International Journal of Natural Science Studies and Development (IJOSS)
Volume 01 Issue 02 2024, pp 43-49
E-ISSN: 2615-1383
DOI: https://doi.org/10.55299/ijoss.v1i2.13

Identification and Analysis of the Nutrition Value of Black Teripang (*Holothuriaedulis*) and Sand Teripang (*Holothuria Scabra*) In the Waitiu Flow of Lewolema District

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Abstract

Indonesia is a country with a large area of water, with enormous potential for marine biodiversity which is useful as food, pharmaceuticals and cosmetics. There are several marine biota that produce secondary metabolites that are beneficial to humans, including microorganisms, blue green algae, green algae, brown algae, red algae, sponges, coelenterates, bryozoans, molluscs and sea cucumbers (echinoderms). Sea cucumbers are marine animals classified in the phylum Echinodermata, class Holothuroidea. This animal lives on sandy substrates or can be found in coral ecosystems. Sea cucumbers have complete and quite high nutritional content, but the existence of sea cucumbers with a high population in East Flores Regency has not been utilized properly. This study aims to identify and analyze the nutritional content of Sand Sea Cucumber (Holothuria Scabra) and Black Sea Cucumber (Holothuria Edulis). Identification is based on morphology and body color and spicules of the dorsal integument tissue, while the analysis of nutritional value includes water content and ash content using the gravimetric method, protein content using the Kjeldahl method, fat content using the Soxhlet method and carbohydrate content using the by difference method. The results of the study showed that the nutritional content of Sand Sea Cucumber (Holothuria Scabra) was 5.472% water content, 51.056% ash content, 27.072% protein content, 1.449% fat content and 20.424% carbohydrate content, while the nutritional content of Black Sea Cucumber (Holothuria Edulis) was 6.214% water content, 18.864% ash content, 51.636% protein content, 0.659% fat content and 28.841% carbohydrate content.

Keywords: *cucumbers; Holothuria Scabra; Holothuria Edulis; Soxhlet; Kjeldahl*

1. INTRODUCTION

Indonesia is a country with a larger sea area than the land area and has the longest coastline after Canada, therefore most of the Indonesian population has a livelihood as a fisherman. According to the land area of 1,922,570 km^2 while the area of Indonesian waters reaches 6,315,222 km^2, with the potential for enormous biodiversity of marine resources that are useful as food, pharmaceuticals and cosmetics. There are several marine biota that produce secondary metabolites that are beneficial to humans including microorganisms, *blue green algae, green algae, brown algae, red algae, sponges, coelenterates, bryozoans, molluscs* and sea cucumbers (*echinodermata*) (Grigorakis, K., 2007)

Sea cucumbers are marine animals that belong to the phylum *Echinodermata*, class

History:
Received : October 07, 2024
Revised : November 11, 2024
Accepted : November 12, 2024
Published : November 12, 2024

Publisher: Inovasi Pratama Int. Press

Holothuroidea. These animals live on sandy substrates or can be found in coral ecosystems. Sea cucumbers have an elliptical body with a length of about 10-30 cm, the sea cucumber mutu is at one end surrounded by tentacles while the anus is at the other end. Sea cucumbers have high nutritional content so they have great potential as a traditional food source. According to sea cucumbers produce secondary metabolite compounds in the form of polar and non-polar compounds that have pharmacological functions such as anticancer, anti-inflammatory, anticoagulant, and antihypertensive (BSNI, 2006)

One of the waters in Indonesia, especially in the waters of East Flores which has a fairly good trepang population is around the waters of Waitiu Lewolema District, East Flores Regency. Sea cucumber habitat in waters with rocky bottom, seaweed or in sand and mud burrows. According to research conducted by on sea cucumber samples showed the best nutritional content in the chemical method, namely the extraction method using 30% ethanol solvent consisting of protein 77.35%; moisture content 9.14%; ash 6.67%; fat 0.10%; and carbohydrates 6.18%, while the best sea cucumber nutritional content with the physical method (steaming method) consists of protein content 61.49%, moisture content 11.53%, ash 10.76%, fat 2.22%, and carbohydrates 14.00% (BSNI, 2006)

Sea cucumbers have a complete and quite high nutritional content, but the existence of sea cucumbers with high populations in East Flores Regency has not been utilised properly, therefore researchers are interested in conducting research with the title Identification and Analysis of Nutritional Value of Black Sea Cucumber (*Holothuria Edulis*) and Sand Cucumber (*Holothuria Scabra*) in Waitiu Waters, Lewolema District (Bordbar, S., Anwar, F., & Saari, N., 2011)

2. METHOD

Tools and Materials

The materials used in this study include Sand Sea Cucumber (*Holothuria Scabra*) and Black Sea Cucumber (*Holothuria Edulis*) taken from the waters of Waitiu Lewolema District, concentrated$_{H2SO4}$, quadest, NaOH, n-Hexan, selenium reagent, boric acid, *bromcresol green*, *ice cool*, *petroleum benzene* reagent, 3% HCl and 0.1 N $_{AgNO3}$.
Tools needed in this study include a furnace, glass funnel, binocular microscope, desiccator, oven, Soxhlet set of tools, hot plate, analytical balance, watch glass, filter paper, cotton, boiling stone, kjedahl flask, aluminium foil, cotton, distillation apparatus, burette, glass jar, measuring flask, measuring cup, erlemeyer and volume pipit (Wirawati, I., 2009)

Sample Identification

Samples that have been obtained are analysed in the laboratory to identify the type with a guide based on morphology and body colour and spicules from the dorsal integumentary tissue.

Nutritional Analysis of Sea Cucumber

The identified sea cucumbers were dried in an oven to remove the water content. Nutritional analysis of sea cucumber includes water content, ash content, protein content and carbohydrate content.

Moisture content analysis

Determination of content using the graphimetric method refers to the Indonesian National Standard (2006) in Sea cucumber water content is determined by drying in the oven. Porcelain cup was dried at 105°C for 5 minutes and then cooled in a desiccator and weighed with an analytical balance. A total of 1gram of sample was put into the cup and heated at 105°C for 3 hours and then cooled in a desiccator for 15 minutes and then weighed. Heating was repeated until a constant weight was obtained. Moisture content was calculated with the equation:

$$Water\ (\%) = \frac{a-b}{a} x\ 100\%$$

With:
a. sample weight before heating (g)
b. sample weight after heating (g)

Analysis of Ash Content

Determination of ash content using gravimetric method refers to SNI 2354.1: 2010. The porcelain cup was put into the oven and then cooled in a desiccator. The porcelain cup and sample as much as 2grams were weighed separately and then put into the furnace with a temperature of 505 ° C for ± 8 hours. Then the sample was removed from the furnace and cooled again in a desiccator and weighed.

Protein content analysis

Determination of protein content using the Kjeldhal method refers to SNI 01-2354.4-2006. The analysis begins with the sample deconstruction stage where the sample is weighed using an aluminium foil mat as much as 0.5 grams, the Kjeldhal flask is prepared and the weighed sample is poured into the flask and added with selenium reagent as much as 2 grams, boiling stones as much as 1-3 seeds then HCl or sulfuric acid is added and processed in a deconstruction device at 410 ° C for ± 2 hours. After that, proceed to the distillation stage for samples that have been deconstructed removed from the deconstruction device and prepared a measuring flask and glass funnel (Setyawan, N., 2019). The sample was added to the measuring flask and poured the sample that had been deconstructed, the flask was closed and cooled using *ice cool* for about 10 minutes. In the volumetric flask, distilled water was added and squashed. A sample of 5 ml was put back into the Kjeldhal flask and as much as 10 ml of boric acid was put into the Erlenmeyer then given *bromcresol green* as much as 2 drops. The Erlenmeyer was dripped with phosphate reagent I and in the Kjeldhal flask as much as 1-2 drops and then processed on a distillation device after that followed by the titration process.

Fat content analysis

Fat content analysis uses the Soxhlet method which refers to SNI 2354.3-2017. Samples were weighed as much as 2gram using a filter paper mat. The filter paper was folded and put into a beaker glass and added *petroleum benzene* reagent, and processed to a temperature of 150oC for 2 hours 30 minutes. Next, it was removed from the soxhlet then put into the oven and finally put into a desiccator and the weighing process was carried out.

Carbohydrate Content Analysis

Carbohydrate content analysis uses the by method which is a method of calculating carbohydrate content by reducing 100% by the sum of the results of four components, namely water, protein, fat, and ash content.

3. RESULTS AND DISCUSSION

Identification of sea cucumbers

Sea cucumber samples were collected from Waitiu River, Lewolema District, stored in a *cool box* and brought to the Larantuka Institute of Teacher Training and Technology Laboratory for analysis. The results of morphological analysis showed that there were two species of one genus (*Holothuria*), namely Black Sea Cucumber (*Holothuria Edulis*) and Sand Sea Cucumber (*Holothuria Scabra*). Morphological differences and differences that can be seen clearly, namely from the shape, colour and colour patterns on the sea cucumber (Sukmiwati, M. et al, 2022).

Black Sea Cucumber (*Holothuria Edulis*)

Black Sea Cucumber (*Holothuria Edulis*) is found on sandy substrates, this type of sea cucumber has a cross-sectional morphology of the body as well as a rounded shape of the anus, the body colour of the sea cucumber on the dorsal part is black, while the ventral part is pink.

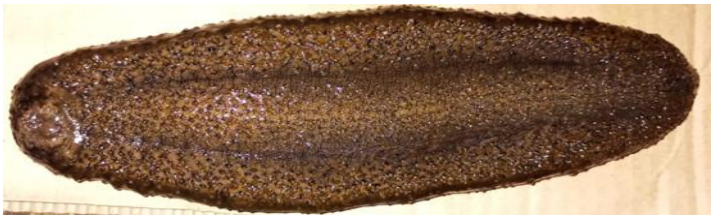

Figure 1. Black Sea Cucumber (*Holothuria Edulis*)

Sand Sea Cucumber (*Holothuria Scabra*)

Sand sea cucumbers (*Holothuria scabra*) are found on sandy substrates. Sea cucumbers found in Waitiu waters have a long round shape with a blackish grey colour, this type of sea cucumber has tentacles in the mouth that function to get food.

Figure 2. Sand Sea Cucumber (*Holothuria Scabra*)

The existence of sea cucumbers in one habitat is strongly influenced by several factors including salinity, temperature, light, pressure and food. Sea cucumbers play an important role in the food chain, this is because sea cucumbers contribute food in the form of eggs, larvae and sea cucumber juvae, for other marine organisms such as various

crustaceans, molluscs and fish. Sea cucumbers ingest large amounts of sediment, which allows for oxygenation of the upper sediment layers (Tumanggor, L., Pd, S., 2023).

Proximate Analysis of Sea Cucumber

The identified sea cucumbers were dried using sunlight. Drying was carried out for approximately 4 days. The results of the study can be seen in table 1.

Table. Results of proximate value analysis of Sand Sea Cucumber (*Holothuria Scabra*) and Black Sea Cucumber (*Holothuria Edulis*).

Sample	Water (%)	Smoke (%)	Protein (%)	Lemak (%)	Karbohidrat (%BK)
Black Sea Cucumber	6,214	18,864	51,636	0,659	28,841
Sand Sea Cucumber	5,472	51,056	27,072	1,449	20,424

Water Content

Determination of water content in this study was carried out using the gravimetric method. The results showed that Black Sea Cucumber (*Holothuria Edulis*) and Sand Cucumber (*Holothuria Scabra*) had a water content of <10%. According to the smaller the water content in a sample means the longer the storage period and the better in maintaining the properties of the compounds contained in the sample (Meyer, G., & Fracalossi, D. M., 2004)

Ash Content

The determination of ash content in this study was carried out using the gravimetric method. The results showed that the ash content of sand sea cucumber (*Holothuria scabra*) was greater than the ash content of black sea cucumber (*Holothuria edulis*), which was 51.056% and 18.864% respectively. Ash is an inorganic substance left over from the combustion of an organic material. The ash content and composition depend on the type of material and the method of ignition. Ash content shows the amount of minerals contained in a sample. The difference in ash content in two types of sea cucumbers is due to several factors, namely season, differences in age, size, type, level of gonad maturity and environmental conditions.

Protein content

Proteins are composed of amino acids containing amino and carboxylic groups. Proteins act as signal receptors, enzymes and as transporters of substances into and out of the body. Protein levels in this study were determined by the Kjeldhal method. The results showed that the highest protein content was contained in Black Sea Cucumber (*Holothuria Edulis*) which was 51.636% while Sand Cucumber (*Holothuria Scabra*) was 27.072%. Protein is the result of the body's metabolism, most of which is stored in meat, especially as an energy reserve, this can be attributed to the high levels of protein contained in Black sea cucumber (*Holothuria Edulis*)**.** In addition, differences in protein content in sea cucumbers are caused by several factors such as species age, type and environmental conditions (Nona, M., Tukan, M., Falah, S., Andrianto, D., & Najmah, D., 2023).

Fat content

Fat is an important biomelecule in the body, fat acts as a source of calorific reserves that have high energy and plays a role in the absorption of fat-soluble vitamins such as vitamin A, vitamin D, vitamin E and Vitamin K. Determination of fat content in this study was determined by Soxhlet method (Pangkey, H., Lantu, S., Manuand, L., & Mokolensang, J., 2012). The results showed the fat content of Black Sea Cucumber (*Holothuria Edulis*) and Sand Cucumber (*Holothuria Scabra*) were 0.659% and 1.449%, respectively. The fat content in sea cucumbers is strongly influenced by eating habits and the environment where they live, besides that some of the fat contained in sea cucumbers is unsaturated fat which functions to reduce cholesterol levels in the blood.

Carbohydrate Content

Carbohydrates are organic compounds containing carbon, hydrogen and oxygen. The form of carbohydrates consists of one melokul sugar called monosaccharide, sugar is the main source of energy in the body. Determination of carbohydrate content in this study using the by method which is a method of calculating carbohydrate content by reducing 100% with the sum of the results of four components, namely water content, protein, fat, and ash. The results showed the carbohydrate content of Black Sea Cucumber (*Holothuria Edulis*) and Sand Cucumber (*Holothuria Scabra*) were 28.841% and 20.424%, respectively.

4. CONCLUSIONS AND SUGGESTIONS

The results showed that two types of sea cucumber were identified in the waters of Waitiu Lewolema District, namely Black Sea Cucumber (Holothuria Edulis) and Sand Sea Cucumber (Holothuria Scabra). Proximate analysis of the two types of sea cucumber showed that the Black Sea Cucumber (Holothuria Edulis) had a water content of 6.214%, ash content of 18.864%, protein content of 51.636%, fat content of 0.659% and carbohydrate content of 28.841%, while the Sand Sea Cucumber (Holothuria Scabra) contained 5.472% water, 51.056% ash, 27.072% protein, 1.449% fat and 20.242% carbohydrate. Differences in nutritional value in sea cucumbers are caused by several factors, namely season, differences in age, size, type, level of gonadal maturity, feeding methods and environmental conditions.

5. ACKNOWLEDGE

The authors would like to express their sincere gratitude to all individuals and institutions that supported this research. Special thanks to the Larantuka Institute of Teacher Training and Technology for providing the facilities and resources necessary for conducting this study. We would also like to acknowledge the assistance of our colleagues in the Fishery Products Study Programme for their valuable insights and contributions throughout the research process. Additionally, we extend our appreciation to the local fishermen and communities in the Waitiu Waters of Lewolema District for their cooperation and support in sample collection. Finally, we thank our families for their unwavering encouragement and support during this research endeavor.

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