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ANALYSIS OF IODINE CONTENT IN SEAWEED AND ESTIMATION OF IODINE INTAKE

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ABSTRACT

Seaweed has become food the most popular in many Asian countries because apart from has a distinctive taste, seaweeds having the mineral content needed by the body. Seaweed iodine containing minerals being obtained from sea water, who was one of micro nonmetallic minerals which is very much needed by the body. Lack of iodine can cause cretinism, hyacinth, and the production of hormone low (hypothyroidism due to enlargement the thyroid gland. Excess intake iodine also can cause an impairment of health. Recommendations intake iodine per day of by 0.15 mg/day. The purpose of this research to know the iodine on seaweed (seaweed) in the village Punaga sub district Mangarabombang district Takalar. The kind of research laboratory this is a observation to technique quantitative analysis. Technique the sample collection in purposive sampling as many as 5 samples. Next sample each in destructor dry then examined in of the spectrophotometer Uv-visible at wavelengths 463,9 nm. Based on research results obtained levels of iodine on seaweed (seaweed) are 1.72 µg/g, 1.92 µg/g, 1.73 µg/g, 1.94 µg/g, and 1.89 µg/g it shows that seaweed has any iodine high.

Keywords: Iodine, Seaweed, spectrophotometer UV-Visible

1. INTRODUCTION

South Sulawesi, which has a coastline of ± 2,500 km makes this region, has good prospects for development of seaweed cultivation. One of the centers of development are quite advanced seaweed that is in Takalar [1]. The algae or seaweed was known as the biggest part of the marine plants that live in the waters, and the low level plants that do not have a different configuration of the skeleton such as roots, stems, and leaves [2].

Seaweed is rich in dietary fiber, vitamins, minerals, and long-chain unsaturated fatty acids that are classified as low-calorie and rich in nutrients that are beneficial to health [3]. Seaweed is a food that is popular in Asian countries such as Taiwan, China, Japan, and Korea is well known as a source of food rich in iodine content [4]. In addition, seaweeds have the nutrients including polysaccharides, proteins, lipids and fats and micro minerals like iron, magnesium and iodine. Nutrient content of seaweed is most important is the trace elements, particularly iodine [5].

Iodine is needed throughout life primarily for the development of cognitive functions appropriate for children. The content of iodine in seaweed very high to overcome iodine deficiency in the body that impact on the person's intelligence and can maximize thyroid function is needed by the body to prevent mumps. Although iodine is essential for thyroid function, excess and deficiency of iodine can be harmful to health [6].

Iodine is one of the elements of micro minerals that are needed by the body, although in relatively small amounts. However, if neglected can cause effects or impacts are quite influential in life [7].

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One of the major nutritional problems are still being experienced by the people of Indonesia is the problem of iodine deficiency disorders. Iodine deficiency disorder is a very serious problem because it can lead to various diseases which affect health, among others goiter, cretinism, and others. With the presence of iodine in kelp can fulfill their minerals in the body [8] in addition, the potential of seaweed as a food ingredient provided many Takalar District can be used as food rich in iodine for the prevention and control of iodine deficiency disorder. One Iodine deficiency disorder prevention efforts by using the supplementary feeding rich in iodine. It is as one of the long-term prevention efforts Iodine deficiency disorder.

According to the World Health Organization (WHO) [9] set a daily maximum intake can tolerate 1.0 mg iodine / day (0,017 mg / kg body weight) of all kinds of seaweed. Therefore, the analysis of iodine in several species of seaweed is an important thing to do in order to know how big the iodine content in seaweed obtained in the Village District of Mangarabombang Punaga Takalar.

2. METHODS

2.1 Reagent and chemicals

AS_2O_3 0.02 N, Ce $(NH_4)_4(SO_4)_2$ 0.03 N, $Fe(NH_4)_2(SO_4)_2$, a solution of incineration auxiliary, KSCN, NaOH 0.5 N.

2.2 Equipments

Instrumentation used is UV-Vis Spectrophotometer with a wavelength of 700-225 nm, an analytical balance, a measuring cup, pipette, flask, oven, furnace, test tubes, rod stirrer, filter paper, pipette volume.

2.3 Analysis of Iodine Content in Seaweed

The sample in this study are 5 types of seaweed *Ulva lactuca*, *Eucheuma cottoni* Brown, *Eucheuma spinosum*, *Eucheuma cottoni* green and *padina* is located in the Village District of Mangarabombang Punaga Takalar.

Samples seaweed taken from the sea and then inserted into cool box. A total of 5 grams of sample is weighed carefully and then put in the cup and added 0.5 ml of ashing maid. The mixture is dried in an oven at a temperature of 105-110 °C (Drying usually takes approximately 2 hours). Gradually, the tube was moved into the furnace then converted into ashes sample at a temperature of 500 °C for 4-6 hours. The samples were cooled and then the ashes are added with 10 ml of arsenic acid and allowed to stand for approximately 15 minutes.

Samples that have been added Arsenic Acid (AS_2O_3) 0.02 N incorporated into a test tube and then filtered in a flask and added with arsenic acid on the mark. After that the sample pipette back and put into a test tube of 1.0 ml each and then added Ce $(NH_4)_4(SO_4)_2$ 0.5 N as much as 1.0 ml and allowed to stand for 15 minutes. After it was added a solution of $Fe(NH_4)_2(SO_4)_2$ 1 ml whipped, then added 1 ml solution of KSCN.

Then the sample is examined in light spectrophotometry Looks (UV-Vis). Iodine content in the sample is calculated based on the standard curve obtained (note if there is the dilution factor, and the absorbance of the sample should be in the range of raw absorbance).

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Calculation levels of iodine (ug / g):

$$\frac{X\ (\mu g/ml) \times \text{The final volume of samples (ml)}}{\text{sample weight (g)}}$$

3. RESULTS AND DISCUSSION

Iodine is a kind of micro mineral element essential for human health, although the number does not need as many other nutrients. According [10] says that humans cannot make the elements of iodine in the body such as making proteins or sugars but must get it from outside the body (naturally) through the uptake of iodine contained in food and beverages.

In this study of iodine contained in seaweed in the analysis by UV-Visible spectrophotometer method to determine the quantity of iodine contained in seaweed. Looks rays spectrophotometry (UV-Vis) that the principle works based on the absorption of electromagnetic radiation that is emitted in the form of wavelengths. In the quantitative determination using spectrophotometry must use colored compounds. Thus, in the measurement of iodine in this research is done by adding a ammonium cerium (IV) sulfate that yellow is reduced to cerium (III) became clear yellow discoloration indicates the occurrence of a cerium (IV) reaction became cerium (III). After it was added $Fe(NH_4)_2(SO_4)_2$ to stop rather than reaction. So that the color remains complex KSCN solution is added so that the colors remain stable readings.

Based on research that has been done shows levels of iodine in 5 types of seaweed are shown in Table 1. The content of iodine in the seaweed species *Ulva lactuca*, *Eucheuma cottoni* green, *Eucheuma spinosum*, *Eucheuma cottoni* brown and *padina* consecutively 1.72 µg/g, 1.92 µg/g, 1.73 µg/g, 1.94 µg/g, 1.89 µg/g. The results showed the iodine content ranged from 1.72 to 1.94 µg/g. The highest iodine content in seaweed *Eucheuma cottoni* (brown) with a value of 1.92 µg/g and its low iodine content in seaweed *Ulva lactuca* with a value of 1.72 µg/g.

In general, the levels of iodine in seaweed high for their conditions of salinity (salt content) is good for the growth of seaweed so the better the salinity of sea water, the higher the content of iodine in seaweed [11].

Table 1. Results of examination of Iodine Levels In Seaweed (Seaweed) located in the village of the District Punaga Mangara bombang Takalar District

sample code	Type Seaweed	Iodin Content (µg/g)
A	*Ulva lactuca*	1,72
B	*Eucheuma cottoni* Green	1,92
C	*Eucheuma spinosum*	1,73
D	*Eucheuma cottoni brown*	1,94
E	*Padina*	1,89

The iodine content in the samples *Eucheuma cottoni* (brown) because of high growth habitat seaweed shallow reefs to a depth of 6 m, far from the mouth of the river so very influential factor in the growth of this type is quite current with stable salinity. As [12], high and low levels of salt (salinity) is dependent upon the extent of the rivers that flow into the sea, the more the river that empties into the sea,

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the ocean salinity will be lower, and vice versa fewer rivers empties into the sea, the salinity will be high [12]

The iodine content in the sample is low because *Ulva lactuca* seaweed growth habitat live towing, absorption of the salinity of sea water contained in *Ulva lactuca* slightly so that the low iodine content.

Needs iodine in humans is 100-150 mg / day or 0.1 to 0.15 mg / day because of the iodine-called trace element or elements that need very small, though very small but must be present in their daily consumption. When compared with the results contained in the iodine content of seaweed so it takes about 60-80 grams of seaweed to meet the needs of iodine [13].

According Purawisastra *et al.* (1987) stated that the iodine content of seaweed (2.54 µg/g) is relatively higher when compared with fresh sea fish (0.076 µg/g), fresh ground fish (0.073 µg/g), class of vegetables such as spinach (0.834 µg/g), chickpea (0.090 µg/g) and carrots (0.193 µg/g).

The solubility of iodine in water is actually very low, but in the presence of a molecular bond iodine (I_2) in combination with iodide will because iodine is very soluble in water. Iodine in the soil and the sea are as iodide. Iodide is oxidized by sunlight into volatile element iodine. Iodine is present in the form of iodide from seawater assimilated with seaweed [14].

High levels of iodine in seaweed can be used as a natural source of the mineral iodine and food ingredient iodine to meet the needs of the community. Seaweed has been used for centuries as a menu of Japanese population. Seaweed in food ingredients commonly used in soups, seasonings, and various other uses such as salad, onigiri and nori. While in Indonesia itself seaweed after processing is widely used as a food ingredient that is consumed directly as gelatin and serve as a side dish companion.

4. CONCLUSION

Based on the research, as many as five types of samples Seaweed (Seaweed) obtained Iodine levels in the samples A (*Ulva Lactuca*) 1.72 µg/g, the sample B (*Eucheuma Cottoni* Green) 1.92 µg/g, sample C (*Eucheuma Spinosum*) 1.73 µg/g, the sample D (*Eucheuma Cottoni Brown*) 1.94 µg/g, and the sample E (*padina*) 1.89 µg/g.

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