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# Proximate Content of *Nostoc commune* in Gilianyar Rice Field Habitat, Bangkalan Regency, East Java

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**ABSTRACT**

*Nostoc commune* become one of the microalgae that can be found in Indonesia. *Nostoc commune* is an edible blue-green microalgae that has been used as a delicacy or herbal medicine in various countries. *Nostoc commune* contains high concentrations of carbohydrates, crude protein, and micronutrients. The purpose of this research is to know the proximate content of *Nostoc commune* in the rice field habitat of Gilianyar, Bangkalan Regency, East Java. The method used in this study includes 2 steps, namely direct observation (on site) and observations in the laboratory. Direct observation was carried out by taking samples of *Nostoc commune* regularly purposive sampling and water samples and water quality measurements on site which includes pH, DO (Dissolved Oxygen), temperature, salinity and light intensity were carried out with 3 location points and 2 repetitions. Observations in the laboratory include proximate analysis, nitrate and phosphate according to standard procedures. The average yield of nutrient concentrations *Nostoc commune* among others, moisture content 24.78%, ash content 0.6055%, fat content 0.92%, protein content 0.47%, crude fiber content 1.190% and carbohydrate content 72.0378% .



## Introduction

Indonesia is one of the countries with water territory reaching two-thirds of the total area in which there is land with high and varied biodiversity, especially in the waters. Various biological resources found in waters certainly have good potential to be developed in order to achieve the welfare of all living things, especially humans. Management and utilization of aquatic biological resources is prioritized on fish resources with high economic value, while biological resources that also have the potential have not received the same thing. One of the aquatic resources that has not been utilized properly is microalgae.

Microalgae are organisms that contain chlorophyll and other pigments so that they can carry out photosynthesis.*Nostoc commune* become one of the microalgae that can be found in Indonesia. Green-Blue Algae or *Nostoc commune* known by the people of Indonesia as "mushroom selo" and some are calling it "lumut sri dempok". Nostoc included in the class of aquatic resources that are abundant in nature, especially in freshwater, brackish and seawater ecosystems. Indonesia's position in the tropical region makes this type of blue-green algae (*cyanobacteria*) is easy to find. *Nostoc commune* widely consumed by humans because it has a chewy texture and is known as star jelly accompanied by a savory taste[1].

*Nostoc commune* is an edible blue-green microalgae that has been used as a delicacy or herbal medicine in Asian, African and South American countries for centuries[2]. Besides that, *Nostoc commune* It is also used as a potential source for treating various ailments in Chinese medicine and has been suggested to be used to treat a variety of ailments including inflammation, night blindness and digestive problems. *Nostoc commune* contains high concentrations of carbohydrates, crude protein, and micronutrients with the potential to be used as alternative food sources[3].

*Nostoc commune* belonging to the class blue green algae often considered by farmers as wild plants or weeds that do not have good content or potential for human life, in fact *Nostoc commune* has benefits in agriculture, it is used as a biofertilizer, because it can help maintain the amount of nitrogen in the soil or substrate and can also increase plant growth[4]. Madura Island is also abundant in aquatic resources such as algae[5], which is included *Nostoc commune* but has not been utilized and researched optimally. Therefore, the need for more in-depth exploration of *Nostoc commune* on Madura Island related to nutritional content that has never been studied so the purpose of this study was to determine the proximate content *Nostoc commune* which is found in the rice field area of Gilianyar, Bangkalan Regency, East Java which is on Madura Island.

## Method

### Time and Research Location

This research was conducted in September - October 2022. The sampling location for this study was located in Gilianyar Village, Kamal District, Bangkalan Regency. Sample analysis was carried out at the Marine Biology Laboratory, Department of Marine Science and Fisheries, Faculty of Agriculture, Trunojoyo University, Madura. The following is a map of the research sampling locations presented in Figure 1.

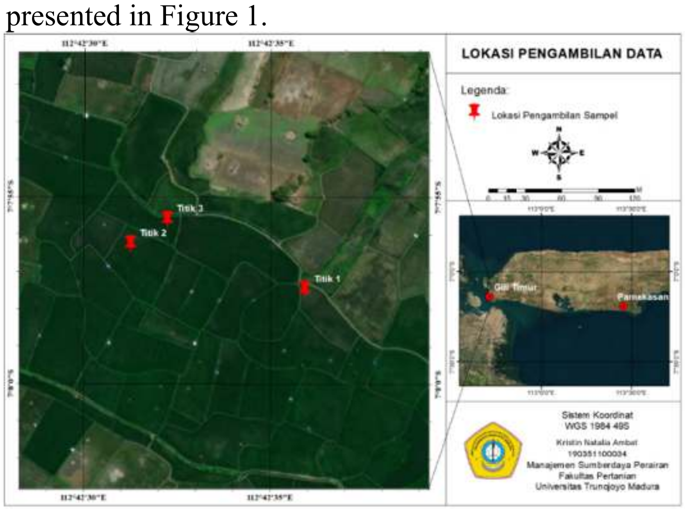



Figure 1. Map of Sampling Locations

**Methods of Research**

The method used in this study includes 2 steps, namely direct observation (on site) and observations in the laboratory. Direct observation was carried out by taking samples of *Nostoc commune* regularly purposive sampling and water samples and water quality measurements on sitewhich includes pH, DO (Dissolved Oxygen), temperature, salinity and light intensity carried out at 3 different location points, namely point 1 that rice fields with rice plants, point 2 is rice fields that have been harvested, and point 3 is rice fields that have been harvested with water plant associations. Retrieval time is repeated 2 times a week apart. Observations in the laboratory were carried out in several stages including sample preparation and drying using an oven with a temperature of <60°C. The next stage is proximate analysis which includes moisture content, ash content, protein content, fat content, crude fiber content and carbohydrate content and water quality, namely nitrate and phosphate.

**Proximate Composition Analysis**

Proximate analysis was performed on the samples *Nostoc commune* consists of several tests, among others, moisture content referring to SNI-01-2534.1-2006[6], ash content refers to AOAC[7], fat content refers to AOAC[7], protein content refers to Sudarmadji *et al.*[8], crude fiber content refers to Insani *et al.*[9] and carbohydrate content (Method by difference).

**1. Moisture Content[6]**

Analysis of moisture content based on SNI-01-2354.2-2006 begins by heating an empty ceramic crucible cup in the oven for 10 minutes at 105℃. The next step, the ceramic crucible cup is transferred into the desiccator for about 5 minutes until it reaches room temperature and the ceramic crucible cup is weighed empty. The sample is then weighed as much as ± 2 grams into the ceramic crucible cup. The ceramic crucible cup that has been filled with the sample is then put into the oven at 105℃ for 3 hours. Next, samples were taken and put in a desiccator for 5 minutes, then the samples were weighed. Calculation of moisture content is carried out using the following equation I.

$$\%\ Moisture\ content = \frac{B-C}{B-A} \times 100\% \qquad \text{(I)}$$

Notes:
A: ceramic crucible cup
B: crucible cup weight + initial sample
C: crucible cup weight + dry sample

**2. Ash Content[7]**

Analysis of ash content was carried out with reference to AOAC (2005)[7] modified. The ash content analysis procedure begins with an empty porcelain ceramic crucible cup inserted into it oven at 105℃ for 10 minutes, then the sample is cooled using a desiccator for 5 minutes and weighed (B1). The sample is weighed as much as 2 g and then put into a ceramic crucible cup and put in an ashing furnace with a temperature of 650℃ for 6 hours. The sample is removed from the furnace and put inside desiccator and weighed (B2). Calculation of ash content is carried out using the following equation II.

$$\%\ Ash\ content = \frac{B2-B1}{Initial\ sample\ weight} \times 100\% \qquad \text{(II)}$$

Notes:
B1: crucible cup weight (gram)
B2: The weight of the crucible cup with the sample after being incubated (gram)

**3. Protein Content**[8]

The protein content analysis procedure begins with 2 grams of fine sample being weighed, then the sample is dissolved in 60 mL of distilled water, and filtered. 10 mL of the filtrate was taken with a 10 mL measuring ceramic crucible cup, then 10 mL of sample solution was taken and 0.4 mL of potassium oxalate and 1 mL of PP indicator were added, then added with 2 mL of formalin and homogenized, then titrated with 0.1 N NaOH until the color pink. Samples that are already pink are recorded and calculated using the following equation III.

$$\%N = \frac{Titration\ formol \times N\ NaOH \times 14{,}008 \times FP}{sample\ weight\ (g) \times 10} \qquad \text{(III)}$$

Notes:
Titrasi formol : Titration sample-titration blanko
FP : Faktor pengenceran ($\frac{100}{10} = 10$)
14,008 : Nitrogen molecular weight

**4. Fat Content**[7]

Fat content analysis was carried out based on the modified AOAC method[7]. The fat content analysis procedure begins by drying the filter paper and woolen threads in the oven at 105℃ for 10 minutes, then removing and cooling in a desiccator for 5 minutes and weighing (A). The sample is weighed as much as 2 grams, then wrapped in filter paper and put into a Soxhlet tube, then doused with fat solvent (hexane), then wait up to 5 hours or until the solvent drops back into the Soxhlet tube and is clear in color. Samples were taken and put into the oven at 105℃ to dry. Next, cooled in a desiccator for 5 minutes and weighed (B). Calculation of fat content is carried out using the following equation IV.

$$\%Fat\ Content = \frac{(B-A)}{Sample\ Weight} \times 100\% \qquad \text{(IV)}$$

Notes:
A: Empty filter paper weight
B: Filter paper weight with sample

**5. Crude Fiber Content**[9]

Analysis of fiber content was carried out on Insani *et al*.[9] started by baking filter paper and beaker at 105℃ for 10 minutes, then put in a desiccator for 5 minutes, weigh 1-2 grams of the sample, then put the sample into the beaker. In the sample added with 50 mL of $H_2SO_4$ and homogenize it and heat it with hot plate for 30 minutes. Then 25 mL of NaOH was added and heated with hot plate for 30 minutes. The next step is filtering the solution and materials. Then rinsed with 25 mL of ethanol and 25 mL of distilled water that has been heated. The filter paper and residue were then heated in the oven at 105℃ until dry and cooled in a desiccator and then weighed. Calculation of crude fiber content is calculated using the following equation V.

$$\%Crude\ Fiber\ Content = \frac{(a-b)}{c} \times 100\% \qquad \text{(V)}$$

Notes:
a: fiber residue weight in filter paper
b: filter paper weight
c: initial sample weight

**6. Carbohydrate Content**[28]
The carbohydrate content contained in a sample can be determined using the following equation VI.

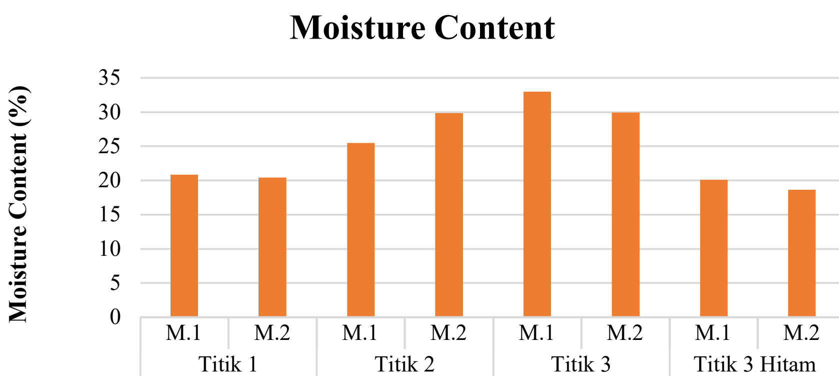
$$\text{Carbohydrate Content (\%)} = 100\% - (A+B+C+D+E) \qquad \text{(VI)}$$

Notes:
A: Moisture content
B: Ash content
C: Fat content
D: Protein Content
E: Crude Fiber Content

## Results and Discussion

### Moisture Content of The *Nostoc commune*

The results of the analysis of the moisture content of the sample *Nostoc commune* shown in Figure 2.




| | M.1 | M.2 | M.1 | M.2 | M.1 | M.2 | M.1 | M.2 |
|---|---|---|---|---|---|---|---|---|
| | Titik 1 | | Titik 2 | | Titik 3 | | Titik 3 Hitam | |
| Kadar Air | 20,87 | 20,41 | 25,48 | 29,86 | 32,96 | 29,92 | 20,08 | 18,65 |

Figure 2. Graph of moisture content analysis results

*Nostoc commune* moisture content analysis in this study was conducted with 4 samples from 3 collectied location according to the method, but in the field, it was discovered that quite a bit of biomass was present at the third location with quite a noticeable color difference: on the surface, it is green with a hint of brown, making it stand out in its measurement. The results of the analysis of the moisture content of the *Nostoc commune* showed that the average moisture content at location 1 is 20.64%, at location 2 is 27.67%, at location 3 is 31.44% and at location 3 which is black is 19.365%. The moisture content of *Nostoc commune* is the highest from the location of the first 3 weeks with a moisture content of 32.96%. The lowest moisture content of *Nostoc commune* is at location 3 which is black in the second week with a moisture content of 18.65%. The average value of the moisture content of the *Nostoc commune* as a whole from location 1 to location 3 is 24.78%. The results of the moisture content values in this study are said to be small because compared to research conducted by Martinez-Goss *et al.*[3] with the results of the *Nostoc commune* moisture content of 96.52% and research conducted by Maza *et al.*[10] with 95,7% - 96,12%.

The low moisture content in this study is due to the drying time which is carried out up to 3-4 days using an oven with a temperature of ±50°C, this is supported by Erni *et al.*[11] that the longer a material is in direct contact with heat, the lower its moisture content or in other words, the higher it is and the longer the drying time used in the drying process, the higher the amount of water that evaporates. The high or low in moisture content is caused by light intensity which also affects the temperature in the waters. The moisture content is affected by the method of drying related to temperature and light intensity[12]. Moisture content as an important characteristic of a food ingredient also determines the level of freshness and also the durability of the food. Since water can alter the texture, look, and flavor of food items, it is one of the crucial properties of an ingredient[13]. It is believed that the high and low moisture content are related to physiological, morphological processes, as well as a mix of both, and environmental influences because the growth phase of water requirements differs. In addition, *Nostoc commune* is classified as microalgae which has a hydrocolloid component that is able to bind and absorb water. Therefore, hydrocolloids interact with various food components, self-assemble on a molecular scale and influence technical functional properties such as texture and also nutritional aspects in this case moisture content[10].

**Ash Content of The *Nostoc commune***

Results of analysis of the ash content of the sample *Nostoc commune* shown in Figure 3.

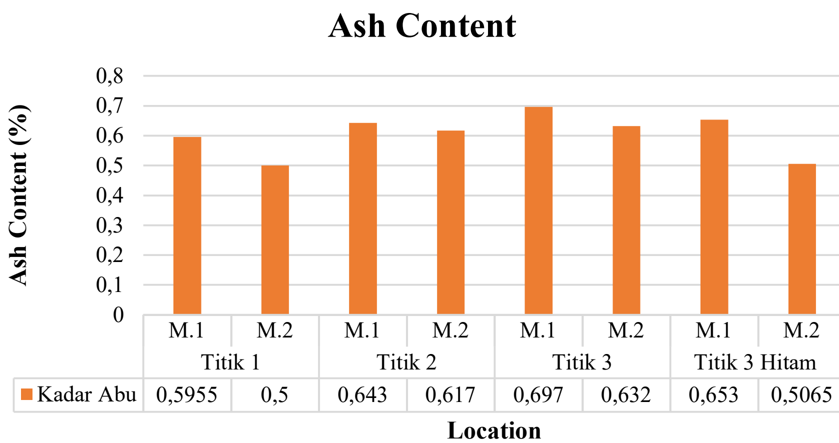



Figure 3. Graph of ash content analysis results

The results of the ash content analysis of the *Nostoc commune* show that the average ash content at location 1 is 0.54%, location 2 is 0.63%, location 3 is 0.66% and location 3 which is black is 0.58 %. The ash content of *Nostoc commune* is the highest from the location of the first 2 weeks with an ash content of 0.643%. The lowest ash content of *Nostoc commune* is at the location of the second week with an ash content of 0.5%. The average value of the ash content of the *Nostoc commune* as a whole from location 1 to location 3 is 0.6055%. The ash content of the *Nostoc commune* obtained from numerous sites exhibits results that are not greatly different due to the same ashing technique and the same kind of material, the *Nostoc commune*. The high or low ash content is influenced by the type of material, time and temperature used during drying and also the ashing method[14].

The average value of *Nostoc commune* ash content obtained in this study is said to be high compared to research conducted by Maza *et al*.[10] who obtained ash content results for the *Nostoc commune* of 0.2%, but said to be low when compared to research conducted by Martinez-Goss *et al*.[3] and Loaiza *et al*.[15] with each ash content value of 5.25% and 10.85%. The ash content gives an illustration of the amount of minerals that are not burnt during the ashing process into volatile substances or also often referred to as the amount of minerals in a food ingredient[16]. Temperature is one of the environmental factors that affect the presence of mineral elements. climatic factors can cause a decrease in the variation of geographic variable mineral elements (P, Cu, Zn, Co, Pb) along with a decrease in temperature and rainfall[17].

**Fat Content of The *Nostoc commune***

The results of the analysis of the fat content of the sample *Nostoc commune* can be seen in Figure 4.

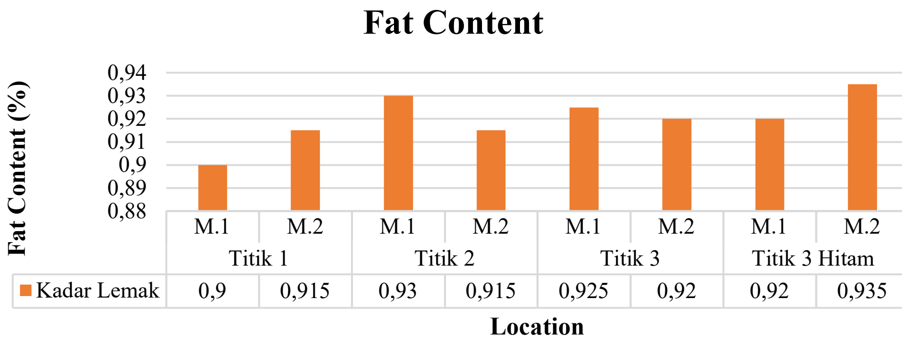



Figure 4. Graph of fat content analysis results

The results of the *Nostoc commune* fat content analysis obtained showed that the average fat content at each observation location was 0.91%, 0.92%, 0.92% and 0.93%. The highest *Nostoc commune* fat content was found at location 3 which was black in the second week with a fat content of 0.935%. The lowest *Nostoc commune* fat content was at the location of the first week with a fat content of 0.9%. The average value of *Nostoc commune* fat content as a whole sample is 0.92%. The value of fat content obtained at each location shows almost the same value from one location to another. Fat is an important and main component in food ingredients along with protein, water and carbohydrates. Based on the average value of fat content obtained, the results obtained in this study were in a range not much different from that of Loaiza *et al*.[15] that is equal to 0.74-1.05%. The value of the fat content obtained showed that the *Nostoc commune* has a relatively low fat content, according to the research of Noerdjito (2019)[18] that the average range of fat or lipid content in microalgae is 7.2-23%.

The high or low lipid content of *Nostoc commune* is due to environmental factors, especially the concentration of nitrate and phosphate at each different location, because nitrate and phosphate provide 4.48% of the lipid content while the optimum physical parameters can also induce Nostoc sp. accumulate lipids up to 4.16%[19]. The low fat content of the *Nostoc commune* from that location is because the *Nostoc commune* is in an environment that is not high pressure, because the higher the environmental stress such as the lack of nitrogen and phosphorus concentrations will increase the accumulation of lipids, this is also in accordance with the statement[19].

**Protein Content of The *Nostoc commune***

Protein content in the sample *Nostoc commune* can be seen in Figure 5.

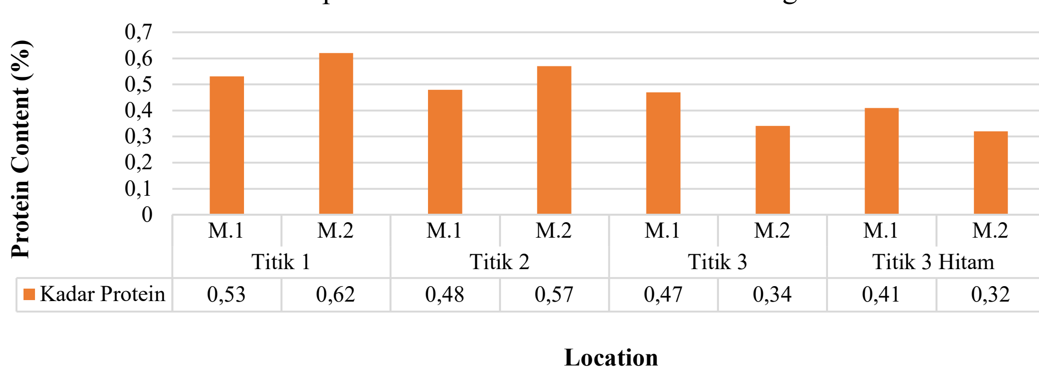



Figure 5. Graph of protein content analysis results

The results of analysis of the protein content of the *Nostoc commune* obtained showed that the highest protein content was found at location 1 of the second week of 0.62% and the lowest at location 3 was black in the second week of 0.32%. While the average level at location 1 is 0.575%, location 2 is 0.525%, location 3 is 0.405% and at location 3 which is black is 0.365%. The average value of *Nostoc commune* protein content of all samples obtained a value of 0.47%. Protein is composed of several amino acids with peptide bonds, so that a low protein content can be related to the amino acids present in a material, the higher the amino acid content, the higher the protein content[20]. The protein value range of 0.32% - 0.62% was obtained which was quite different from that of Martinez-Goss *et al*.[3] which is equal to 21.51 and research by Loaiza *et al*. [15] with 25-41%.

The protein levels value in the *Nostoc commune* is said to be low, this is seen from Noerdjito's research[18] that the average range of fat content in microalgae is 7.2-23%. Therefore, the value of protein content obtained in this study has a value that is almost close to another study conducted by Maza *et al*.[10] with a *Nostoc commune* protein value obtained of 1.21%. Differences in protein levels are caused by different water conditions, resulting in different nutrition and nutrient intake for each species according to the statement of Gao *et al*.[21]. High or low levels of protein in *cyanobacteria* or *Nostoc commune* are also caused by sunlight in relation to light intensity and brightness for the photosynthesis process which will later produce primary metabolites (carbohydrates, fats and proteins). *Cyanobacteria* are able to harvest light for photosynthesis and obtain essential biomass (carbohydrates, proteins and lipids) for their life[19].

**Crude Fiber Content of The *Nostoc commune***

The result of measuring the amount of coarse fiber in the sample *Nostoc commune* can be seen in Figure 6.

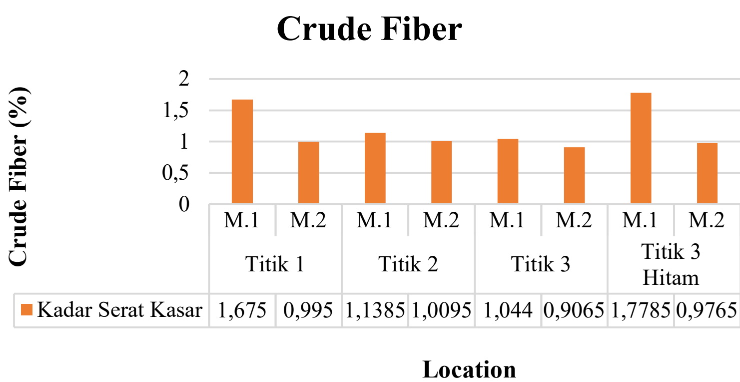



Figure 6. Graph of analysis results of crude fiber content

The average value of *Nostoc commune* crude fiber content of all samples obtained a value of 1.190%, with the highest value from location 3 which is black in the first week of 1.7785%, while the lowest content is at location 3 in the second week of 0.9065%. The average value at location 1 is 1.335%, location 2 is 1.074%, location 3 is 0.975% and at location 3 which is black is 1.377%. This crude fiber is often referred to as a residual component resulting from hydrolysis with a strong acid which is then hydrolyzed by a strong base as was done by this study using $H_2SO_4$ as a strong acid and NaOH as a strong base, resulting in a loss of about 50% cellulose and 85% hemicellulose. The range of values for crude fiber content obtained as a whole is 0.9065% - 1.7785%. The *Nostoc commune* crude fiber content in this study is high, this was seen from the research conducted by Maza *et al*.[10] that the crude fiber content of *Nostoc commune* is 0.023%. This range of valuesis not much different from that of Loaiza *et al*.[15] is 0.39% - 1.64%. The height or the presence of differences in crude fiber content in the *Nostoc* *commune* is influenced by differences in habitat and also the season at the time of sampling, this is supported by the research of Nurjanah *et al*.[22] that the different content of crude fiber in seaweed is caused by differences in habitat, season, and type of species.

**Carbohydrate Content of The *Nostoc commune***

Calculation results by difference carbohydrate content in the sample *Nostoc commune* can be seen in the graphic Figure 7.

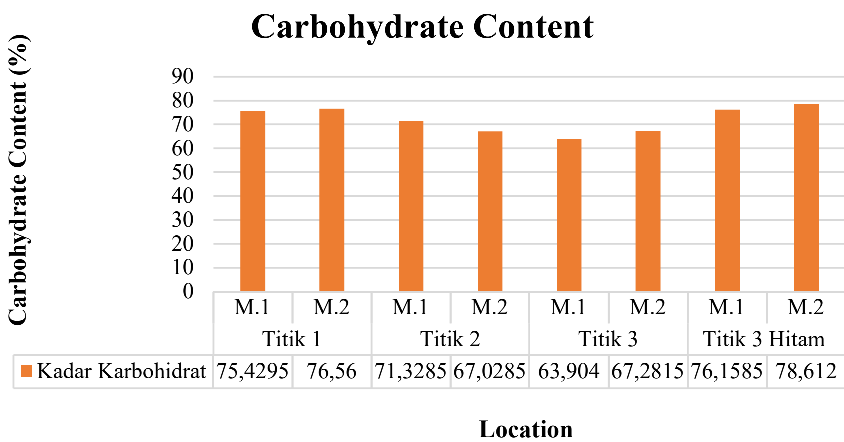



Figure 7. Graph of analysis results of carbohydrate content

The average value of *Nostoc commune* carbohydrate content as a whole from location 1 to location 3 obtained a value of 72.0378% with the highest value of 78.612% from location 3 which is black in the second week, while the lowest value is at location 3 in the first week with levels carbohydrates of 63.904%. From the calculation the average value of carbohydrate content was obtained at location 1 of 75.99%, location 2 of 69.1785%, location 3 of 65.5927% and at location 3 which is black by 77.385%. Judging from the value of carbohydrate content obtained at each location, it shows that the value does not differ much from one location to another and the results obtained are in a range that is not much different from the study of Martinez-Goss *et al*.[3] and Loaiza *et al.*[15] each got a carbohydrate content result for Nostoc of 69.56% and 43-48%.

The value of carbohydrate content in the *Nostoc commune* in this study is relatively high. The average range of carbohydrate content in microalgae is 4.6-23%[18]. Research by Ilhamdy *et al*.[23] that the carbohydrate content is closely related to environmental conditions, one of which is the concentration of nutrients in the growth medium. Nurjanah *et al*. stated that the carbohydrate content of seaweed can be affected by several water quality parameters including temperature, salinity, and light intensity[22].

**Water quality**

Table 1. Results of water quality measurements

| Parameter | Location | | | Average |
|---|---|---|---|---|
| | Point 1 | Point 2 | Point 3 | |
| pH | 7.7 | 7.15 | 7.5 | 7.45 |
| DO (ppm) | 5.04 | 1.99 | 3.855 | 3.629 |
| Temperature (°C) | 26.95 | 27.55 | 29.9 | 28.13 |
| Salinity (ppt) | 0 | 0 | 0 | 0 |
| Light Intensity (lux) | 1780 | 1603 | 1715 | 1699 |
| Nitrate (mg/L) | 4.62 | 4.09 | 4.52 | 4.408 |
| Phospate (mg/L) | 0.815 | 2.025 | 0.385 | 1.075 |

The results of water quality measurements obtained the highest pH value at location 1 with 7.7 and the lowest pH value at location 2 was 7.15. The average pH value of the three locations is 7.45. The pH of a water is one of the important chemical parameters in monitoring the stability of waters and plays a role in determining whether a water is good or bad. The variation in pH (Potential Hydrogen) values at the three locations is still relatively safe and good for microlagae life, especially *Nostoc commune*, this is supported by the statement of Whitton and Potts[24] and Black[25] that *Nostoc* commune can grow optimally in the range of pH 6 – 7 and cannot grow in acidic pH conditions (below pH 4).

DO (Dissolved oxygen) is the main support for life in the waters, including the biota in it. Dissolved oxygen is the main requirement for all living things to carry out metabolic processes, respiration and exchange of substances which will later produce energy that supports growth and also reproduction[13]. The highest DO value is at location 1 which is 5.04 ppm, while the lowest DO value is at location 2 with a value of 1.99 ppm. The low value of dissolved oxygen at location 2 is suspected because when sampling was carried out in paddy fields after harvesting rice, it was possible that there was high substrate agitation which resulted in a high organic matter decomposition process and made more use of available dissolved oxygen in water bodies. The variation in DO (Dissolved Oxygen) valuesat three locations is still relatively safe and good for microlaga life when viewed from the average value. The minimum DO required by microalgae is 3.0 ppm or 3.0 mg/L[26].

Temperature measurements carried out at each location got the highest result at location 3 with a temperature value of 29.9°C while the lowest temperature value was at location 1 which was 26.95°C. The average temperature of all locations is 28.13°C. The average optimum temperature for microalgae growth is around 20-30°C, and can vary depending on the location, composition of the aquatic media, reserves of food containing pigments, and the physiological properties of the algae[27]. Therefore, the temperature variation at this research location can be said to be quite optimum because it is still in the range of that value.

Continuing with the results of salinity measurements, the values obtained for all sampling locations show the same salinity, which is equal to 0 ppt, even though the rice fields are not too far from coastal waters (± 1km). Low salinity is influenced by the characteristics of rice fields which resemble shallow waters, fresh water intrusion can spread to the bottom of the waters, therefore causing low salinity[28].

The highest light intensity measurement results are at location 1 which is equal to 1780 lux, while the lowest light intensity is at location 2 with a light intensity value of 1603 lux. The average value of light intensity from the three locations is 1699 lux. The difference in intensity values is caused by the time of measurement that is intermittent and the weather at the time of measurement. Light has an important role for the growth of algae, because light is a source of energy for the process of photosynthesis. In general, algae are able to grow in a light range with an intensity of 1000-10000 lux, while the optimal light intensity to support the growth of microalgae ranges from 2500-5000 lux[29]. Most microalgae cannot grow well under constant lighting conditions, because they need rest periods to store food.

Nitrates have benefits as nutrients by microalgae which can help growth and synthesis in proteins. The results of nitrate analysis in the laboratory showed that the highest nitrate value was at location 1, which was 4.62 mg/L, and the lowest nitrate value was at location 2, which was 4.09 mg/L. The average value for nitrate yields from the three locations was 4.4083mg/L. Nitrogen-nitrogen content of more than 0.2 mg/l can result in nutrient enrichment, so that it can stimulate the growth of algae and aquatic plants in these waters quickly[30]. A complete nutrient composition and the right nutrient concentration determines the biomass production and nutrient content of microalgae[31]. Nitrogen in nitrate is one of the macronutrients that greatly affects the growth and productivity of algae biomass because it is needed to form protein and chlorophyll.

Phosphate ($PO_4$) is a very essential element as a nutrient for various aquatic organisms. The results of the phosphate measurement obtained the highest result at location 3, which was 1.075 mg/L, while the lowest was at location 1, which was 0.815 mg/L. The average value for phosphate content is 1.075mg/L. The variation in phosphate values at the three locations is still relatively safe and good for microlagae life when viewed from the average value. The optimum phosphate value for microalgae life is 0.018 – 27.8 mg/L[32]. Based on the results of water quality measurements both in situ and in the laboratory showed good results for microalgae life, in this case the *Nostoc commune*. With the quality of the supporting environment, it is estimated that it will also affect the proximate content of the *Nostoc commune*.

## Conclusion

Based on the results of research on the analysis of proximate levels in the *Nostoc commune* taken from the Gilianyar rice field area, Bangkalan Regency, East Java, the average nutrient concentration for moisture content was 24.78%, ash content was 0.6055%, fat content was 0.92%, protein content of 0.47%, crude fiber content of 1.190% and carbohydrate content of 72.0378%. In addition, water quality measurements obtained average results for pH of 7.45; DO (Dissolved Oxygen) of 72.0378%; temperature of 28.13°C; salinity of 0ppt; light intensity of 1699 lux; nitrate of 4.4083mg/L; and phosphate of 1.075mg/L.

## Acknowledgment

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