Inventory and prevalence of ectoparasites Octolasmis sp. in the mangrove crab (Scylla tranquebarica) in Lubuk Kertang, Langkat

E Yusni* and F A Haq

Management of Aquatic Resources, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Sumatera Utara, Indonesia.

E-mail: *eriyusni@hotmail.com

Abstract. Mangrove crabs (Scylla tranquebarica) are one of the fisheries commodities with high economic value. However, there are several obstacles in the process of developing crab culture, such as parasitic infections. The presence of parasites can reduce production in crab culture, one of which is the parasite Octolasmis sp. The purpose of this study was to identify Octolasmis parasites that infect mangrove crabs and knowing the prevalence rate of the parasite Octolasmis sp. on mangrove crabs in Lubuk Kertang, Langkat. This research used exploratory method, while the sampling technique used in sampling was the random sampling method. Crab identified as many as 15 crabs. The results showed that the type Octolasmis sp. identified to attack mangrove crabs in Lubuk Kertang, Langkat are Octolasmis cor and Octolasmis angulata. The prevalence rate of the Octolasmis parasite was based on the number of parasites found, the Octolasmis cor parasite is 93.3% and the number of O. angulata is 53.3%. Based on the prevalence and intensity of octolasmis found more octolasmis cor than octolasmis angulata.

1. Introduction
Mangrove crab (Scylla sp.) is a brackish water fishery commodity that has important economic value. Demand for crab commodities continues to increase, both in the domestic and foreign markets. Mangrove crabs are widely known as good food ingredients and high protein [1].

Mangrove crabs live in brackish water rivers, in mangrove forest and in ponds One of the potential mangrove ecosystems as mangrove crab habitat in Langkat Regency is in the Village of Lubuk Kertang, District of West Berandan because it has a wide mangrove area. In Lubuk Kertang Village, there is still a silvofishery pond located in a mangrove rehabilitation area managed by the local community.

The increasing demand should be offset by an increase in the business of mangrove crab farming. One of the unresolved obstacles in the maintenance of mangrove crabs is the problem of pests and diseases that can cause losses due to a decrease in production value. One of the pathogens that causes disease is parasites. Parasites that infect mangrove crabs generally come from the type of ectoparasites [2].

One of the parasites that can harm crab farmers is Octolasmis sp. This parasite is often found attached to the surface and crevices of mangrove crabs. This condition results in disruption of the process of respiration and physiological disorders due to reduction in the surface of the crab’s gills. According to [3], Octolasmis sp. which is thought to be a potential threat to the development of mangrove crabs,
so that they can have a negative impact on the economic income of the community, especially mangrove crab farmers.

The objectives of the present study were (1) to identify Octolasmis parasites that infect mangrove crabs and (2) knowing the prevalence rate of the parasite *Octolasmis* sp. which infects mangrove crabs in the pond of Lubuk Kertang Village, West Berandan, Langkat.

2. Materials and methods

2.1 Time and place of research
This research was conducted in July 2019. Sampling conducted in Lubuk Kertang, West Berandan, Langkat. Octolasmis ectoparasite investigation are carried out in the Aquatic Environmental Laboratory, Major of Aquatic Resource Management, Universitas Sumatera Utara.

2.2 Tools and materials
Equipment used includes surgical instruments, cool box, ruler, petri discs, slide glass, cover glass, microscope, drop pipettes, paper labels, trays, rulers, callipers, refractometer, DO meter, pH meter, thermometer, camera and stationery.

The ingredients used are mangrove crabs (*Scylla tranquebarica*). Other ingredients are physiological saline solution, formalin 3%, KOH 10%, alcohol 35%, 50%, 70%, 80%, 90% and absolute alcohols, xylol and entellan.

2.3 Research procedure

2.3.1 Water quality data collection. Data collection on water quality in silvofishery ponds in Lubuk Kertang Village, West Berandan, Langkat was conducted simultaneously with crab sampling, which included measurements of physical parameters namely temperature and chemical parameters namely DO, salinity and pH.

2.3.2 Sampling. Mangrove crab samples were obtained by purchasing it as many as 15 from silvofishery ponds, the mangrove crab chosen were those whose conditions were still live and of different sizes. The samples are put into a cool box and taken to the laboratory to be examined for ectoparasitic Octolasmis that infect it.

2.3.3 Ectoparasite examination. The mangrove crab is measured in length and weight. Examination of ectoparasite octolasmis by observing crab gills directly. The parasite that has been found is then preserved. the first step in preservation of the parasitic Octolasmis is fixation with formalin 3%. Then immersed in a 10% KOH solution for 10 minutes. After that, dehydrate the specimen with multilevel alcohol for 1 minute each. Then, the specimen *Octolasmis* sp. parasite can be identified morphologically based on [4] and [5], namely by observing the number of capitular, scutum, tergum and carina as determinants of species using a microscope.

2.4 Data analysis. The data obtained included the type of parasite, prevalence and intensity of parasitic attacks analysed descriptively. The prevalence (incidence) is calculated using Eq. 1 according to [6]:

\[
\text{Prevalence} = \frac{\sum \text{Fish infected}}{\sum \text{Fish examined}} \times 100\%
\]  

and the intensity is calculated using Eq. 2 according to [7]:

\[
\text{Intensity} = \frac{\sum \text{Parasite found}}{\sum \text{Fish infected}}
\]
Parasite intensity calculation results included in the category of parasite intensity based on Table 1. While the relationship between the prevalence of parasites with environmental parameters were analysed descriptively based on Table 2.

Table 1. Category of prevalence of ectoparasites

| Characteristics      | Percentage | Information                                      |
|----------------------|------------|--------------------------------------------------|
| High Prevalence      | > 65%      | Parasites can cause stress until death occurs on the host |
| Medium Prevalence    | 30-65%     | Parasites can cause stress, but cannot cause death to the host |
| Low Prevalence       | 1-30%      | Parasites cannot cause stress and death to the host |

Source: Schmidt, 2008

Table 2. Intensity attack parasite category

| Intensity (ind/h) | Information      |
|-------------------|------------------|
| <1                | Very low         |
| 1 – 5             | Low              |
| 6 – 55            | Medium           |
| 51 – 100          | Severe           |
| >100              | Very severe      |
| >1000             | Super infection  |

Source: Williams and Williams, 1996

3. Results and discussion

3.1 Parasites inventory

Based on the identification of the morphological characteristics of the parasite *Octolasmis* sp. in mangrove crabs (*S. tranquebarica*) during the study, 2 species of Octolasmis parasite were found in Lubuk Kertang, West Berandan, Langkat. The parasites found in the mangrove crab gills are *Octolasmis cor* and *Octolasmis angulata* that presented in Figure 1a and Figure 2a.

Figure 1a. *Octolasmis cor* parasite results of the study (40x magnification); Note: 1) Tergum, 2) Carina, 3) Scutum

Figure 1b. *Octolasmis cor* parasite (Jeffries et al. 2005)
Octolasmis ectoparasites found on mud crab in Lubuk Kertang are *O. cor* and *O. angulata*. This result is evidenced by the morphological characteristics of each species, such as the number of branches; scutum, tergum, and carina are currently on the parasite. In *Octolasmis cor* the number of scutum branches consists of 2 branches and 1 carina, the shape of the scutum branches is somewhat widened, according to Figure 1a. While *O. angulata* has the same number of scutum and carina branches as *O. cor* i.e. 2 scutum branches and 1 carina (Figure 4a) but the shape of the scutum branch tip is rather tapered. Both types of Octolasmis were also reported by [2] who discovered 2 types of Octolasmis namely *O. angulata* and *O. cor* in Malaysia.

The results of the examination of 15 samples of mangrove crab obtained the intensity level of the Octolasmis parasite that infects mangrove crabs in Lubuk Kertang with a value of 7 ind/h for *O. cor* species and 2 ind/h for *O. angulata* species. The results of Intensity and prevalence of Octolasmis ectoparasite are presented in Table 3.

**Table 3. Intensity and prevalence of Octolasmis ectoparasite**

| Parasite found | Total of Parasites | Total of Sample Infected | Total of Sample Examined | Intensity (ind/h) | Prevalence (%) |
|----------------|--------------------|--------------------------|--------------------------|-------------------|----------------|
| *O. cor*       | 95                 | 14                       | 15                       | 7                 | 93.33          |
| *O. angulata*  | 17                 | 8                        | 15                       | 2                 | 53.33          |

Based on the information in Table 3, it is known that Octolamsis parasitic with the highest prevalence is *Octolasmis cor* with a prevalence rate of 93.3% in the gill as many as 95 parasites that attacked 14 mangrove crabs. That value is higher than *Octolasmis angulata* with a prevalence rate of 53.3% in the gill as many as 17 parasites that attacked 8 mangrove crabs.

Based on the results of calculations, it is known that the intensity level of the Octolasmis parasite that infects mangrove crabs in Lubuk Kertang is 7 ind/h for *O. cor* species and 2 ind/h for *O. angulata* species. Based on the category of ectoparasites intensity according to [8], the intensity values of 1-5 are included in the mild category. High intensity can endanger the survival of mangrove crabs because of the increased surface area of the gills that will be covered by this parasite, while the low intensity does not have a very large influence on the process of respiration so that it has not been a major threat to the survival of mangrove crabs.

The prevalence rate of *O. cor* parasites that infest mangrove crabs in Lubuk Kertang is 93.3% while the prevalence of *O. angulata* parasites that infest mangrove crabs in Lubuk Kertang is 53.3%. The highest prevalence value is owned by *O. cor* which is 93.3% which means that 93.3% of the population of mangrove crabs in Lubuk Kertang is suspected of being infested by the *O. cor* parasite. The lowest
The prevalence value is owned by *O. angulata* which is 53.3% which means that 53.3% of the population of mangrove crabs in Lubuk Kertang. The prevalence value of *Octolasmis cor* in this study is included in the high prevalence category while the prevalence value of *Octolasmis angulata* is included in the moderate prevalence category.

According to [8], the prevalence value of 30-65% is included in the category of moderate prevalence, which means that parasites can cause stress, but cannot occur death at the host. While the prevalence value of > 65% is included in the high prevalence category which means that the parasite can cause stress until death occurs on the host.

The existence of *Octolasmis cor* which has a higher intensity and prevalence value than *Octolasmis angulata*. The same thing happened in the observation of [9] of male and female mangrove crabs in Semarang Ponds, where it was reported that the highest prevalence value was owned by *O. cor*, which was 54% in female crabs, in male crabs by 40% while the value of the lowest prevalence is owned by *O. angulata* that is equal to 52% in female crabs, in male crabs by 38%.

### 3.2 Water quality measurement

Water quality measurements are carried out at each crab sampling. The measured water quality parameters consist of temperature, dissolved oxygen (DO), pH and salinity. The results of water quality measurements are presented in Table 4.

| Water Quality Parameters | Measurement Results | Water Quality Standard Range [10] |
|--------------------------|---------------------|----------------------------------|
| Temperature              | 33 – 34.4 °C        | 25 - 35 °C                       |
| DO                       | 4 – 5.9 mg/L        | > 5 mg/L                         |
| pH                       | 6.5 – 7.37          | 7.5 – 8.5                        |
| Salinity                 | 11 - 20 ppt         | 10 - 25 ppt                      |

Based on Table 4, it is known that the water quality in Lubuk Kertang is in a fairly good condition for the survival of mangrove crabs, seen from several parameters that are in accordance with the reference quality standards for water quality for the survival of mangrove crabs.

Water quality measurements are performed every crab sampling with parameters measured include temperature, DO, pH and salinity. The results of temperature measurements range from 33 to 34.4 °C. DO measurement results range from 4 to 5.9 mg/l. Salinity measurement results range from 11-20 ppt while pH values range from 6.5 to 7.37. According to [10] the appropriate temperature ranges for the life of mangrove crabs ranges from 25 - 35 °C, DO values > 5 mg/L, pH values ranging from 7.5 - 8.5 and salinity values range from 10 - 25 ppt. Based on reference to the quality standards of water quality for the survival of mangrove chips, it is known that the water conditions in Lubuk Kertang are in good condition.

The condition of the waters in Lubuk Kertang which is included in good condition, but does not rule out the possibility of developing Octolasmis parasites in these waters. The octolasmis parasite is known to be a parasite that does not require an intermediate host [11] so that it can directly attack the mangrove crabs by entering through the respiratory cavity and directly attacking the internal gill organs.

The difference in prevalence between the two species does not only occur because *O. angulata* and *O. cor* distribute themselves. There are also several considerations such as temperature in the waters, because temperature is one of the factors that influence the infestation of a parasite. Each *Octolasmis* spp species has a different optimum temperature for development [3]. Based on the observation of [12] on the observation of the optimum temperature of *O. cor*, the results of these observations found that the optimum temperature of *O. cor* ranged from 28.4-30.8°C. The condition of the water temperature at the sampling location is thought to support the existence of *O. cor* than *O. angulata*.
4. Conclusion
The results obtained from this study indicate that the types of Octolasmis ectoparasites found in crabs in Lubuk Kertang are Octolasmis cor and Octolasmis angulata. From 15 mangrove crabs examined, a total of 112 parasites were found, namely from Octolasmis cor as many as 95 parasites and from Octolasmis angulata 17 parasites.

It is known that Octolasmis parasitic with the highest prevalence is Octolasmis cor with a prevalence rate of 93.3% in the gill as many as 95 parasites that attacked 14 mangrove crabs. Than Octolasmis angulata with a prevalence rate of 53.3% in the gill as many as 17 parasites that attacked 8 mangrove crabs. Based on the category of ectoparasites prevalence, the prevalence value of Octolasmis angulata is included in the low prevalence category, while Octolasmis cor is included in the high prevalence category.

References
[1] Burhanuddin and Hendrajat E A 2018 Pentokolan Kepiting Bakau Scylla tranquarica pada Substrat Berbeda [Fingerling Production of Mud Crab Scylla tranquarica in Different Substrates] Proceeding Simposium Nasional Kelautan dan Perikanan Universitas Hasanuddin [Proceedings of the National Symposium on Maritime Affairs and Fisheries V Universitas Hasanuddin Makassar]
[2] Mustaqin I, Julyantoro P G S and Sari A H W 2018 Identifikasi dan Predileksi Ektoparasit Kepiting Bakau (Scylla spp.) dari Ekosistem Mangrove Taman Hutan Raya (Tahura) Ngurah Rai, Bali [Identification and Predilection of Mangrove Crab Ectoparasites (Scylla spp.) from the Mangrove Ecosystem of the Taman Hutan Raya (Tahura) Ngurah Rai, Bali] Current Trends in Aquatic Science 1 pp 24-31
[3] Suherman S P 2013 Identifikasi Morfologi, Molekuler dan Tingkat Serangan Ektoparasit Octolasmis spp pada Kepiting Bakau Scylla spp di Perairan Sulawesi Selatan [Morphology, Molecular Identification and Infestation Level of Ectoparasite Octolasmis spp. on Mud crab Scylla spp. in South Sulawesi] MSc Thesis Universitas Hasanuddin Makassar
[4] Jeffries W B, Voris H K, Naiyanetr P, and Panha S 2005 Pedunculate Barnacles of the Symbiotic Genus Octolasmis Cirripedia: Thoracica: Poecilasmatidae from The Northern Gulf of Thailand The Natural History Journal of Chulalongkorn University 5 1 pp 9-13
[5] Ihwan M Z, Ikhwanuddin M, Wahidah W, Ambak M A and Marina H 2014 Present Distribution of Pedunculate Barnacle of Wild Mud Crab Scylla olivacea from Setiu Wetland, Terengganu Coastal Water, Malaysia Poultry Fisheries and Wildlife Sciences 2 2 pp 1-3 DOI: 10.4172/2375-446X.1000117
[6] Prayitno S B 1998 Prinsip - Prinsip Diagnosa Penyakit Ikan [Principles of Diagnosis of Fish Diseases] Universitas Diponegoro Semarang p 95
[7] Schmidt G D 2008 Essentials of Parasitology Fifteenth Edition New Delhi Universal Book Stall
[8] Williams E H and Williams L B 2017 Parasites of Offshore Big Game Fishes of Puerto Rico and The Western Atlantic, Puerto Rico Agris University of Puerto Rico 382 p
[9] Wardhani C K, Sarjito and Haditomo A H C 2018 Study Keberadaan Ektoparasit Octolasmis sp. pada Kepiting Bakau (Scylla serrata) Jantan dan Betina pada Pertambakan Semarang [Study of Ectoparasite Existence Octolasmis sp. on The Mud Crab (Scylla serrata) Males and Females in Semarang Ponds] Journal of Aquaculture Management and Technology 7 1 pp 38-45
[10] Shelley C and Lovatelli A 2011 Mud Crab Aquaculture a Practical Manual Rome Food and Agriculture Organization of The United Nations)
[11] Jeffries W B, Voris H K, Heil S P, Laurie C 2005 Life cycle stages of the lepadomorph barnacle, Octolamis cor, and methods for their laboratory culture [1995] Phuket Marine Biological Center Research Bulletin pp 29-35
[12] Jeffries W B, Voris H K and Yang C M 1985 Growth of Octolasmis cor (Aurivillius, 1892) on The Gills of Scylla Serrata (FORSKAL, 1755) Biological Bulletin 169 1 pp 291-96