The Potential of Nereis sp. (Polychaete) as Prawn Feed at the Coastal Farming of Jeruklegi, Cilacap

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IOP Conference Series: Earth and Environmental Science

PAPER · OPEN ACCESS

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To cite this article: E S Wibowo *et al* 2020 *IOP Conf. Ser.: Earth Environ. Sci.* **550** 012030

The Potential of *Nereis sp*. (Polychaete) as Prawn Feed at the Coastal Farming of Jeruklegi, Cilacap

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Abstract. *Nereis* sp. (Polychaete) belongs to the Nereidae family that lives as benthic organisms in estuarine. The high level of amino acid and unsaturated fatty acid in *Nereis* sp. is potentially used as a nutrient in prawn feed. These compositions increase the quality of prawn gametes and larvae. However, there is still less information about the nutrient composition of *Nereis* sp. in the Jeruklegi area. Therefore, a study about nutrient composition (chemical composition) of *Nereis* sp. in this area was conducted to provide necessary information for the *Nereis* sp. culture in the future. This study used a survey method, and sampling was conducted in four stations with three replications at each three-sampling point in each station. The result showed no significant differences in protein and fat composition of *Nereis* sp. among stations. The protein contents ranging from 42.06 to 51.68%, and fat content range from 12.93 to 22%. The high content of both protein and lipid are reliable to fulfill the requirements in prawn farming. Therefore, *Nereis* sp. from Jeruklegi has a high potential to be utilized as a new food resource on prawn farming.

1. Introduction

Nereis sp. (Polychaete) has a specific feature of many chaetae on its parapodia [1]. *Nereis* sp. commonly lives in the tidal or estuarine areas. *Nereis* sp and other Polychates are plenty found on the Northern Java beach [2]. *Nereis* sp is one of the natural feeds that can increase the shrimp and fish egg production. The need of *Nereis* sp. as feed recently obtained through direct capture from the wild (wild capture). This method of capture can threaten the population and cause overall habitat destruction.

The study of *Nereis* sp. as potential feed has been done on the northern coast of Java, such as coastal farming in Randusanga and Pengadaran, Brebes, Central Java [3]. Another study was also conducted in Kwanyar coastal area [4], Bangkalan [5]. However, lacked study about the potential of *Nereis* sp in the southern coastal area, while a limited study was performed about Nereis sp abundance in those areas. Area of Jeruklegi, Cilacap is one of the mangrove areas in southern Java and has grown as a fish and prawn farming area. There were some biodiversity potentials of the Jeruklegi area, including *Nereis* sp.; thus, the study of the nutrition or chemical composition of *Nereis* sp and organic composition of the area needs to be evaluated. This study will provide essential information for sustainable *Nereis* sp culture to support the demand of natural feed in prawn farming and to reduce dependency on nature.

2. Methods

2.1. Material and Chemicals

This study used transect, sample box, plastic bag, microscope, object-glass, cover glass, cavity slide, capillary pipe, Petri dish, *Nereis* sp., 70% ethanol, and ice.

2.2. Study site
This study was conducted on the coastal farming areas in Jeruklegi, Cilacap, and Animal Physiology Laboratory, Biology Faculty, Jenderal Soedirman University, Purwokerto.

2.3. Sampling design
This study used a survey method. Samplings were done at three sampling points in four stations with three replications every two weeks. *Nereis* sp. samples were collected during low tide on 1x1m2 transect. *Nereis* sp. samples from each transect were counted and were kept in a labeled plastic bag. The samples were examined for their biological characteristics in Animal Physiology Laboratory, Biology Faculty of Jenderal Soedirman University. The observed characters were the total number of segments, body weight, sex, and gonad maturity.

2.4. Chemical composition of Nereis sp. body
The chemical composition of *Nereis* sp. was estimated using proximate analysis. The method is as follows. The total wet weight of *Nereis* sp. was measured. Afterward, the samples were dried at 80°C until a constant weight was reached. The dried samples were ground and kept at room temperature for a further macromolecule composition test based on the available literature [6]. The parameters were water, furnace, protein, lipid, and crude fiber content.

2.5. Substrate organic compound
The substrate's organic compounds were estimated with the titrimetric method, as explained in the available reference [7].

2.6. Data analysis
The data about the total number of body segments, body weight, sex ratio, and water quality were analyzed statistically using analysis of variance (ANOVA) with a significance level of 95%.

3. Results

The chemical composition of *the Nereis* sp. body obtained from Jeruklegi coastal farming, Cilacap, is presented in Table 1. The result showed that protein content ranged from 42.06-51.68%, and fat content ranged from 12.93-22.00%.

Protein and lipid content of *Nereis* sp. among stations had no significant difference ($p>0.05$). The data of organic material compounds within the station substrate were shown in Table 2.

Table 1. The chemical component of *Nereis* sp. obtained from Jeruklegi coastal farming, Cilacap

Sample Code	water %	DW%	Protein (%)	Lipid (%)	CF (%)	Furnace (%)	NNEM (%)
Station 1	12.20	87.80	51.68	18.86	5.85	22.56	1.05
	12.21	87.79	51.13	18.25	7.49	21.79	1.35
	3.91	96.09	43.31	6.89	5.31	34.38	10.11
Average	9.44	90.56	48.71	14.67	6.22	26.24	4.17
Station 2	6.48	93.52	50.26	13.15	5.73	24.77	6.09
	6.00	94.00	50.89	12.93	6.49	25.93	3.77
	5.31	94.69	54.52	9.93	2.38	24.66	8.52
Average	5.93	94.07	51.89	12.00	4.86	25.12	6.13
Station 3	13.63	86.37	42.54	19.37	7.47	25.95	4.67
	12.39	87.61	42.35	18.54	6.67	26.45	5.99
	5.54	94.46	57.71	10.52	2.56	20.41	8.81
Average	10.52	89.48	47.53	16.14	5.56	24.27	6.49

Station 4	15.02	84.98	42.67	22.00	7.78	23.95	3.61
	13.33	86.67	42.06	20.16	7.41	24.52	5.85
	5.55	94.45	57.89	10.83	2.23	19.96	9.09
Average	11.30	88.70	47.54	17.66	5.81	22.81	6.18

DW: Dry Weight
CF: Crude Fibre
NNEM: Non-Nitrogen Extract Matter

Table 2. Organic compound on the substrate of the study site

Station	Organic Carbon (%)	Organic compound (%)
1	7.06	13.11
2	4.74	8.17
3	4.64	8.01
4	8.63	14.87

4. Discussion

4.1.Organic and inorganic component of Nereis sp. body

Analysis of variance proved that no significant difference in the protein and fat composition of the *Nereis* sp. was observed among the stations. It assumed because all station has similar organic compounds. This study's result was similar to the composition of *Nereis* sp from Brebes [8] that has 52.26% of protein and 29.83% of lipid. The protein composition of *Nereis* sp. from Jeruklegi was higher than do in soy powder and water plant powder *Lemna gibba*, which has 41% protein, respectively [9]. Therefore, the protein content of 42.06 up to 51.68% and lipid content of 12.93 – 22.00% showed that *Nereis* sp from the Jeruklegi area could be used as the potential substitution of fish protein powder in prawn feed ingredients.

The utilization of *Nereis* sp. as an ingredient of prawn feed has been reported in a previous study [10][8] on freshwater prawn and giant tiger prawn. It was further explained that protein and lipid content of *Nereis* worm could fulfill the need of nutrition of various prawn species [4]. Nutrition composition and content of *Nereis* sp. in prawn feed might increase the growth and survival rate of prawn and fish. The study from [11] prawns that were feed with polychaete produced better quality eggs compared to prawns that were fed with pellets.

The protein composition of 42.06% to 51.68% can fulfill the protein requirement of crab and prawn, as stated in the study by [12], the protein requirements of mangrove crab were 34 – 51%. It has also been stated by [13] that Crustacean has the optimum protein requirement of 40%. According to [4], low protein content in the feed could reduce the calcium composition in the Crustacean exoskeleton. As a consequence, it might interfere with shrimp growth and development.

The lipid content range from 12.93% to 22.00% was high enough to fulfill the nutritional requirement of Crustacean. The previous study from [14] proved that lipid content of 2 up to 10% in feed leads to better development of freshwater prawn. Juvenile crab also needed 5.3 to 13.8% of fat for better growth.

4.2. Organic compound of the substrate

The organic compounds of the substrates were shown in Table 2. The value indicated that the substrate could be placed in the category of high – very high. It was in line with the standard provided by [15] that soil can be classified based on their organic chemical as follow; extremely low (<1.00% C), low (1.00 – 2.00% C), medium (2.01 – 3.00% C), high (3.01 – 5.00% C), extremely high (>5.00% C). The obtained value of organic compounds in the substrates indicated that the substrates are still providing a reliable environment to support the life of *Nereis* sp.

The organic content of the substrate is caused by organic material decomposition [16]. The process provides reliable content of organic material in the substrate, which might support organismal life. Based

on the study [17], *Nereis* sp. in mature could live in the substrate with a TOC level of 1.72 – 3.30%. Meanwhile, Nereid Polychaete in the intertidal zone of estuarine and brackish water live in the sediment with medium up to high organic composition [18]. That sediment substrate contained more organic materials [16]. Those materials were used by benthic organisms, including Polychaete, at the bottom of the water. Further, according to [19], Polychaete could absorb dissolved organic materials. Therefore a high population of polychaete might be found in the site with high organic compounds.

Nereis sp. is a benthic organism; thus, the existence is strongly related to the availability of feed source, or the organic compounds in the substrate. The existence of macrobenthos was affected by the organic content of the substrate. However, the organic content of the substrate that exceeded the threshold is considered as pollutants [20]. The availability of organic compounds may lead to enormous animal diversity.

5. Conclusion

This study showed that *Nereis* sp. in the Jeruklegi coastal farming area, Cilacap had protein content ranges from 42.06 – 51.68% of protein, and lipid content ranged from 12.93 – 22.00%. Thus, it was potentially utilized as a prawn feed to fulfill the protein and lipid requirements in prawn farming.

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