

NATURAL FOOD COMPOSITION OF VARIOUS TYPES *Sea cucumber* FROM NATUNA WATERS, RIAU ISLAND

by:

Mery Sukmiwati

(Faculty of Fisheries and Marine Science, University of Riau Indonesia)

Abstract

The aim of this research is to investigate natural food composition of various sea cucumber. Samples were collected in the coastal waters of Natuna, Riau Islands In June 2009. Samples were taken from 2 location: Sepempang and Pengadah beach. The analysis methods use is identification of phytoplankton, frequency of presence phytoplankton and percentage volume of phytoplankton. Of ten species found 19 genus and detritus, include two families : Chrysophyta and Chyanophyta. The highest frequency of precentage volume of food is 13,5% by *cymbrella* from Sepempang beach and 13,6% by *Cymbella* from Pengadah beach.

Keywords : frequency of presence phytoplankton, identification of phytoplankton, percentage volume of phytoplankton, sea cucumber, Natuna

1. INTRODUCTION

Sea cucumber (Holothuroidea) spread across the waters of the sea of Indonesia, from the West to the East. These animals are found almost all over the beach ranging from a shallow area up to 40 meters (aziz, dalaman 1997).

At this time catching sea cucumber do not have the kinds of economic value but also the kinds of cheap that initially was not a concern. The exploitation is often done intensively without looking at the type and size of the sea cucumber population very natural decrease. Exploited cause degradation of coral reef resources and habitats most threatened coastal areas, which in turn may accelerate the decline in the availability of sea cucumbers. Sea cucumber species extinction could happen, this resulted in the loss of genetic in nature. It is therefore necessary conservation efforts and his farmers to offset an excessive catcher (Sukmiwati, 2011).

Preservation efforts or the cultivation of sea cucumber is inseparable from the provision of a feed in sea cucumber in natural habitat and the abundance of food available, that plankton and detritus, so need to do research on the composition of the natural food of different kinds of sea cucumber, so knowable eventually natural food most widely found on the stomach sea cucumber and certainly most favored by sea cucumber to be cultivated further.

Research purposes is to know: 1). A kind of food edible, 2), Frequency presence organism is eaten and 3). Percentage volume of food.

The benefits of this research is to know what kind of food and frequency of presence and percentage volume of food in the stomach, then this information is an important aspect in an efforts of cultivating sea cucumber feeding in the form of natural feed availability.

2. MATERIALS AND METHODS

This research was carried out in the coastal waters of Sepempang and Pengadah Natuna Riau Islands, Plant Taxonomy Laboratory, Animal biology, Andalas University, Padang, and Oceanographic Research Centre laboratory LIPI Jakarta, from June 2009 until December 2010.



The materials used in this research was: sea cucumber, and chemicals used for the preservation of a sample of sea cucumber is 10% formalin. While the tools used include: a knife, a set of surgical instruments, tweezers, a measuring cup, erlemeyer, mikropipet, petri dish, hand tally counter, a Pasteur pipette binoculars, microscopes, glass cover, glass objects, brushes, tissue paper, syringes, paper labels, digital camera, stationery.

The methods used to determine the composition of the natural foods on different types of sea cucumber is using gastric analysis methods include: number of methods, the frequency of presence and percentage volume of food

Methods used to know composition food natural on many kinds of trepang is use analysis method gastric among other: method amount, frequency of presence and percentage volume of food

First of all taken samples which will be observed, examples taken at random (*random sampling*) simple 10 species of the entire species. Prior to observation under a microscope, dihomogenkan samples in advance by way of churning out slowly until blended. Then taken using a pipette 1 ml wide mouth then drops by drops were observed under the microscope. For each type of sea cucumber is taken three times, each one drops. For each drop will be observed as much as three times the magnification microscope viewing field of 10 x 10.

Identification kinds of food

The calculation the number of organisms that are observed with hand tally counter. The identification of the types of foods do to genus. The identification of the types of plankton using reference books; Sachlan (1982) and Sumich (1992).

To know qualitative type of organism anything eaten by trepang used method of frequency of presence with the formula as follows:

$$FK = \frac{\text{the number of gastric containing food a kind}}{\text{the whole number which contains the stomach}} \times 100 \% \quad (\text{Effendie, 2003})$$

Percentage volume of food

The calculatiom volume of food based on the percentage of the amount, with the assumption that the size of the diet is relatively the same, with the following formula:

$$\% \text{Volume} = \frac{\text{An individual quantity of any kind}}{\text{An individual quantity of all kinds}} \times 100\% \quad (\text{Effendie, 2003})$$

3. RESULT AND DISCUSSION

The identification food from 10 species trepang found 19 genus plankton and detritus included in the family two: namely chrysophyta and chyanopyhta. Chrysophyta comprises 17 genus and cyanophyata consisting of two genus, namely oscillatoria lyngbia and detritus

Of analysis gastric caped an individual quantity of food most numerous edible derived from chrysophyta containing pigment caratenoid, fucoxanthin chlorophyl and besides detritus.dinding his cell consisting of and cellulose hemi cellulose (a dictionary, of at 2004).

Table 1a. Food Variation, Frequency of presence of food (%) a quantity of food found in each trepang in waters of sepempang Natuna.

NO	Food Variation Famili Genus	Fk (%)	Species of sea cucumber					Individual quantity
			I	II	III	IV	V	
Chrysophyta								
1.	<i>Aulacoseira</i>	60	2	4	0	1	0	7
2.	<i>Coscinodiscus</i>	100	3	12	7	4	4	30
3.	<i>Bidulphia</i>	80	1	6	0	2	3	12
4.	<i>Chaetoceros</i>	100	5	17	6	9	7	44
5.	<i>Cocconeis</i>	100	21	23	19	15	14	92
6.	<i>Diploneis</i>	100	15	27	7	7	11	67
7.	<i>Navicula</i>	100	22	33	22	19	21	117
8.	<i>Cymbella</i>	100	28	28	22	25	27	130
9.	<i>Nitzchia</i>	100	26	25	21	21	26	119
10.	<i>Surirella</i>	60	4	0	0	7	6	17
11.	<i>Synedra</i>	60	5	2	0	3	0	10
12.	<i>Rhopalodia</i>	100	12	12	10	12	9	55
13.	<i>Pleurosigma</i>	100	19	16	12	19	16	82
14.	<i>Staroneis</i>	80	7	3	0	2	2	19
15.	<i>Frustulia</i>	40	3	2	0	0	0	5
16.	<i>Asterionella</i>	100	17	18	9	16	22	82
17.	<i>Eunotia</i>	100	4	7	9	4	7	31
Cyanophyta								
18.	<i>Oscillatoria</i>	60	0	8	0	1	2	11
19.	<i>Lyngbia</i>	20	0	0	0	4	0	4
20.	Detritus	100	18	22	21	16	18	95
Jumlah genus			18	18	12	19	16	
The total number of individuals			212	265	165	187	200	

Note:

- I = *H. atra*
- II = *H. edulis*
- III = *S. chloronotus*
- IV = *S. quadrifasciatus*
- V = *S. noctivagus*

From the table 1a. known that frequency of presence food is eaten by trepang derived from waters sepempang most numerous of the family chrysophyta, from 18 genus reached 100 % was amounting to 65 % (11 genus), presence 100 % means food of organisms plankton / the zooplankton or detritus in possibly find on all species trepang found in waters sepempang natuna kepulauan riau. High levels of food presence of 11 genus chrysopyta also caused by a factor of physics, chemical, habitats that could support growth the genus well. Besides high levels presence genus is caused the rate predatory aquatic organisms against genus the lower than to genus other. Abundance phytoplankton certain in a waters besides affected by various factors such as intensity of light, temperature, ph, oxygen, content CO2 free, depth, nutrients are also factors of prey (Arinardi dkk, 1996). From the results of the analysis of the stomach, the number of individuals the most widely found is on a sea cucumber *H. edulis* which 261 individuals consisting of 18 genera (Table 1a). The number of individuals at most food found in the stomach derived from sea cucumber Sepempang is a species of the genus *Cymbella*. 130 individuals.

Table 1a. Food Variation, Frequency of presence of food (%) a quantity of food found in each trepan in waters of Pengadah Natuna

NO.	Food Variation Famili Genus	Fk (%)	Spesies Of Teripang						Individual quantity
			I	II	III	IV	V	VI	
Chrysophyta									
1.	<i>Aulacoseira</i>	83,3	5	0	2	3	6	3	19
2.	<i>Coscinodiscus</i>	100	7	3	5	5	2	6	28
3.	<i>Bidulphia</i>	50	1	0	0	0	8	3	12
4.	<i>Chaetoceros</i>	100	8	12	16	7	14	17	74
5.	<i>Cocconeis</i>	100	26	15	11	13	27	25	117
6.	<i>Diploneis</i>	100	20	8	14	22	12	34	110
7.	<i>Navicula</i>	100	27	21	19	28	29	24	148
8.	<i>Cymbella</i>	100	31	16	13	25	24	40	149
9.	<i>Nitzchia</i>	100	29	11	17	19	15	24	115
10.	<i>Surirella</i>	83,3	4	2	6	0	11	16	39
11.	<i>Synedra</i>	50	5	0	3	0	0	2	10
12.	<i>Rhopalodia</i>	100	14	10	8	16	13	18	79
13.	<i>Pleurosigma</i>	100	22	17	18	9	18	21	105
14.	<i>Staroneis</i>	83,3	8	2	0	6	8	8	32
15.	<i>Frustulia</i>	66,6	3	0	0	2	5	3	13
16.	<i>Asterionella</i>	100	17	15	21	15	17	20	105
17.	<i>Eunotia</i>	100	4	2	2	3	5	6	22
Cyanophyta									
18.	<i>Oscillatoria</i>	50	0	2	2	0	0	5	9
19.	<i>Lyngbia</i>	66,6	0	2	1	0	3	2	8
20.	Detritus	100	19	17	29	25	31	17	138
Jumlah genus			18	16	17	15	18	20	
The total number of individuals			250	155	187	198	248	294	

Note: = *H. atra*, II = *H. Fuscocinerea*, III = *A. Lecanora*, IV = *B. Marmorata*, V = *P. Graeffei*, VI = *S. vastus*

From the table 1b, known quantity of food that is eaten trepan derived from perairan pengadah most is the family chrysophyta genus, from 17 is reached 100 % to 65 % (11 genus)

The frequency of the presence of detritus achieved the 100%, the frequency of the presence of 100% means the food is plankton or zooplankton and detritus found in all species of sea cucumber found in the waters of the Natuna Islands of Riau Pengadah. The number of individual foods that are found in the stomach derived from the waters of Pengadah the most from Chrysophyta namely; *Cymbella* 149 individuals (table 1b).

Aquatic organisms have a temperature range for growth. The algae of famil Cyanopyhta range can be tolerant of higher temperatures above 30oC (Effendi, 2003). Based on the results of temperature measurement for temperature ranges from research 28 - 29oC (table 3) Natuna waters can say that's good enough for the life aquatic organisms based on raw aquatic organisms water quality of life for the marine biota.

On a Table 1b 10 species are known from the stomach analysis performed sea cucumber *S vastus* the most numerous found the amount of food eaten, 20 genera and the total number of individual food eaten that 294 individuals (Table 1b). From the results of the analysis of the stomach can be drawn the conclusion that sea foods that dominate the sea cucumber which is found in the genus *Cymbella* Chrysophyta, *Navicula* and detritus.

The high level of the presence of chrysophyta in the gastric trepan pertaining to the high the availability of food in the waters, this natural the high level of the availability of eating this natural supported by several factors abiotik waters namely oxygen dissolved and brightness. Oxygen dissolved and the level of brightness perairan sepempang and pengadah

supporters so as to the growth of phytoplankton especially of the family chrysophyta 6,7-7,2 (table 3.) Oxygen dissolved derived from diffusi oxygen from the air into the water and the process of photosynthesis from the green plants.

Brightness describes the penetration of light into the waters. Indirectly the brightness can affect aquatic productivity. The higher the level of brightness in light penetration is growing, so the process of photosynthesis can occur in the deepest water layer.

The brightness of the waters are influenced directly by particles suspended in it, the less suspended particles, then the brightness of the water will be higher. When the brightness level higher then the process of photosynthesis to take place. The value of brightness in the Natuna waters during the study ranged from 7.00-9.50 m, it can be said the Natuna waters belong to the clear waters (Nessa and Rahman, 1997) which in principle supports the growth and development of the algae especially Crysophyta.

The measurement result level brightness and depth in waters pengadaha show the high brightness and increased depth. Precisely make waters pengadaha more availability food from chrysophyta compared with waters sepempang (1a table and 1b). Although increase depth but offset by level brightness a high so the intensity of light that went in waters remain perfect, so not prevent process of photosynthesis in waters. Result of measuring depth when research 26.83 10,00-12,65m table (3)

Next described by (Nybakken, 1992) that the lower, the penetration of light depth, as rising so that light is needed to the process of photosynthesis by aquatic herbs depopulate. Hence, indirectly depth will affect growth algae that live inside of them.

The speed of the flow will affect the type and nature of the organisms that live in the water. Speed of a great flow > 5 m/sec reduced the types of flora can stay so that only those types of inherent are resistant to flow and not subjected to physical damage (Welch, 1980). The results of measurements of the speed of the flow during the study ranged from 14.00-15.00 m/sec (table 3) thus the current speed in the Natuna waters support for the growth of phytoplankton. The speed of the flow is generally range from 12.00-20.00 cm/sec (Department of marine and fisheries, 2007)

Table 2a. Percentage volume of food on each species trepang in waters of sepempang Natuna riau islands

No	Foods (Genus)	Percentage volume of food on each spesies trepang in waters Sepempang Natuna Riu, Islands				
		I	II	III	IV	V
Chrysophyta						
1.	<i>Aulacoseira</i>	2,00	1,51	0,00	0,53	0,00
2.	<i>Coccinodiscus</i>	2,80	4,53	4,24	14	2,00
3.	<i>Bidulphia</i>	0,40	2,26	0,00	1,07	1,50
4.	<i>Chaetoceros</i>	3,20	6,42	3,64	4,81	3,50
5.	<i>Cocconeis</i>	10,40	8,68	11,52	8,02	7,00
6.	<i>Diploneis</i>	8,00	10,19	4,24	3,74	5,50
7.	<i>Navicula</i>	10,80	12,45	13,33	10,16	10,50
8.	<i>Cymbella</i>	12,40	10,57	13,33	13,37	13,50
9.	<i>Nitzchia</i>	11,60	9,43	12,72	11,23	13,00
10.	<i>Surirella</i>	1,60	0,00	0,00	3,74	3,00
11.	<i>Synedra</i>	2,00	0,75	0,00	1,60	0,00
12.	<i>Rhopalodia</i>	5,60	4,53	6,06	6,42	4,50
13.	<i>Pleurosigma</i>	8,80	6,04	7,27	10,16	8,00
14.	<i>Staroneis</i>	3,20	1,13	0,00	1,07	3,50
15.	<i>Frustulia</i>	1,20	0,75	0,00	0,00	0,00
16.	<i>Asterionella</i>	6,80	6,79	5,45	8,58	9,00
17.	<i>Eunotia</i>	1,60	2,64	5,45	2,14	3,50
Cyanophyta						
18.	<i>Oscillatoria</i>	0,00	3,02	0,00	0,53	1,00
19.	<i>Lyngbia</i>	0,00	0,00	0,00	2,14	0,00
20.	Detritus	7,60	8,30	12,73	8,56	9,00
Total		100	100	100	100	100

Note : I = *H. Atra*, II = *H.edulis*, III = *S.chloronotus*, IV= *S.quadrifasciatus*, V= *S. noctivagus*

On a table 2a, known that the number of percentage volume of food the highest in the gastric trepang be found on food from chrysophyta namely cymbella (13,50 %) on trepang *S. Noctivagus*.

From the results of the analysis of the percentage of the volume of food can be concluded that the percentage of the volume of food that includes 20 genus found on trepang *S. vastus*. According to Bakus (1973), sea cucumber generally make use of organic materials and detritus disubstratnya. Lawrence (1987) says of food/feed sea cucumber at consists of the content of organic matter in the sand and a wide range of biota found in sand such as diatoms, Protozoa, algae, Polichaeta filament, Copepods, Foraminifera, radiolaria, and sand particles and particles of crushed coral and Mollusc shells. In addition, Sea also feed on plankton, organic matter on corals, small Crustaceans and Polychaeta (Macne et al., 1958 in Bakus, 1973).

According to bakus (1973), Nessa and Rahman (1987) that trepang besides spatially deposit feeder also is poliphagia and ate up all that they found basic waters as detritus, sand particles ,coral , broken down diatomic bentik, algæ green, algæ blue and the dead on the surface of coral, red algae, copepoda and gastropod

Table 2a. Percentage volume of food on each species trepang in waters of Pengadah Natuna Riau Islands

No	Foods (Genus)	Percentage volume of food each species trepang in waters Pengadah Natuna Riau Island					
		I	II	III	IV	V	VI
Chrysophyta							
1.	<i>Aulacoseira</i>	2,00	0,00	1,07	1,52	2,42	1,02
2.	<i>Coscinodiscus</i>	2,80	1,94	2,67	2,53	0,81	2,04
3	<i>Bidulphia</i>	0,40	0,00	0,00	0,00	3,23	1,02
4.	<i>Chaetoceros</i>	3,20	7,74	8,56	3,54	5,65	5,78
5.	<i>Cocconeis</i>	10,40	9,68	5,88	6,57	10,89	8,50
6.	<i>Diploneis</i>	8,00	5,16	7,49	11,11	4,84	11,56
7.	<i>Navicula</i>	10,80	13,55	10,16	14,14	11,69	8,16
8.	<i>Cymbella</i>	12,40	10,32	6,95	12,63	9,68	13,60
9.	<i>Nitzschia</i>	11,60	7,10	9,09	9,60	6,05	8,16
10.	<i>Suirella</i>	1,60	1,29	3,21	0,00	4,44	5,44
11.	<i>Synedra</i>	2,00	0,00	1,60	0,00	0,00	0,68
12.	<i>Rhopalodia</i>	5,60	6,45	4,28	8,08	5,24	5,78
13.	<i>Pleurosigma</i>	8,80	10,97	9,63	4,55	7,26	7,14
14.	<i>Staroneis</i>	3,20	1,29	0,00	3,03	3,23	2,38
15.	<i>Frustulia</i>	1,20	0,00	0,00	1,01	2,02	1,02
16.	<i>Asterionella</i>	6,80	9,68	11,23	7,58	6,85	6,80
17.	<i>Eunotia</i>	1,60	1,29	1,07	1,52	2,02	2,04
Cyanophyta							
18.	<i>Oscillatoria</i>	0,00	1,29	1,07	0,00	0,00	1,70
19.	<i>Lyngbia</i>	0,00	1,29	0,53	0,00	1,21	0,68
20.	Detritus	7,60	10,97	15,51	12,63	12,50	5,78
	Total	100	100	100	100	100	100

Note: I= *H. Atra*, II= *H. Fuscocinerea*, III = *A. Lecanora*, IV= *B. marmorata*, V= *P. Graeffei*, VI= *S. vastus*

On a table 2b, known that the number of percentage volume of food the highest in the gastric trepang be found on food from chrysophyta namely cymbella (13,60 %) on trepang *S. vastus*

Analysis of the results can be concluded that the percentage of volume of food slightest found in the gastric trepang *s.vastus*, in other words all kinds of food that is found in the gastric various species of trepang, found in the gastric *S.vastus*, means '*S.vastus* the genus plankton feeding on all that is in the waters where trepang derived.

Table 3. Physical and chemical factors in the Natuna waters of Riau Islands

Parameter	Locations	
	Sepempang	Pengadah
Temperature (°C)	28,60 - 29,80	28,40 - 29,30
Salinity (‰)	28,30 - 32,29	27,90 - 31,20
pH (mg/l)	6,60 - 7,50	6,75 - 7,90
Oxygen dissolved (mg/l)	6,70 - 6,93	6,85 - 7,18
Brightness (m)	7,00 - 7,50	9,00 - 9,50
Depths(m)	8,00 - 9,50	10,00 -10,65
Current Flow cm/dtk)	14,00 - 15,00	14,00 -14,50

4. CONCLUSION

1. The identification food from 10 species trepang found 19 genus plankton and detritus included in the family two: namely chrysophyta and chyanopyhta. Chrysophyta comprises 17 genus and cyanophyata consisting of two genus, namely oscillatoria lyngbia.
2. Frequency of presence food is eaten by trepang derived from sepempang and pengadah highest is detritus reach 100 %.
3. An individual quantity of food that mostly found in the gastric trepang derived from waters sepempang and pengadah of chrysophyta namely genus cymbella, with total 130 and 149 individuals.
4. The number percentage volume of food the highest in the gastric trepang derived from sepempang and pengadah of chrysophyta namely cymbella (13,5 %) on trepang *S. nogtivagus* and (13,6%) on trepang *S.vastus*.

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