. This is also influenced by the drying process. Conclusion: Sargassum sp has good content to be consumed and used as local food products.

1. Introduction

Food is a basic human need in addition to clothing, housing, and education. The development of nutritious food can be done by utilizing marine natural resources that have not been utilized optimally. Marine natural resources are a very potential food source. The utilization and development of these resources are strongly supported by the condition of Indonesian waters. Seaweed prospect in the future is quite good considering the potential of Indonesian waters is still large enough for the cultivation of these commodities. in the region because it is rich in nutrients and bioactive compounds that are beneficial to health [1]. One of the edible seaweeds is Sargassum sp., which is the largest class of brown algae (Phaeophyta) in the tropical sea. This seaweed has abundance and distribution, which is very high, found in almost all Indonesian sea areas. In general, seaweed Sargassum sp. not yet widely
known and utilized. From several studies, it was reported that this has a high nutrient content, such as protein and some essential minerals. It's just that the analysis of nutritional composition is still incomplete [2].

Teluk Awur Village is a village on the coast of Teluk Awur, Jepara Regency, which has the abundant potential of brown seaweed Sargassum sp and grows wild in the Teluk Awur Coast area. Sargassum sp is one type of brown seaweed that can be processed into food, pharmaceutical products, cosmetics, and textiles. Besides having economic value and protection for marine biota, Sargassum sp can be beneficial in the health field because of the content of proteins, minerals, alginates, active compounds of steroids, alkaloids, and phenols which function as antibacterial, antifungal, and antiviral properties [3]. However, Sargassum sp in the Teluk Awur coast area has not been fully utilized by the surrounding community because they do not know how to process seaweed and its health benefits. By knowing the nutritional value, it is expected that the use of seaweed can be expanded, not only enjoyed by the community around the coast, but also by the general public. In connection with this, this research is conducted. The purpose of this study was to determine the nutritional composition of Sargassum sp which includes protein content, fat content, ash content, and moisture content.

2. Method

The study was conducted in July 2019 with seaweed samples of Sargassum sp and E. cottonii were taken from Teluk Awur Beach, Jepara Regency. Analysis of nutrients composition was carried out at the Laboratorium Terpadu Universitas Diponegoro. Both samples are taken from the sea after it dried out in the sun. The tools used are neraca analytic (OHAUS, capacity : 210 gram, readability : 0,001 gram, repeatability (SD): 0,001 gram, linearity : ±0,002 gram, power requirements: 9,5-20V 6W), oven (memmert-UNB 400, temperature range: 20-220ºC, setting accuracy: 0,5ºC, indicator resolution: 0,5ºC, power: 1400 W), desiccator (Duran desiccator diameter 25 cm, vol 10,5 liter, H 344 mm), tanur (type AA-550 Neytech USA, temperature range: 200-1100ºC, temperature accuracy: ±25ºC at steady state), destillation unit (Buchi K-355, power consumption: max 2,2kW, connection voltage: 230±10% reproducibility (RSD): ≤ 1%, detection limit: ≥1%), sample tube distillation unit (sample tube 300 ml for distillation unit K-355 Buchi), fume hoods (Nadiso NDS A-001 Blower Metal Base, Nadiso S-130), Kjeldahl Digestion M (Gopal-AVMK01), Soxhlet Extraction Heater (JP 601), and Soxhlet apparatus 150 mL/fat analysis (Pyrex SOXH-SET 150).

2.1. Determination of water content

Analysis of water content using the method of SNI 2354.2:2015 by weighing the sample in a cup of 2 gram, then put it in the oven and then weighed again.

2.2. Determination of ash content

Ash content analysis using SNI 01-2354.1-2006 by inserting samples into the cup in the furnace with the temperature raised gradually reaching 550ºC for 8 hours until turned into white ash then weighed.

2.3. Determination of protein levels

Analysis of protein content using the SNI 01-2354.4-2006 method by weighing a sample of 2 grams and then put into the destruction flask. The destruction step is carried out at 410ºC until the solution is clear. After the destruction step is finished, add 50-75 mL of distilled aquades. The distillation step is carried out by adding 50-75 mL of sodium hydroxy thiosulfate solution. The next step is to titrate the distillate with HCl 0,2 N until the color changes to neutral gray.

2.4. Determination of fat levels

Analysis of fat content using SNI 2891.01.1992 method by drying 1-2 grams of sample in the oven with a temperature of 80ºC for 1 hour. Then, put into the soxhlet that has been connected with a fat flask filled with boiling chips. Extract with hexane or other fat solvents for 6 hours. Dry the fat extract in the oven at 105ºC and weigh it.
3. Result and discussion
Analysis of protein nutrients in seaweed samples refers to the requirements that have been established (SNI-01 2345 42006). The results of testing Sargassum sp samples obtained can be seen in Table 1.

Table 1. Test results of protein nutrient content in Sargassum sp

| No | Sample     | Protein (% Weigh) |
|----|------------|------------------|
| 1. | Sargassum sp | 3.048            |
| 2. | E. cottonii | 2.056            |

The amount of protein in food ingredients determines the quality of the food ingredients concerned. In this study, protein level of Sargassum sp was 3.048% and E. cottonii had 2.056% protein level. Sargassum sp. has a higher protein value compared to E. cottonii seaweed. Sargassum protein levels are in accordance with Burtin's opinion, which is 3-9% of dry weight and higher than E. cottonii. High water in seaweed causes an increase in water content in seaweed and decreases in protein content in seaweed itself, where the protein content is inversely proportional to the water content of an ingredient [4]. Protein content in seaweed is influenced by seaweed type, and season period, the highest is obtained in winter and spring, while the lowest protein content is recorded during summer [5]. Protein has benefits as a substance that can help regenerate body cells both during cell repair and growth so protein consumption is highly recommended for children.

Analysis of fat nutrients in seaweed samples refers to the requirements that have been set (SNI-2891 01 1992). The results of testing Sargassum sp samples obtained can be seen in Table 2.

Table 2. Test results for fat nutrient content in Sargassum sp

| No | Sample     | Fat (% Weigh) |
|----|------------|---------------|
| 1. | Sargassum sp | 0.617         |
| 2. | E. cottonii | 0.652         |

Food sources of fat can come from animals called animal fats and from plants called vegetable fats. In this study, the result of fat content in Sargassum sp was 0.617% of dry weight and E. cottonii was 0.652% of dry weight. Sargassum sp. has lower fat content compared to E. cottonii. Seaweed contains very little fat because seaweed generally stores its food reserves in the form of carbohydrates, especially polysaccharides. While animals store their food reserves in the form of fat. The fat content in seaweed is generally 1-3%. Differences in the form of storage of these food reserves cause vegetable fat generally to have a low percentage, whereas animal fat has a high percentage. Fat itself has benefits as a source of energy, but if excessive fat consumption will trigger the accumulation of fat in the body and blood vessels.

Ash content testing in seaweed samples refers to the requirements that have been set (SNI-01-23544.1-2006). The results of testing Sargassum sp samples obtained can be seen in Table 3.

Table 3. Test results for ash content in Sargassum sp

| No | Sample     | Ash (% Weigh) |
|----|------------|---------------|
| 1. | Sargassum sp | 7.112         |
| 2. | E. cottonii | 1.124         |

Ash is a component of food that is important for determining mineral content. In this study, the amount of ash content of Sargassum sp was 7.112% and E. cottonii was 1.124%. The amount of ash content of Sargassum sp is higher than the amount of ash content of E. cottonii. The ash content standard in brown seaweed is 36% [6]. Sargassum sp does not meet these standards. Ash content has a relationship with the mineral level of an ingredient. High or low ash content contained in a material
can be related to the number of mineral elements, but the mineral content of seaweed can be influenced by the processing given [7]. Sargassum sp has higher ash content (minerals). This is thought to be related to the way of absorption of mineral nutrients Aside from being a form of adaptation to the environmental conditions of marine waters containing various minerals with high concentrations. The absorption of mineral nutrients in seaweed is done through the entire surface of the talus, not through the roots, so that absorption of mineral nutrients is more effective. The amount of mineral nutrients absorbed affects the ash content in the seaweed tissue so that the seaweed ash content is high [8].

Moisture content analysis on seaweed samples refers to the requirements that have been set (SNI-2354.2.2015). The results of testing Sargassum sp samples obtained can be seen in Table 4.

Table 4. Results of testing the content of moisture content in Sargassum sp

| No | Sample      | Moisture (% Weigh) |
|----|-------------|--------------------|
| 1  | Sargassum sp| 67.281             |
| 2  | E. cottonii | 91.032             |

Moisture content in food affects the quality and shelf life of the material. The lower the moisture content the longer the product's shelf life. In this study, it was found that the moisture value of Sargassum sp was 67.281%, and the value of the water content of E. cottonii was 91.032%. The standard moisture value of brown seaweed was less than 32%, it could be said that the Sargassum sp sample did not meet these standards. Moisture content can be affected by the drying process in the sample. The moisture decreases with increasing temperature given. This is likely due to the higher heating resulting in the movement of water particles in the material faster, causing water to evaporate faster. Drying with higher temperatures affects the water in the material and the shorter the time needed to make the moisture lower [9].

4. Conclusion

Based on the description above it can be concluded that Sargassum sp has higher protein content, lower fat content, higher ash content, and lower moisture content compared to E. cottonii. Laboratory test results show that Sargassum sp has good content for consumption and is used as a local food product with good nutritional value and is beneficial to the body, so that it is hoped that the Teluk Awur Village community can utilize Sargassum sp, which thrives in coastal areas.

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